The Energy and Resources Institute

The ROCKEFELLER FOUNDATION

STATE LEVEL ENGAGEMENT FOR MAINSTREAMING URBAN CLIMATE RESILIENCE POLICY

Goa and Uttarakhand

WORKING PAPER

July 2016

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Abbreviations

ACCCRN	Asian Cities Climate Change Resilient Network
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
AR5	Fifth Assessment Report
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CDP	City Development Plan
CPHEEO	Central Public Health and Environmental Engineering Organization
CRS	City Resilience Strategies
CTs	Census Towns
CWC	Central Water Commission
DDW	Department of Drinking Water
DEWATS	Decentralized Wastewater Treatment System
DSTE	Department of Science, Technology and Environment
ECBC	Energy Conservation Building Code
GEDA	Goa Energy Development Agency
GIS	Geographic Information System
GoI	Government of India
GoU	Government of Uttarakhand
GRIHA	Green Rating for Integrated Habitat Assessment
GSDMA	Goa State Disaster Management Authority
GSIDC	Goa State Infrastructure Development Corporation Ltd
GSUDA	Goa State Urban Development Agency
HRIDAY	National Heritage City Development and Augmentation Yojana
HSM	Hazardous Substances Management
HUDCO	Housing and Urban Development Corporation Limited
INR	Indian Rupee
JNNURM	Jawaharlal Nehru Urban Renewal Mission
LICI	Life Insurance Corporation of India
MFF	Multi Tranche Financing Facility
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MIS	Management Information Systems
MoEF	Ministry of Environment, Forest and Climate Change
MoHUPA	Ministry of Housing and Urban Poverty Alleviation
MoUD	Ministry of Urban Development
NCAOR	National Council of Antarctica and Ocean Research
NDMA	National Disaster Management Authority
NGOs	Non-Governmental Organizations

NIO	National Institute of Oceanography
NPO	National Partner Organizations
NUSP	National Urban Sanitation Policy
PHE	Public Health Engineering
PTCUL	Power Transmission Corporation of Uttrarakhand Ltd
PWD	Public Works Department
SADAs	Special Area Development Authorities
SAG	State Advisory Group
SDMA	State Disaster Management Authority
SIDGCL	Sewage & Infrastructure Development Corporation of Goa Ltd
SLR	Sea Level Rise
SPV	Special Purpose Vehicle
SSLBs	Standardized Service Level Benchmarks
SWMC	Solid Waste Management Cell
TCPO	Town and Country Planning Organization
TERI	The Energy and Resources Institute
TSO	The Stationery Office
UD	Urban Development
UDD	Urban Development Department
UDRP	Uttarakhand Disaster Recovery Project
UEAP	Uttarakhand Emergency Assistance Project
UEPPCB	Uttarakhand Environment Protection and Pollution Control Board
UHUDA	Uttarakhand Housing and Urban Development Authority
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
UJN	Uttarakhand Peyjal Nigam
UJS	Uttarakhand Jal Sansthan
ULBs	Urban Local Bodies
UP	Uttar Pradesh
UPCL	Uttarakhand Power Corporation Ltd
URDPFI	Urban and Regional Development and Plan Formulation and Implementation
UREDA	Uttarakhand Renewable Energy Development Agency
USIDCL	Uttarakhand State Infrastructure Development Corporation Ltd
UT	Union Territory
UUSDA	Uttarakhand Urban Sector Development Agency
UUSDIP	Uttarakhand Urban Sector Development Investment Program
WRD	Water Resources Department

Contents

Chapter 1

Introduction

Context

Climate change is one of the foremost emerging global challenges, the impacts of which are increasingly manifesting themselves through highly erratic instances of weather deviations and induced extreme events. While both urban and rural areas are vulnerable to climate change, its impacts on cities and towns are of particular concern due to high concentrations of people and infrastructure in these areas (TERI 2014). While urban centres in India are the new engines of economic growth, they are still grappling with issues, such as infrastructure deficits, inadequate basic service provision, clubbed with multiple climate hazards. Recent climate calamities and the resulting loss and damage have caused for a deeper look at the preparedness and adaptive capacity of the regions that are vulnerable to climate-induced disasters and extreme events The damage assessment figures for Hudhud cyclone in 2014 indicate a total loss of INR 90,000 crore ($20 billion) in Visakhapatnam. Similarly, the floods in Jammu and Kashmir, in September 2014, caused a total damage of INR 6,000 crore ($1 billion). The floods in Mumbai in the year 2015 caused a direct loss of about INR 550 crore (about $100 million) (TERI 2015b). These calamities are grim reminders of the need to factor in extreme events that are predicted to increase as a result of climate change. With meticulous planning, taking into account considerations of climate resilience, urban planners, and policymakers can address some of the issues and improve living conditions of the people. In this context, the Asian Cities Climate Change Resilient Network (ACCCRN), a nine-year initiative (2008–16), supported by the Rockefeller Foundation, has been instrumental in bringing forth the urban climate change resilience agenda to cities in Asia. In India, with ACCCRN's support, the cities of Surat, Indore, Gorakhpur, Guwahati, Bhubaneswar, Panaji, and Shimla, have developed and demonstrated effective processes and practices for addressing urban climate vulnerabilities using participatory planning as well as implementing targeted intervention projects (ACCCRN 2013). Other cities are already replicating the process and have come up with their own City Resilience Strategies (CRS). The ACCCRN experience, however, has revealed that due to lack of an enabling policy environment, institutional and financial arrangements, and statutory backing, all these cities are facing challenges in implementing the City Resilience Strategy in a comprehensive manner. The policy synthesis report prepared by TERI in Phase I (TERI 2011) and the policy briefs prepared by the different national partner organizations (NPO) to ACCCRN in India also highlight the importance of mainstreaming the climate change resilience agenda in urban planning processes and practice (ACCCRN 2013).

In India, urban development is a state subject as per the Constitution of India, and the state governments are empowered to take forward the urban climate change resilience agenda. It is within the powers and mandate of the state governments to enact laws and regulations, bring forth policies and guidelines, and set up institutions for planning and execution of matters pertaining to urban development. The sector-wise plan outlays and financial allocation for development and management of urban infrastructure and services is also carried out by the state governments. Funding for interventions and projects identified under centrally sponsored schemes also flow through the state governments. Under such a framework, it becomes imperative to engage with the state governments to bring about any reforms in the urban planning and development process to integrate climate resilience and also for up scaling and replication of initiatives such as those undertaken in ACCCRN cities.

Also, climate change concerns have not yet been factored into the recent and existing schemes related to urban development such as JNNURM, UIDSSMT, 100 Smart Cities, and AMRUT. There is a need for spelling

out the interrelation of improved planning and management of urban areas, access and quality of infrastructure and services, and climate resilience measures that include adaptation and mitigation measures at a policy level. This would not only steer the present and future course of urban planning and development processes but also help in interweaving these concerns into the state and central level schemes for urban areas. In light of the Smart City and AMRUT missions which will lead to intensive investment and development in urban areas, it is an opportune moment wherein climate resilient development can be integrated into the urban development and planning framework.

It is in this background that TERI undertook a research program for drawing up road maps for an urban resilience policy for two states in India—Goa and Uttarakhand. The program was initiated in 2014, with support from the Rockefeller Foundation, with an intention to build a positive interest and dialogue on the subject at the state level. This working paper is a result of TERI's two year-long engagement with the two states. It documents the processes and approaches adopted during this program and synthesizes the key findings.

Study Objectives

The state-level policy research and engagement was undertaken in two states: Goa and Uttarakhand, with the following objectives:

- Generating awareness and interest amongst state governments and state-level departments; and facilitating a dialogue to bring the agenda of urban climate change resilience in foreground
- Supporting state governments in identifying entry points and preparing a policy road map for mainstreaming climate resilience in cities within the states.

Broad Program Approach

TERI's program looks at policy and institutional barriers that restrict the city governments to bring in climate resilience as one of the development parameters. The objective of the program is to address capacity, institutional,

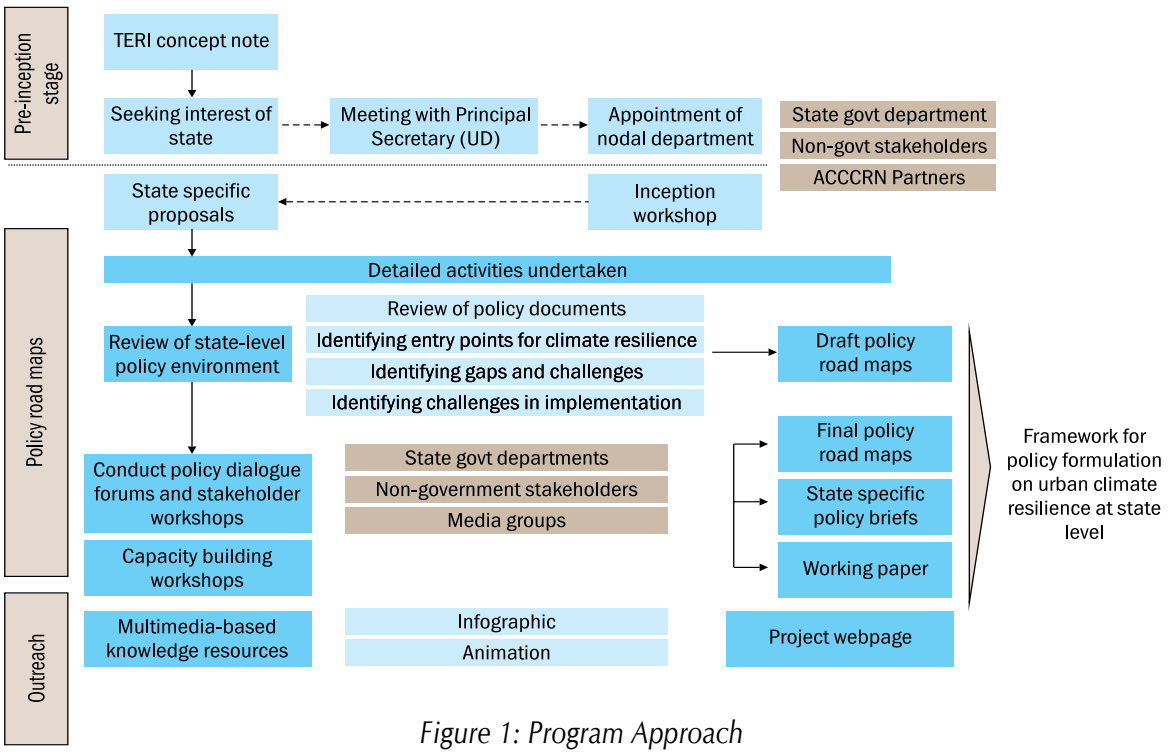


Figure 1: Program Approach

and regulatory barriers in responding to the impacts of climate change. The two-year long program undertook a policy review exercise which helped in identifying entry-points for mainstreaming the climate change resilience agenda in the State's purview and mandate, synergizing with the State's existing priorities, policies, and programs. Various government and non-government stakeholders were consulted at various stages of the study to come up with the most feasible and implementable road map for formulating a policy framework for urban climate resilience. Figure 1 gives a brief understanding of the approach and methodology of the program. This broad program approach was contextualized based on the requirements and recommendations of the respective state governments which were identified during the inception stage (Chapter 2).

Study areas

Goa

With a population of 1.45 million (Census 2011) and land area of 3,702 sq. km, Goa is India's smallest state. Although Goa has been a rural economy, traditionally, with a strong mining base, it now has a fast growing industrial sector. Demographics in Goa have witnessed a significant change in the last two decades, with high degrees of in-migration, both temporary, such as tourists and permanent like those moving in to pursue employment opportunities. More than half (62.5 per cent) of the State's population resides in urban areas, thus, making Goa a highly urbanized State. A number of rural settlements around the major towns as well as midlands have grown in size in terms of population as well as composition of the work force, thereby attaining the status of census towns (CTs). According to the Census of India 2011, there are 14 municipal towns, with 7 each in North and South Goa, and 30 CTs with 20 in North Goa and 10 in South Goa. It is observed that the bulk of the population resides in the four coastal talukas of Mormugao, Salcette, Bardez, and Tiswadi, giving rise to various regional imbalances and straining of the State's coastal resources such as land and water. Moreover, the population growth is skewed towards the coastal and urban regions of the State.

One of the major factors accounting for increased urbanization is the rise in the tourism sector which is one of the major economic activities in the State. The total tourist arrivals have more than doubled in the last decade (TERI 2015a). This urban and economic growth has resulted in an increasing pressure on the natural resources, ecosystems and environment. There are growing concerns on sustainability and emerging needs for alternative development pathways to meet the sustainability challenge. The uneven distribution of population, rapid urbanization, growing environmental pressures due to mining, tourism, industrial activity, degradation of forests and biodiversity, declining interest in agriculture, rising dumps of wastes, housing and construction activity, and energy security are major concerns for the State of Goa. Climate change and the resultant stress on Goa's coastal ecosystems due to sea level rise (SLR) and stress on rain-fed river systems pose additional threats. The draft State Action Plan for Climate Change has identified coastal erosion as one of the main issues arising owing to climate change. Panaji has been identified as one of the coastal cities vulnerable to flooding due to the predicted sea level rise and about 20 per cent of Goa's coastline has already been affected by erosion. Moreover, uncontrolled construction and growth in and around the ecologically sensitive *khazan* lands has affected the capacity of these wetlands to contain floods caused by sea water inundation, storm surges, and extreme weather events. Based on the projected sea level rise (SLR) scenarios and vulnerability assessment conducted for Panaji city, a large share of its key infrastructure assets, service networks, and ecologically sensitive areas including khazan lands, salt pans and creeks are likely to be affected due to climate change impacts like SLR and coastal flooding (TERI, 2015)

Uttarakhand

With a population of 10.08 million, a land area of 53,483 sq. km, and a density of 189 per sq. km. (Census 2011), Uttarakhand is a key tourist and religious destination. It is divided into two divisions—Kumaon and Garhwal, with six districts in the Kumaon division and seven districts in the Garhwal division. Urban areas in Uttarakhand consist of largely small to medium towns; some of which comprise large transitional/migratory populations and

geographically difficult and hilly terrain. Uttarakhand has an urban population of approximately 31 lakh. There are 72 urban local bodies (ULBs) in the State, as well as 9 cantonment boards. Urbanization and urban expansion in the State have largely been unplanned processes, resulting in typical issues such as the lack of civic amenities in proportion to the population density. Today, many urban areas in the State are heavily impacted upon by the transient population, comprising mainly pilgrims and tourists (Government of Uttarakhand 2014). According to the 2011 Census, Haridwar, Dehradun, and Udham Singh Nagar are the most populous districts, each of with a population of over one million. By district, the pattern of urbanization indicates that Dehradun district is most urbanized where more than half (55.2 per cent) of total population is concentrated in urban areas. It is followed by Haridwar (36.53 per cent), Udham Singh Nagar (34.75 per cent), and Nainital (34.19 per cent) districts (Jagdeep Kumar 2015). There are six towns falling under the category of Class I cities that collectively contribute nearly 45 per cent of the total urban population of the State, whereas six Class II cities contribute only 11 per cent of total urban population of the State. Nineteen towns fall under the category of Class III and contribute about 18 per cent of urban population.

Uttarakhand, with its fragile terrain, is also extremely prone to natural disasters induced by hydro-meteorological events. The history of disasters over the past 20 years shows that Uttarakhand is vulnerable to multiple hazards with an increasing frequency of occurrences of these events. The State is prone to cloudbursts, flash floods, landslides, dam bursts, avalanches, and cold waves, the impacts of which are aggravated due to its location in the seismic zone IV and V, which are the highest seismic risk zones of the country. Every year, Uttarakhand faces enormous losses during the monsoon season, due to rains, cloudbursts, flash floods, landslides, floods, hailstorms, and water logging events. During the monsoon period, from June to September Uttarakhand is extremely vulnerable to cloudbursts (Government of Uttarakhand, 2014). Perhaps, the worst disaster experienced in the State was the 2013 cloudburst. The Working Group II Report of the Fifth Assessment Report (AR5) of the IPCC points to an increasing trend in the frequency and severity of such weather extremes and climate-induced hazards with a high level of uncertainty associated with such extreme events (IPCC 2014).

Outcomes of the Study

The program focused on engagement and outreach with government and non-government stakeholders to bring about a discourse on 'urban resilience planning' and mobilize policy action at the state level. To this end, the study led to the following outcomes:

- Policy road maps for an urban climate resilience policy in Uttarakhand and Goa
- A comprehensive working paper focusing on the key processes and outcomes
- State-specific policy briefings, highlighting gaps, and requirements for mainstreaming urban climate resilience
- Multimedia-based knowledge resources—Infographic and animation video
- Project webpage for disseminating the outcomes and hosting the multimedia resources
- Social media engagement — polls and photography contest for youth

Chapter 2

Overview of the Approach Adopted for the Study

Methodology and Approach

The program approach was designed in a way wherein first, a broad methodology was outlined that eventually evolved during the process of stakeholder engagements to suit the context and the need of the two states. The following section will give a detailed discussion on the key activities undertaken at each stage.

Pre-Inception

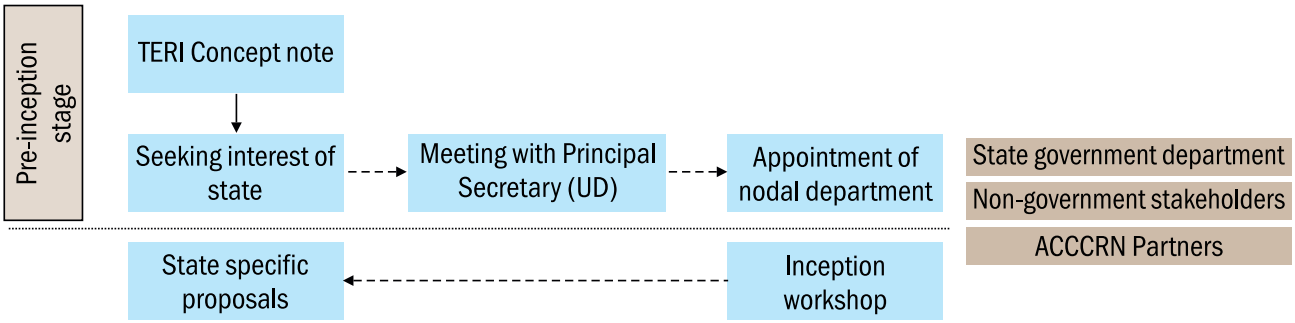


Figure 2: Pre-Inception Activities

Selection stage—seeking interest of state governments

As a first step, TERI approached multiple potential states to seek their willingness and interest to participate in the program which included the states where ACCCRN initiatives are being undertaken. States where action plans for climate change have been prepared were also approached, assuming a preliminary level of awareness and momentum on the subject. TERI also approached the state's where it already had a MoU/working relationship with the state government. Another criterion for selection was that the study should be a relevant exercise to the state as this factor will also drive the state's interest in the study. Based on these criteria, the following states were approached—Assam, Madhya Pradesh, Goa, Odisha, Rajasthan, Sikkim, and Uttarakhand, to seek their buy in and willingness to participate in the program. TERI approached the state governments with a detailed concept note giving a background on the need for the study and its relevance to the state government in view of the climate change concerns in cities and also the State Action Plans on Climate Change. The note gave an overview of the activities to be conducted as part of the study and the role and commitment envisaged for the state government for the same. During this stage, TERI also conducted a roundtable consultation to seek inputs from the ACCCRN partners (Annexure 1).

Based on the positive interest shared by two states, Uttarakhand and Goa, a presentation was made to the Principal Secretary, Urban Development (UD) of the respective state governments, on the proposed concept note, seeking support and interest to be a part of the study. Subsequently, the Urban Development Directorate in Uttarakhand and Goa State Urban Development Agency (GSUDA) in Goa were appointed as the nodal agencies for program implementation in the respective states.

Stakeholder Engagements

i) Inception Workshop

An inception workshop was organized in both the states in order to understand the state specific requirements and expectations from the research program. It also aimed at understanding the policy and institutional frameworks in both the States for contextualizing the design and implementation of the program. During this stage, three options were proposed:

1. TERI prepares an outline of policy and road map for its implementation
2. TERI provides a detailed road map for sector specific mainstreaming that will have bearing on all concerned departments
3. A combination of the options 1 and 2 above

As an outcome, the program approach to be adopted for Goa and Uttarakhand was finalized and accordingly the program was contextualized and engagements were conducted. In Uttarakhand, it was recommended that sector-wise integration points should be identified for policy and institutional frameworks governing urban development at the state level. This was proposed to be in the form of amendments in the existing policies and acts regulating the relevant sectors in the urban space.

In Goa, the stakeholders prioritized a combined approach which included identifying action points and key components for a new urban resilience policy as well as entry points in the existing laws, policies, and regulations. It was suggested that the new multi-sectoral resilience policy should focus on urban climate resilience but also include and integrate other relevant sectors like that of environment, disaster management, water resources, and parastatals such as Public Works Department (PWD).

ii) Multi-stakeholder Consultations

The next step was to interact with stakeholders from various departments guided by a detailed questionnaire (Annexure 2) to understand their insights on the following aspects:

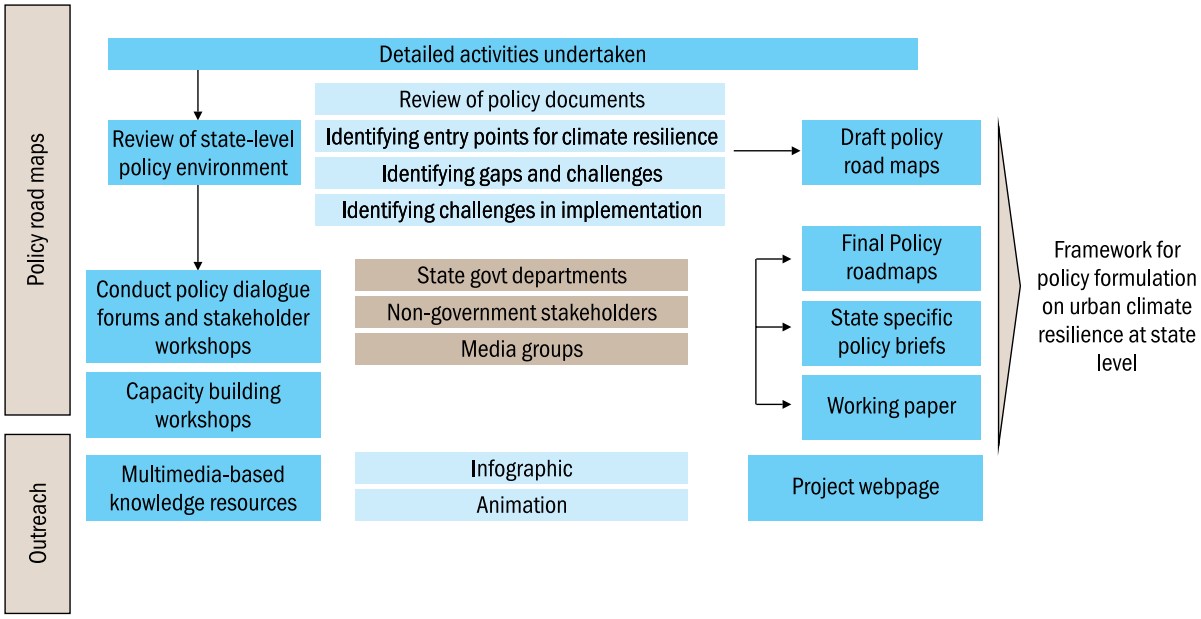


Figure 3: Program Activities and Approach

1. The perceived impacts of climate change on their sector and department's functioning
2. The current policy framework for that department
3. The key policies that could provide entry points for climate resilience planning
4. Opinion on institutionalization of the new proposed policy and mechanisms through which it could be steered

iii) State Level Policy Dialogue Forums

Based on the sector specific inputs, the draft policy road map was prepared which was presented back to the stakeholders for validation at a State Policy Dialogue Forum. During this forum, entry points that were identified for each sector were presented and discussed in great detail. As an outcome of this exercise, the project team was able to prioritize the key policies and issues to be addressed for mainstreaming urban resilience planning. This led to the preparation of the final policy road map which have been presented in Chapter 3.

iv) Capacity building workshops

Dedicated sensitization and capacity-building workshops on the theme of 'Urban Resilience' were also organized in the study areas—Goa (January 2015) and Uttarakhand (April 2015). These were targeted towards the municipal officials and elected representatives of the State. These capacity building workshops positively impacted the program by way of sensitizing the key stakeholders on the issue of urban resilience and provided familiarity on the subject even before the individual consultations and State Policy Dialogue Forums were organized.

Understanding the Process of policy formulation in India

In the case of Goa, an additional preliminary step was to study the policy formulation process in order to propose recommendations for a new urban climate resilience policy. Thus, TERI conducted a review of some of the recently drafted policies to understand the typical public policy formulation process in India and the components of a policy document.

Broadly, public policy may be described as the overall framework within which the actions of the government are undertaken to achieve its goals. It is a purposive and consistent course of action devised in response to a perceived problem of a constituency, formulated by a specific political process, and adopted, implemented, and enforced by a public agency (Hai, 2016). Policy making in itself is a dynamic political and the involvement of businesses and civil society—consumers, private entrepreneurs, employees and citizens and community groups, and NGOs—in designing public policy is critical to improve the transparency, quality, and effectiveness of their policies as well as establishing the legitimacy of the public policy. Once a policy is declared, then programs are devised devised under it to take action to achieve those overall goals. For example, poverty alleviation is a policy of Government of India for which several programs have been designed, such as the Integrated Rural Development Program, MGNREGA, etc. Each of these programs have their own goals to achieve which collectively achieves the unified goal of the original policy. There can be a number of programs established for achievement of a single policy goal, and there are a number of policies that are formulated to achieve the goals of the government (Rao, 2011).

Public policy making is the principal function of the state and as a quasi-federal polity[1], public policy in India is made at three levels—central, state, and local. Urban development, housing, urban policy, and urban planning in India are state subjects under the Constitution of India and the Centre can, at the most, "issue directives, provide advisory services, set up model legislation and fund Programs which the states can follow at will" (Ramachandran, 1989). However, despite the fact that states have been empowered to make urban policy, they have rarely done so. The urban policies existing in the states have been largely an off shoot of that outlined in the national five year plans and other policies and Programs of the central government (Batra 2009). On the other hand, in the case of environmental policies, though the Union does enjoy a dominant role in environmental policy making, the centre and the state have shared some times overlapping functions as the subject falls in the concurrent list of the constitution. The process of public policy formation can be looked as a series of events/steps which have been discussed in detail below:

1. Agenda Setting/Policy Agenda formation

Policy formulation is typically a purposive and consistent course of action devised in response to a perceived problem of a constituency. However, it is acknowledged that a number of other political and apolitical reasons may work in isolation or in combination in the success or failure of public policymaking (Somanathan 2005). Some of the reasons include, but are not limited to:

- Political agenda/will of the government For example, the Government of India's policy to boost economic growth and maximize investments in the country has resulted in programs, such as 'Make in India and '100 Smart Cities'
- To improve social/economic condition of society — For example, policies targeting 100 per cent access to primary education and health care

1 Constitutional division of power between one central and several regional governments.

- Inadequacy of existing laws and policy frameworks — The National Urban Transport Policy, 2006, was drafted in response to the increasing traffic woes in urban areas and in cognizance of the fact that poor mobility can become a major dampener to economic growth and cause the quality of life to deteriorate (Ministry of Urban Development, Government of India).
- Adherence to International Obligations — As seen in case of policies pertaining to environment and human development.
- Civil society movement, Judicial activation, etc. (Rao V M 2009)

2. Defining the Problem and Setting up Policy Objective

Once an issue comes to the forefront of policy agenda setting for the state/central government, the next step is to clearly identify the policy problem and set up the policy objective regarding the same. This process may involve discussion with various stakeholders/experts (MHRD 2016) including businesses and civil society — consumers, private entrepreneurs, employees and citizens and community groups, NGOs, etc., to acquire a better understanding of the policy problem.

3. Evaluating Policy Options

Once the policy objectives have been identified, the next step is to identify the various policy measures to fulfill the objectives. Existing institution frameworks and laws and political and financial constraints need to be taken into consideration while identifying the various policy options.

At this stage, it is also important to look at inter-linkages with other policies, plans, and sectors. While policy in any sector can theoretically affect any other, in practice the inter-linkages and trade-offs may be relatively greater among related sectors. As a general principle, related sectors with significant policy interactions between them, like environment and urban development, should be grouped together so as to maximize policy coordination (Batra 2009). Multiplicity of agencies and fragmented institutional and policy structure makes it very difficult, even for closely related sectors, to align their policies in accordance with a common overall agenda. Besides, it fails to recognize that actions taken in one sector have serious implications on another and may work at cross purposes with the policies of the other sector (Batra 2009).

Stakeholder interaction is an integral part of this step to get adequate input from outside government and with adequate debating on alternatives and their impacts on different groups, including involvement of those affected by policies.

4. Developing Policy implementation enabling Mechanism

Once the policy option has been identified, the next step is to develop the enabling mechanisms for its implementation. This may involve drafting of new statutes, identifying entry points and bringing about changes in existing laws and regulations, mechanisms for inter-departmental coordination, identifying budgetary allocation as well as training and capacity building of institutions involved. The policy draft documents generally clearly define the policy enabling mechanism that need to be created to ensure efficient implementation (MHFW 2005).

The role of the bureaucracy is instrumental at this stage due to the major information base, knowledge and experience, permanent service, and advisory expertise ambits possessed by the bureaucrats in policy matters (Rao M V 2011).

Policy review

In order to identify entry points in the existing policy and institutional framework and define the enabling mechanisms, a detailed review of the present policy environment was conducted. This involved a cross-sectoral assessment of acts, rules, and policies that govern urban development processes in the state, to identify entry points for introducing the principles of resilience in specific sections of these documents. The sectors, namely, Urban Planning and Housing, Environment, Climate Change and Disaster Management, Water Supply and Sewerage,

Solid Waste Management, Public Health and Sanitation, Road Transport, and Energy were assessed. A list of policies, acts, rules, and regulations reviewed by TERI may be found in Annexure 3.

Preparation of Road Map

Building on all the activities discussed above, the policy road map for the two states were prepared. These road map give insight in the form of policy action points to the state governments. In addition to this, it provides entry points for mainstreaming resilience in the existing institutional and policy frameworks. The road map have been discussed in greater detail in Chapter 3.

Outreach and engagement

Another key component of the program was focused towards sensitizing the media and civil society on the subject of urban climate change resilience. This was achieved through the following activities:

Media Sensitization Workshop for Vernacular Media

A training program for the vernacular media in Goa was organized to sensitize them about the need and efficacy for building climate resilience in urban areas. The half day training program was aimed at sensitizing the local media to understand the nuances of climate resilience and recognize the importance of reporting stories on this subject. The workshop was successful in terms of publicizing the study. Several news articles were published in leading vernacular media which helped in the larger outreach of the program to the masses. This also positively motivated the state government towards bringing in a policy for urban climate resilience.

Multimedia-based Free Knowledge Resources

As part of the project, an infographic titled 'Decoding urban resilience—the policy way' was prepared. The infographic introduces the concept of a 'resilient city' and focuses on the need to mainstream climate resilience into the urban planning process. The infographic has been uploaded as a dynamic image on a dedicated webpage. Each section of the infographic leads to a webpage that details out the information and provides reading resources. The webpage fulfils dual objectives:

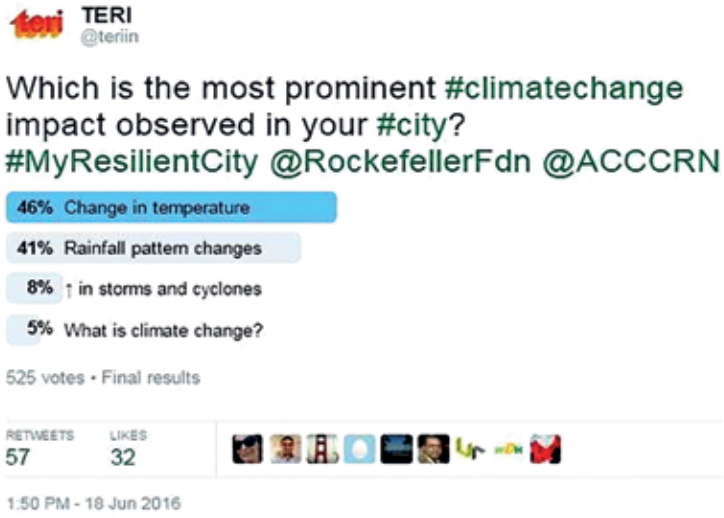
1. Simplifies the concept of 'mainstreaming resilience planning' and communicates it to the public through a visual medium
2. Provides an opportunity to share resources and best practices from the previous projects undertaken as part of the ACCCRN initiative through connecting webpages.

The webpage also features a section depicting the viewpoints of key government stakeholders from Goa and Uttarakhand (as quotes) on the subject.

A short animation clip (2–3 minutes) on the subject has also been prepared by the team which can be used freely by the ACCCRN community for dissemination.

Social Media Engagement with Youth

A 'Photography Contest' on issues related to urban development and climate impacts was organized through TERI's social media platforms. The objective was to sensitise and capture young minds and generate out-of-the-box ideas on solutions and alternative development pathways towards cities that are climate resilient. The entries were invited through the social media platform using innovative tags like: #MyResilientCity. Twitter Polls were also conducted as part of this engagement.



Challenges and Limitations

Owing to the nature of the program, there was a need to ensure continuous dialogues with the various departments that were engaged in the process, which in itself was a constant challenge as climate change or resilience planning does not fall under the existing mandate of Urban Development Departments in state governments. Similarly, other state line departments, that is, PWD, Water Resources Department (Jal Nigam), Environment, Health, Transport, Disaster Management, Forest, Industry, Tourism, Housing, work towards implementation of dedicated sectoral policies, and do not have a mandate on climate resilience. Thus, proposing the concept of an urban climate resilience policy in addition to their existing day-to-day function and seeking commitment for the engagement was initially a challenging task. This was especially apparent while scheduling consultations, interviews, and policy dialogue forums. Geographical and weather constraints, especially in the case of Uttarakhand, was another challenge that affected the extent of participation in the engagement process.

Climate change is often perceived as a distant threat and typically it is not accorded immediate priority by urban managers and decision makers. To address these apprehensions, appropriate measures were dovetailed into the stakeholder engagements. For instance, the initial dialogues and consultations with the state government stakeholders were largely focused towards sensitization on the need for urban climate resilience. In this direction, attention was drawn towards urbanization pressures, environment hazards, and recent disasters, when building a case for the study to the state government authorities. During the State Policy Dialogue Forums, even before presenting the draft policy road map, these points were reiterated through a dedicated sensitization session. This was helpful in terms of generating recognition of the state's present vulnerability and increasing their interest levels and quality of inputs for the policy road map.

Chapter 3

Preparation of Policy Road maps

Introduction

This chapter discusses the policy road map that were prepared based on extensive stakeholder engagements in Goa and Uttarakhand over a period of two years and a detailed analysis of the national and state policy and institutional frameworks. Besides proposing key components for a new state-level urban climate resilience policy, the road map identifies entry points for mainstreaming climate change adaptation into the existing framework for urban planning and development in the two states. The subsequent sections present an elaborate discussion on these aspects.

Insights to Policy Road map

A dedicated component on stakeholder engagement was inbuilt in the program with an objective of understanding and prioritizing the state-specific context and the need for coming up with a policy on urban climate resilience. These stakeholder engagement workshops helped in understanding the following:

- Scoping the relevant sectors in the context of resilience planning in urban areas
- Role of existing institutions and their functions and mandates
- Key challenges and barriers to urban climate resilience in the state
- Feasible approaches and timeline for formulation and implementation for a new urban climate resilience policy
- Key components to be addressed by the new urban climate resilience policy
- Mechanisms for implementation and financing

The inception workshop was instrumental in scoping the sectors into:

- Urban Planning and Housing
- Environment, Climate Change, and Disaster Management
- Water Supply and Sewerage
- Solid Waste Management
- Public Health and Sanitation
- Road Transport
- Energy

It was observed that as per the present institutional mechanism, various state-level departments are responsible for all matters pertaining to development and management of urban infrastructure under the purview of sector-specific policies and regulations. However, building urban resilience would need a cross-sectoral approach owing to the nature of climate change impacts and its implications on the urban systems and well-being of communities. Therefore, the new policy should be able to establish these inter-sectoral linkages. This calls for inter departmental coordination and inter-sectoral dialogues amongst the concerned departments and agencies. In this context, it was suggested that operationalization of the proposed road map will require certain immediate action points, such as

identifying a nodal agency responsible for coordinating resilience building initiatives and an overarching chapter on climate resilience in the master plans to guide and regulate urban growth. It was also observed that in order to institutionalize the resilience agenda into the implementation and financial mechanisms, it will need convergence into the centrally sponsored and state-driven schemes.

State specific approaches were defined to design the policy road maps of the state. In Uttarakhand, sector-wise integration points were defined in the existing policy and institutional framework. However in Goa, the policy road map includes an approach where resilience planning is built in through a multi sectoral policy that defines linkages to relevant sectors such as environment, disaster management, water resources, and parastatal bodies. Based on this approach, the program activities led to identification of key components and aspects that the state level policy framework needs to address both in terms of the new and the existing policies and regulations. The following section gives a detailed discussion on the key components.

Key Components of the Proposed Urban Climate Resilience Policy Framework

The new policy on urban climate resilience as well as mainstreaming resilience into the existing policies should entail the following components:

1. **Background:** The policy should outline the context in terms of urbanization levels, climate change analysis for the state and its impacts on various critical sectors such as water, transport, communications, and sanitation, to name a few. An inherent link has to be drawn, between the urbanization level, patterns of urban development and the challenges and pressures, thereof, and the varied ways in which climate change impacts affects the same. It should also bring out the interconnectivity between various sectors in terms of adaptation and mitigation interventions. This should set out a case that rationalizes the need for the urban resilience policy and the benefits that could be derived from it.
2. **Goal:** The inherent goal of the policy is to mainstream climate change considerations into the urban development planning process and urban project design to achieve adaptation objectives and provide an enabling environment for climate resilient planning. It should aim at climate proofing urban development in an integrated manner such that all sectors such as energy, infrastructure and services, and roads and transport are included in the process of planning.
3. **Objectives:** The proposed policy should entail the following objectives:
    i. Introduce a clear time bound implementable agenda for mainstreaming climate change concerns into urban development planning
    ii. Identify stakeholders who will be responsible for implementation of program under the policy
    iii. Present a model institutional mechanism to be adopted at the State level to facilitate implementation of the policy
    iv. Identify technical assistance needed to plan for climate resilience and identify sources for knowledge and capacity development
4. **Preparation of a Detailed Risk Profile for the State in the Context of Urban Areas and Vulnerability Analysis of Cities:** The policy should call for preparation of detailed risk profile of the state in terms of climate impacts and extreme events. Past climate data and future projections of climate and various other sectoral datasets, to help assess the vulnerability, and coping capacity of city systems to climate events, would be required to this end. Engagement and communication with multiple departments, institutions and stakeholders, would be required to complement the multi-sector needs and requirements of such an exercise. While the regional information on climate impacts and its sector specific connotations could be found from State Action Plan on Climate Change, the 4x4 assessment report of the Ministry of Environment, Forest and Climate Change,

Government of India, could also come in handy in understanding regional climate assessments on which the policy recommendations could be based.The preparation of risk profile also calls for improved scientific evidence base and coordination mechanisms between scientific research and academic institutions (including both national and state-level agencies).

5. **City Resilience Strategy:** While the state level risk profile will outline the importance of sectoral interventions and would make a case for state level actions to address regional issues related to climate change that would have impact on urban areas, the State level policy must make a case for cities to conduct risk and vulnerability analyses to understand their specific requirements for resilience building and develop city-specific strategies for adaptation and mitigation.
6. **Data and Climate Projections:** Resilience planning would entail drawing up extensively from specific datasets such as socio-economic data, climate trends, and sector-specific datasets to enable formulation of strategies. Studying past climate trends and developing climate projections are essential components of risk and vulnerability assessments. The state policy, therefore, will have to define an action plan for conducting the climate modeling and projections and trend analysis and developing of database management systems. Most cities in India lack the proper information systems required for addressing the various aspects of climate change impacts, such as, data on weather anomalies, and frequency and extent of urban floods. Integrating resilience planning in the urban planning process requires very specific data sets on various local and regional climate parameters. Hence, maintenance of a repository of city and region specific data using Management Information Systems (MIS) would be an essential step, which could be used to develop time-series and spatial data bases in this regard. Besides, climate modeling, which is a specialized field requiring capacity building and technical expertise, can be facilitated by forming a repository of institutions and experts at the state or national level to act as resource persons for cities.
7. **Capacity Building:** Climate resilience is a new concept in India, requiring specific technical know-how and data for cities to draw up their resilience plans. It also requires awareness generation amongst civil society to foster interest and support (TERI 2014). Therefore, it is imperative to provide for need-based area-specific training for officials at all levels of urban governance to enable planning for climate resilience and preparedness for dealing with any climate-induced emergency situation. In addition to building capacity of relevant stakeholders, the policy should call for raising awareness of citizens about the need to include climate resilience in the urban development planning process.

   The target stakeholders for these would include city planners, decision makers and practitioners, political representatives, sector experts, city managers, engineers, and citizens. Through the capacity building programs, the target stakeholders should get acquainted with the principles of resilience planning and its benefits for the cities' sustainability and development. It should enable them to practically utilize the techniques, methods, and tools developed for resilience planning in their respective areas of work.
8. **Institutionalization plan:** To facilitate all the above, a strong regulatory and institutional backing is required which also draws out financing mechanisms to support the cause. An important point of consideration is the fact that resilience requires multi-sectoral and cross-sectoral interventions and may not fit into the present divisions of institutional responsibilities. Therefore, while the policy can guide the overall mechanisms to support resilience mainstreaming into urban development discourse, it should also identify various entry points within existing institutional mechanisms and regulatory framework (TERI 2014).

The institutionalization thus, should entail the following aspects:

- **Multi-level engagement:** To establish resilience planning, an integrated approach to various urban sectoral needs through continuous stakeholder consultations, inter-departmental and institutional coordination, and community participation should be adopted. The policy should establish a mechanism to institutionalize the process of this multi-stakeholder engagement at all the three tiers of governance.

- The national government can incorporate climate resilience in the reforms agenda and resource planning under national schemes, and bring in incentive mechanisms for states and cities. They could also facilitate partnerships with international and non-government actors for technical and implementation support.
- The state government should support the national government's interventions towards the goal of resilient urban systems by integrating climate resilience into state-level laws and regulations, budgeting for climate resilience, and initiating and implementing capacity-building programs at the state and city levels.
- At the city level, governing local bodies should assess and understand their climate and vulnerability and develop responses to climate-proof urban systems.
- **Integrating Climate Resilience into Urban Development Laws and Regulations:** Considering that resilience options are not independent of the regular sustainability goals and planning needs of the city, it is pertinent to dovetail climate resilience to the urban development framework. Climate considerations can be integrated into state-level acts and regulations, for instance, the State Town Planning Acts should have clauses that integrate climate parameters into master planning processes. Resilience interventions should be included into zoning, development regulations, and building bylaws of the cities. Climate resilience measures should be integrated into national and sub-national schemes and plans, such as the town planning schemes and City Development Plans (CDPs). A nodal body at the city level, such as the Municipal Corporation should be established which can act as the statutory authority to coordinate and direct the resilience planning and implementation efforts with relevant officials, semi-officials, and non-governmental agencies.
- **Financing Urban Resilience:** Reinforcing and climate proofing existing infrastructure would require additional funds. Therefore, financial allocation for resilience building and adaptation projects would also be an integral part of the proposed policy. Establishing national- and state-level climate funds and resource planning under various national schemes can go a long way in this direction.

Mainstreaming Urban Climate Resilience in Existing Policies and Institutions

This section presents an analysis of the overall institutional and policy frameworks that drive urban development in India. The national laws, policies, and regulations supporting urban governance have been reviewed for each sector. The section also presents the corresponding state-level institutional frameworks for Uttarakhand and Goa. A detailed review of the urban policy landscape at the state level for both Uttarakhand and Goa has been conducted to identify entry points for mainstreaming climate adaption planning into the process of urban development.

National Level Framework

Urban Planning and Housing

Typically development plans and master plans have shaped the urban infrastructure development in India. More recently centrally sponsored schemes such as Jawaharlal Nehru Urban Renewal Mission (JNNURM), Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT), SMART cities scheme, the AMRUT scheme, and the Housing for All scheme have also been driving the process of urban infrastructure development. At the national level, the Ministry of Urban Development (MoUD) has been assigned by the central government with all the activities falling under the realm of urban development. The Ministry is responsible for the formulation of national level policies and coordination of activities of various nodal authorities concerned with urban development in the country with the Town and Country Planning Organization (TCPO) functioning as its technical wing. The Urban and Regional Development and Plan Formulation and Implementation (URDPFI) Guidelines formulated by the MoUD is used by the ULB or Development Authority for planning at city/zonal/neighborhood level.

Environment, Climate Change, and Disaster

At the national level, the Ministry of Environment, Forest and Climate Change (MoEFCC) has been entrusted with all activities related to environment and forests and implementation of the National Action Plan on Climate Change. It is responsible for formulating policies, supporting and monitoring programs, and coordinating the activities of various central ministries, state governments, and other nodal authorities relating to environment, forestry, and climate change issues in the country. The primary concerns of the Ministry are implementation of policies and programs relating to conservation of the country's natural resources, prevention and abatement of pollution and action on climate change mitigation, and adaptation for sustainable development and enhancement of human well-being.

The National Disaster Management Authority (NDMA), headed by the Prime Minister, was formulated in 2005 under the Disaster Management Act, 2005, to spearhead and implement a holistic and integrated approach to Disaster Management in India. NDMA is mandated to lay down the policies, plans, and guidelines for Disaster Management to ensure timely and effective response to disasters. NDMA is the nodal agency for disaster management at the national level and coordinates with other Ministries and departments of Government of India for disaster preparedness and response and relief measures.

Solid Waste Management, Public Health, and Sanitation

The Central Public Health and Environmental Engineering Organization (CPHEEO), attached to the Ministry of Urban Development (MoUD) is the nodal agency which provides guidelines on solid waste management. Apart from this, the Hazardous Substances Management (HSM) Division of the Ministry of Environment, Forest and Climate Change (MoEFCC), is the nodal agency for safe management and use of hazardous substances, including hazardous chemicals, hazardous wastes, and e-waste. The CPHEEO Manual on Solid Waste Management; the Municipal Solid Waste (Management & Handling) Rules, 2016; Hazardous Waste (Management & Handling) Rules, 2016, Bio Medical Waste (Management and Handling Rules) 2016 formulated at the national level provide standards & guidelines for management of solid waste in the country. A separate section of rules known as the Constructions and Demolition Rules, 2016, included under the Solid Waste Management Rules, 2015, looks into the handling and management of construction debris.

At the national level, the Ministry of Health and Familiy Welfare is the nodal ministry of the Government of India for all matters pertaining to public health, medicine, food safety, medical research, and family welfare. The Ministry also implements multiple health, disease prevention and management, and family welfare programs. The Ministry will also be responsible for implementation of the recently launched National Urban Health Mission.

Water Supply, Sewerage, and Drainage

At the national level, Ministry of Urban Development (MoUD) and Ministry of Housing and Urban Poverty Alleviation (MoHUPA) are the key ministries implementing various programs and schemes for Water Supply & Sanitation and the Smart Cities scheme, AMRUT[2], HRIDAY[3] scheme, and Housing for All, are some of the recently launched flagship schemes of Government of India. The National Urban Sanitation Policy (NUSP), which aims at transforming towns and cities of India into 100 per cent sanitized, healthy spaces, ensuring public health, and clean environment was launched by MoUD in 2008. Recently, the Prime Minister of India launched the Swachh Bharat Mission[4]. The MoUD already has Standardized Service Level Benchmarks (SSLBs) for benchmarking

2 Atal Mission for Rejuvenation and Urban Transformation (AMRUT) is a scheme that targets 500 cities in India towards provision of basic services (e.g. water supply, sewerage, urban transport) to households and builds amenities in cities which will improve the quality of life for all, especially the poor and the disadvantaged.

3 The Ministry of Urban Development, Government of India, launched the National Heritage City Development and Augmentation Yojana (HRIDAY) scheme on January 21, 2015, with a focus on holistic development of heritage cities.

4 The urban component of the Mission is proposed to be implemented over five from October 2, 2014 in all 4,041 statutory towns. The total expected cost of the program is Rs 62,009 crore, out of which the proposed central assistance will be of ₹ 14,623 crore. The Cabinet has merged the 'Nirmal Bharat Abhiyan', a campaign for rural sanitation with the Swachchh Bharat Mission.

certain indicators for key urban services such as water supply, sewerage, storm-water drainage, and solid waste management. The MoHUPA has primarily been entrusted with provision of basic services to the urban poor.

Tourism

The Ministry of Tourism, Government of India, is the apex body for the formulation of national policies and programs and for co-ordination of activities of various central government agencies, state governments/UTs, and the private sector for the development and promotion of tourism in the country.

Road Transport

At the national level, the Ministry of Road Transport and Highways is the key ministry regulating the development and management of roads and highways in the country whereas the National Highways Authority of India is responsible for planning, development, and maintenance of the highways.

Energy

The Ministry of Power is the key ministry responsible for generation and transmission of power in the country, with the Ministry of New and Renewable Energy looking into all matters pertaining to development of renewable energy sources in the country.

State Level Framework

Uttarakhand

To prepare a road map for an urban climate resilience policy, the existing policy landscape in the urban sphere was thoroughly analyzed. Policies and regulations, under each sector, in the urban realm was thoroughly studied, gaps identified, and suitable entry points with a potential for climate change adaptation were identified. Multi stakeholder consultations were conducted to vet them and to collect additional comments and recommendations needed to develop the road map. Building on all the insights gathered from the process of policy review and multi stakeholder consultations, the policy road map was developed.

Sectoral overview

Urban planning and Housing

Urban planning being a state subject, it is essentially the state government that drives the urban development planning and implementation process through its 'line departments'. In Uttarakhand, the Urban Development Department (UDD) is the administrative department for local self-governments and the Housing Department is the administrative department for the Urban Development Authorities. The Town and Country Planning department, which comes under the Urban and Housing Department, is responsible for urban planning and development control. The Town and Country Planning department is the nodal department which prepares guidelines for regulated urban development in the state. The department is entrusted with the work of preparation of master plans for urban centres, zonal plans, and industrial hub plans for integrated planned urban development in coordination with the respective development authorities. The department also renders advisory services to all the development authorities, regulated areas, and urban local bodies of the state. Apart from this, the department is also involved in framing the state housing policies, building bylaws, and zoning regulations. The Uttarakhand Housing and Urban Development Authority (UHUDA) constituted under the Uttarakhand (UP Urban Planning and Development 1973) Amendment Act 2013, referred to as the state authority, is the development authority responsible for plan implementation and development of housing in the urban areas of the state. There are Special Area Development Authorities (SADAs) in case of delineated 'Special Areas' constituted under the Uttarakhand (UP Special Area Development Authorities Act, 1986) Adoption and Modification order 2006. The powers and functions are same as that of the development authorities. With regard to the provision of urban function, the local bodies are governed

by the Uttaranchal (UP Nagar Nigam Act, 1959) Act, 2002, and Uttaranchal (UP Municipalities Act, 1916) Act, 2002. Under the provision of these Acts, all local governing bodies are responsible for providing necessary urban and community services, such as water supply, solid waste management, health centres, educational institutes, and housing and property tax.

At the state level, the states typically have a sector-wise framework of line departments that are responsible for undertaking planning, development, execution, operation and maintenance of infrastructure and services in urban and rural areas within the state. However, in the recent past, state level infrastructure development departments/ corporations have been constituted in most states for coordinating large-scale infrastructure projects. The Uttarakhand State Infrastructure Development Corporation Ltd (USIDCL) has been floated as a Special Purpose Vehicle (SPV) and acts as a coordinating agency for speedy implementation of all the infrastructural projects, envisaged by the government, such as roads, bridges, flyovers, bus stands, hospitals, tourism-related projects, etc. Apart from this, the Uttarakhand Urban Sector Development Agency (UUSDA) is the state-level coordinating agency for implementation of the centrally sponsored schemes under the Uttarakhand Urban Sector Development Investment Program (UUSDIP). This urban development investment program is assisted by the Asian Development Bank (ADB), under Multi Tranche Financing Facility (MFF), conceived to support the Government of India (GoI) and Government of Uttarakhand (GoU) in their policy of balanced regional socio-economic development and poverty reduction through improvements in urban governance, management, and infrastructure and service provision throughout the urban sector in Uttarakhand. The major urban centers of Uttarakhand—Dehradun, Haridwar, Nainital, and Rudrapur—are included under this program. The Uttarakhand State Urban Development Agency is the nodal agency for co-ordination, monitoring, and implementation of various centrally sponsored schemes implemented by the MoUD and MoHUPA. The agency is a society registered under the Societies Registration Act, 1860, under the administrative control of the Urban Development Department, Government of Uttarakhand.

Besides, owing to the ecological sensitivity of the region, a special authority, under the Uttaranchal River Valley (Development and Management) Act, 2005, has been constituted to regulate sustainable development and proper management of river valleys with special reference to Bhagirathi river valley in Tehri and Uttarkashi districts. Five urban local bodies (Uttarkashi, Bhatwari, Deoprayag, New Teri, and Chamba) are situated within the basin of the Bhagirathi river, and under the provisions of Uttarakhand (UP Regulation of Building Operations Act, 1958/ (U.P. Planning & Development Act, 1973), Adoption & Modification order, 2006, they are required to prepare master plans and sectoral/zonal Plans for their respective urban area. Under the provisions of the River Valley Act 2005 these respective master plans and sectoral/ zonal plans have to be reviewed by the River Development Authority in order to ensure that they are integrated with the master plan and sectoral plan being prepared for the river basin under the Uttaranchal River Valley Act, 2005. To restrict any human activities in the flood plains of a river, the Flood Plain Zoning Act, 2013, under the aegis of the Irrigation Department, has been constituted. A Flood Zoning Authority constituted under the provisions of the Act is responsible for conducting surveys to establish flood plain zones and delineate the areas which are subject to flooding and classification of land accordingly. Based on this, the state government demarcates the flood plain areas, and either prohibits or restricts the use of land therein.

Potential for Mainstreaming

All the relevant policies, regulations, and programs were studied, to identify entry points, with a potential for mainstreaming climate change adaptation into the urban planning and development process. Annexure 3 gives an overview of all the relevant policies and regulations that were reviewed under the ambit of the sector under consideration. The provisions of the Urban Planning and Development Act, Special Area Development Act and River Valley Protection Act, deal with the preparation of master plans. The need to integrate a chapter on climate change resilience under the respective master plans was identified as one of the key recommendations under this sector. It was also suggested that climate change considerations and resilience be introduced as a mandatory criteria for the approval of the master plan. Table 1 illustrates the scope for mainstreaming climate resilience in the urban planning and housing sphere.

Table 1: Urban Planning and Housing

Regulations	Entry Points/Recommendations/Action Points
Development Areas — Uttarakhand (UP Urban Planning and Development Act, 1973) Amendment Act, 2013	▪ Chapter III, Section 8 of the Uttarakhand (UP Urban Planning and Development Act, 1973) Amendment Act, 2013, stipulates the preparation of master plan for the development area. A chapter on climate change resilience, which includes present vulnerabilities, must be incorporated in the master plan. A climate vulnerability assessment can be conducted in order to draw out the vulnerabilities. Further, to reduce the vulnerability, the land use planning of that area should be revisited and evaluated. ▪ Chapter III, Section 10 and 11 of the Uttarakhand (UP Urban Planning and Development Act, 1973) Adoption & Modification order, 2006 Act, stipulates that the master plan after preparation should be submitted to the state government. It also deals with the procedure to be followed for the preparation and approval of the master plan. Under this provision, the state government should make climate change considerations and resilience integration mandatory criteria in the preparation and approval process of the Master plans.
Special Development Areas-—Uttarakhand (UP Special Area Development Authorities Act, 1986) Adoption & Modification order, 2006.	
Regulated Areas—Uttarakhand (UP Regulations of Building Operation Act, 1958) Adoption & Modification order, 2006	
Uttarakhand River Valley Protection Act, 2005	▪ Chapter V, Section 17, gives the state and central government requisite powers to issue directions to the development authority to carry out the provisions of this Act. Hence under the provisions of Section 17, the state government can direct the development authority to make climate change considerations and resilience integration mandatory in their planning, approval, and notification processes. ▪ Chapter III, Section 10 (1, 2, and 3) stipulates the preparation of master plan and sectoral plan for the sustainable development of the river valley. A chapter on climate change resilience, which includes present vulnerabilities, must be incorporated in the master plan. A climate vulnerability assessment can be conducted in order to draw out the vulnerabilities.
Uttarakhand Urban Sector Development Investment Program (UUSDIP)	▪ The UUSDA will function under the overall control and guidance of the Urban Development Directorate. Climate resilient infrastructure should be made mandatory by the Urban Development Directorate under this program. ▪ An inventory of groundwater sources should be made which can be used as a potential source of water supply and water source for sanitation activities. ▪ Projects which undertake effective treatment and disposal of waste water should be implemented.

Uttarakhand flood plain zoning Act, 2013	▪ Chapter III, Section 5, deals with surveys and delineation of flood plain areas. Under this provision, the flood zoning authority should strictly enforce the establishment of flood plain zones and delineate the areas which are subject to flooding. ▪ Flood zoning map should be prepared and duly approved and circulated to development authorities and other departments. ▪ Chapter V, Section 12 gives the state government requisite powers to prohibit and restrict activities in the flood plains in the interest of public health, safety or property. Stricter enforcement of this provision, restricting human activities, and haphazard developments in the flood plain zones should be exercised. ▪ Only very limited and that too scientifically designed construction activities should be permitted in flood plains. ▪ Construction in flood plain of rivers must be done based on the recommendations of central agencies such as Central Water Commission (CWC) as well as state irrigation department.
The Uttarakhand District Planning Committee Act, 2007	▪ Section 9, from clauses (a) to (p) outlines the functions to be performed by the District Planning Committee under the provisions of this Act. Section 9 (a) specifies that the committee has to identify local needs and objectives within the framework of State objectives. Uttarakhand by virtue of its location and topography is highly vulnerable to the impacts of climate change and climate change induced extreme events. Thereby the objective of the District Planning Committee should entail the need for building climate resilience and climate adaptation planning ▪ Section 9(m) stipulates the District Planning Committee has to ensure participation of voluntary organizations in overall development process. The Committee with the involvement of NGOs and other local organizations can take up measures to integrate climate change resilience. NGOs and other local organizations can sensitize the local population by conducting public awareness programs on climate change impacts, coping mechanisms and climate adaptation techniques ▪ Section 10 stipulates the District Plan should include subjects enumerated under the UP Municipalities Act, 1916, and UP Municipal Corporation Act, 1959, which includes the provision and maintenance of urban infrastructure and services such as construction and maintenance of drains, solid waste management etc. All these provisions (infrastructure and services), should be planned keeping in mind the prevalent and future impacts of climate change, that is, climate resilient infrastructure.

Building Byelaws, 2011, and amendment, 2015	▪ Enforcement of sanction and approval of building plans by authorized body, only if the environmental conditions stipulated in the model building bylaws are incorporated for the respective categories of buildings. ▪ General provision of model bylaws, for the hilly regions should be suitably modified to meet the requirements of fragile nature of the hilly ecosystem. ▪ Green building practices in heating ventilation and air conditioning (HVAC), power and water supply and waste management in public and commercial buildings in accordance with the Green Rating for Integrated Habitat Assessment (GRIHA)/ Energy Conservation Building Code (ECBC) compliance should be integrated.

Environment, Climate Change, and Disaster

In Uttarakhand, two notifications have been issued by the MoEFCC under the Environment Protection Act, 1986. One notification restricts the location of industries, mining operations, and other development activities in the Doon Valley and the other declares the watershed of river Bhagirathi an eco-sensitive zone. At the state level, the Uttarakhand Environment Protection and Pollution Control Board (UEPPCB) is responsible for carrying out all activities pertaining to conservation of natural resources and Environmental Impact Assessment of industrial/ development projects, among others. It is the nodal agency for pollution control and other environment-related aspects in the state. Since environment is a central subject, the powers and functions of the pollution control board are guided by the following acts and programs at the national level.

- River Board Act, 1966
- Water (Prevention and Control of Pollution Act), 1974
- Water (Prevention and Control of Pollution) Rules, 1975
- Hazardous waste (management and handling) amendment rules, 2016,
- Air (Prevention and Control Act), 1971
- Environmental (Protection) Act, 1986

The State Forest Department is responsible for the conservation and protection of the forest cover in the state. The state CAMPA Project has been envisaged to address forestry issues in Uttarakhand for a period of 10 years (starting from 2010). The Plan focuses on natural resources management and wildlife conservation, eco restoration, and bio diversity conservation with livelihood support and strengthening of infrastructure. The State Forest Department is responsible for the implementation of this action plan with the support and active participation of local communities for some of the identified activities.

In order to address climate change, the State Action Plan on Climate Change was prepared which aimed at improving the climate resilience and adaptation ability of the communities, public or private infrastructures and preserving the ecosystems. The State Forest Department was assigned with the responsibility of preparing the State Action Plan on Climate Change. The State Climate Change Council which was constituted by the State Government is mandated with the apex role of overseeing all aspects of the state's preparations and initiatives to address climate change and its impacts under this action plan.

The State Disaster Management Authority (SDMA) of Uttarakhand constituted under the National Disaster Management Act, 2005, is the nodal agency in the state and is responsible for disaster preparedness, management, response, and recovery and executing the Standard Operational Procedures with NDMA in case of disaster events.

The 2013 disaster in the state brought about massive destruction and loss of lives and property. Two disaster recovery programs are being financed by the international multilateral banks, World Bank and Asian Development Bank, which are assisting in the social and economic recovery in Uttarakhand in the aftermath of the 2013 disaster.

Potential for Mainstreaming

Considering the occurences of extreme climatic events are more frequent, there is a need for better planning and preparedness to face them. Anexure 3 provides an overview of all the policies and regulations that were reviewed in order to identify entry points which have a scope to be mainstreamed, to facilitate climate change adaptation planning and disaster prepardness. Disaster risk reduction coupled with adaptation action gives huge benefits when it comes to climate resilience. The Disaster Management Act, 2005, provides for diasaster mitigation and management in the state. Under the provisions of the Act, integrated solutions for disaster risk reduction and climate change adaptation have been identified as one of the main components of the urban climate resilience policy road map Table 2 further illustrates the scope for mainstreaming climate resilience under this sector.

Table 2: Environment, Climate Change, and Disaster Management

Regulations	Entry Points/Recommendations/Action Points
Doon Valley Notification 1989, (under the Environment Protection Act, 1986)	Climate change considerations and disaster risk reduction should be integrated in the zonal master plans
Notification declaring watershed of the Bhagirathi an eco-sensitive zone, 2012 (under the Environment Protection Act, 1986)	
Uttarakhand State CAMPA Project	▪ The CAMPA project looks in the conservation of soil cover to arrest soil erosion, floods and siltation of river and the mitigation of landslides which is aimed at enhancing climate change and disaster preparedness. The State Forest department should assign one wing department exclusively for the speedy completion of the projects concerned with disaster risk reduction and climate change adaptation. ▪ The funds allocated towards the suppression and management of forest fires under the CAMPA project need to be utilized appropriately to tackle the threat of forest fires. ▪ A certain percentage of the funds should be allocated towards urban forestry as it is instrumental in enhancing urban climate resilience .
Uttaranchal Disaster Management Act, 2005	▪ The Disaster Management Plan should address the interlinked challenges of disaster risk, climate change, and sustainable development. ▪ The Disaster Management Plan should be prepared in consultation with the ULBs, especially of the vulnerable cities to incorporate urbanization challenges, shocks, and stressors. ▪ Resources should be allocated and directed toward addressing immediate concerns related to landslide, flood/flash flood and earthquake threat. ▪ ULBs should prepare flood management plans with technical assistance from State Disaster Management Authority and execution and coordination assistance from District Disaster Management Authorities ▪ Participatory approach, to understand coping mechanisms of the society, should be included as an aspect of disaster management ▪ There should be an enhanced understanding of climate vulnerabilities and strategies should be devised to mitigate the vulnerabilities.

Solid Waste Management, Public Health, and Sanitation

At the state level, the Urban Development Directorate is responsible for implementation of waste handling and managment rules by the ULBs and municipal authorities by preparing a state level municipal solid waste policy or strategy. Solid waste management is one of the essential obligatory functions of the ULBs and municipal authorities under the provisions of Uttaranchal (UP Nagar Nigam Act, 1959) Act, 2002, and Uttaranchal (UP Municipalities Act, 1916) Act, 2002. The State Pollution Control Board is responsible for monitoring the progress of implementation of action plan and compliance of the standards regarding groundwater, ambient air, leachate, and compost quality, including incineration standards as specified under Schedules I and II.

Uttarkhand had drafted a state-level action plan under the Municipal Solid Waste (Management and Handling) Rules, 2005, (revised to Municipal Solid Waste (Management and Handling) Rules, 2016). The draft has been prepared in tandem with the key stakeholders—State Pollution Control Board, Urban Local bodies (81), and the Department of Environment and Forests of the state government. The draft plan is based on a 30-year projection. The action plan is tri-phased and envisages a total expenditure of approximately ₹ 786 crore. The funding of its operation and management for the first five years is proposed under the National Ganga River Basic Authority Namami Gange Mission. In all, 49 projects will be launched during this period from 2015/21 by 81 urban local bodies (ULBs) to manage solid waste in the state. The state government had also introduced the Uttarakhand Plastic and Biodegradable Waste and Disposal Regulatory Bill in 2013. However, the Bill could not be operational in the absence of rules and guidelines for its implementation[6]. Plastic has been banned across the state by the Uttarakhand Government following the National Green Tribunal order and all the local bodies have been directed to enforce it effectively[7]. The urban local bodies also have to provide for the collection and recycling of non-biodegradable garbage under the provision of the Uttar Pradesh Plastic And Other Non-Biodegradable Garbage (Regulation Of Use And Disposal) Act, 2000, which is applicable to the state.

At the state level, the Department of Medical Health and Family Welfare is the nodal agency for all matters pertaining to public health system and services. This department is responsible for improving access to quality health services and improving health infrastructure. The Uttarakhand Health and Family Welfare Society, constituted under the Department of Medical Health and Family Welfare, serves as the umbrella society for all national health programs and reforms. All funds from the central government for operationalizing the national programs are received in the society and thereafter released to program officers (of different programs) in the state and district societies as envisaged in state and district action plans. The Society functions through a network of public health centres and hospitals in the urban and rural areas of the state and few specialised clinics for implementation of various health programs. To provide integrated and sustainable system for primary health care delivery, with focus on urban poor living in slums and other health vulnerable groups in cities, 36 urban public health centers have been set up under the aegis of the Society.

The Uttarakhand Urban Sector Development Investment Program (UUSDIP) deals with infrastructure projects aimed at improving public health and the environmental quality in the program towns and the adjacent open land and water bodies. Under UUSDIP, funds have been allocated to implement projects that look at increasing the coverage of solid waste collection and supporting sound solid waste disposal methods, such as construction of scientific landfills and segregation of waste.

Potential for Mainstreaming

The management of solid waste, sanitation, and public health services is critical for climate change action, as climate change not only induces extreme events and casualities but also induces epidemics and other health issues. The lack of a proper system to manage and handle waste in the cities would aggravate the crisis situation. Annexure 3 presents an overview of the policies and regulations reviewed under this sector. It is important that solid waste management, sanitation, and health facilites be augmented, with a particular focus on the urban poor, in order to improve the reslience of the communties. Efforts should be directed towards incoporating climate

5 *The Times of India*, online edition, July 11, 2015.

change considerations as a mandatory criteria while approving the set up and authorization of waste disposal facilities and landfills. To prevent the choking of sewers and drains, the 'ban of plastics' as per both the National Green Tribunal annd under the provisions of the Uttar Pradesh Plastic and Other Non-Biodegradable Garbage (Regulation of Use and Disposal) Act, 2000, should be strictly enforced.

Table 3: Solid Waste Management, Public Health, and Sanitation

Regulations	Entry Points/Recommendations/Action Points
The Municipal Solid Waste (Management & Handling) Rules, 2016)	• The State Board grants the authorization for setting up waste processing and disposal facility only after considering the views of agencies such as the State Urban Development Department, the Town and Country Planning Department, the Ground Water Board, etc. All these departments should review the proposal in the lens of building climate resilience and their comments should be considered by the state government while granting the authorization. • All the ULBs should enforce the ban of plastics under the notification of the nation green Tribunal and the provisions of the Uttar Pradesh Plastic and Other Non-Biodegradable Garbage (Regulation of Use and Disposal) Act, 2000 • Ensure stricter implementation and enforcement of Section 3 under the provisions of the Uttar Pradesh Plastic and Other Non-Biodegradable Garbage (Regulation of Use and Disposal) Act, 2000, to prevent the choking of sewerage systems and drains.
Uttar Pradesh Plastic And Other Non-Biodegradable Garbage (Regulation of Use and Disposal) Act, 2000 (applicable to Uttarakhand)	

Water Supply and Sewerage

The Uttarakhand Peyjal Nigam (UJN) and Uttarakhand Jal Sansthan (UJS) constituted as per the provisions of the UP Water Supply and Sewerage, Act, 1975, under the Department of Drinking Water (DDW), prepare and execute urban water supply and sewerage schemes in the state. UJN is primarily engaged in construction of drinking water schemes in rural and urban areas and sewerage schemes in urban areas, whereas UJS is primarily carrying out functions of O&M of these schemes handed to them by the UJN.

Also, under the Uttarakhand Urban Sector Development Investment Program (UUSDIP), projects aimed at improving both the quantity and quality of water supply towards established standards and improved waste water management are being implemented. The Department of Irrigation and Ground water Board are the nodal department for matters related to conservation and development of water resources for domestic and industrial use, watershed management, irrigation, flood control, and anti-sea erosion.

Potential for Mainstreaming

Climate change impacts and extreme events have a direct bearing on water supply and sewage systems. As per the State Action Plan, the Gangotri glacier in the Uttarkashi district of Uttarakhand has been receding at the rate of 20–22 m annually, with grave implications for water availability downstream and hydropower generation. The State Action Plan also predicts that precipitation in the 2030s is expected to increase by 60 to 206 mm. The rise in precipitation is expected to result in an increase in sediment yield which could be detrimental to existing water resources (Government of Uttarakhand 2014).

Annexure 3 provides an overview of all the policies and regulations studied and reviewed under this sector. Water supply abstraction and treatment plans are often sited beside rivers and are mostly the first to be affected by floods and other extreme climatic events. As these are centralized systems, more often the breakdown of the system, due to an extreme event, disables the entire region, thus increasing the vulnerability. As a climate

adaptation measure, the possibility of decentralized systems, DEWATS can be explored. The approving authority can incentivize or provide fast track approvals for the development of similar sustainable urban drainage systems. Table 4 elaborates on the potential entry points that can adopted for mainstreaming climate resilience in this sector.

Table 4: Water Supply and Sewerage

Regulations	Entry Points/Recommendations/Action Points
UP Water Supply and Sewerage, Act, 1975	Section 14 enumerates the functions of the Jal Nigam which is, to render all services in regard to water supply and sewage for the state. Under this provision the following actions can be undertaken: ▪ In cities, where sewerage/drainage are not developed and in new developments; the possibility of decentralized systems—DEWATS at level of residential units/ wards should be explored by the Jal Nigam. The State Government should provide incentives/ fast track approvals for the development of such sustainable systems. ▪ In cities, where sewerage/ drainage exist or are partially developed; the Jal Nigam should revisit the drainage and sewerage systems to ensure disintegration of storm water drains appropriately with the new sewer drains when they are sanctioned for and also look for feasibility of DEWATS.

Tourism

Tourism is a one of the fastest growing industries and a major driver of economic growth and livelihood promotion in Uttarakhand. Over a million pilgrims and tourists annually visit the five prominent shrines—Yamunotri, Gangotri, Kedarnath, Badrinath, and Hemkund Sahib—in the Uttarakhand region. Apart from religious tourism, Uttarakhand is also a sought after destination for adventure tourism.

The tourism sector in Uttarakhand is governed by the following acts/ policies/ plans:

i) Uttaranchal Tourism Development Board Act, 2001

ii) The Uttarakhand Tourism Policy, 2001

iii) Uttarakhand Tourism Development Master Plan, 2007–2022

The Uttarakhand Tourism Development Board and Tourism Department are responsible for administrating the tourism sector in the state. They are responsible for policy formulation; planning and development of basic infrastructure; promotion, publicity and marketing of Uttarakhand as a prime tourist destination, both within and outside the country.

Potential for Mainstreaming

The Uttarakhand floods in June 2013 caused massive devastation in the state. The floods destroyed tourism infrastructure such as hotels, lodges and restaurants, and abruptly ended the main annual tourist season. It is estimated that around 80 per cent of all livelihood losses as a result of the disaster have been in this sector. Considering the fact that the tourism sector contributes significantly to the economy of the state it is important that the sector is climate proofed. Also the tourism sector has a bearing on traffic, infrastructure services, and solid waste management, and is mostly the cause for the encroachment of land due to illegal construction. All this negatively impacts the overall ecosystem. Infrastructure provision for the future, given the demands of the high tourist inflow, and the need to climate proof the new and existing development is an essential component that the new policy is addressing. Annexure 3 provides an overview of all the policies and regulations that have been reviewed under this sector. In order to mainstream climate change adaptation and generate awareness on the same, it is essential that capacity building programs be conducted for the different stakeholders, which the Uttaranchal Tourism Board can take charge of. Energy efficiency practices such as green building practices in HVAC, power

and water supply, and waste management can be integrated in tourism and allied activities. Table 5 expands on the scope for mainstreaming climate resilience under this sector.

Table 5: Tourism

Regulations	Entry Points/Recommendations/Action Points
Uttarakhand Tourism Policy, 2001	▪ Capacity building and awareness generation of the different stakeholders in the tourism sector; property developers, hotel owners, restaurant owners on the climate risk the tourism sector is exposed to, should be taken up by the Uttaranchal Tourism Development Board. ▪ Integrating green building practices in HVAC, power and water supply and waste management in the tourism and allied activities.
Uttaranchal Tourism Development Board Act, 2001	
Uttarakhand Tourism Development Master Plan, 2007–22	

Road Transport

The Public Works Department (PWD) is responsible for construction, maintenance, and planning of roads, bridges, and government buildings. As the state shares its border with China, a certain section of roads in Uttarakhand are maintained by the Border Road Organization. The Road Maintenance Policy, 2015, has been constituted for better management and maintenance of road network. PWD is the nodal department for implementation of the maintenance policy and coordination with the other departments dealing with roads. The Road Infrastructure Protection Act, 2014, provides for prevention of misuse, damage, unauthorized use, and encroachment of road infrastructure. Under the provisions of this Act, the state government by notification empowers the municipal corporation, municipalities, and the development authorities to exercise powers and perform functions specified by this Act, in respect of road infrastructure falling within their jurisdiction.

Potential for Mainstreaming

As a state, Uttarakhand is highly vulnerable to natural disasters and extreme climatic events. The aftermath of the 2013 disaster witnessed damaged roads, bridges, and heavy loss of lives and property. Both the World Bank and ADB are providing financial assistance in rebuilding roads to restore the connectivity lost due to the disaster through the Uttarakhand Disaster Recovery Project (UDRP) and the Uttarakhand Emergency Assistance Project (UEAP). Though the focus is on the immediate need of reconstruction of damaged roads, disaster preparedness of the roads with respect to future events is also an important consideration. The design and construction standards focus on developing roads that are better prepared to face geo hazards, extreme climatic events, and natural disasters. Annexure 3 provides an overview of the regulations and policies reviewed under this sector. Table 6 illustrates on the potential entry points that can adopted for enhancing the climate resilience of road networks.

Table 6: Road Transport

Regulations	Entry Points/ Recommendations/Action Points
Road Maintenance Policy, 2015	▪ The norms under routine maintenance look at cleaning of drains, culverts and soil erosion control on hill slopes, which should be strictly enforced to prevent the choking of drains and landslides respectively and hence enhancing the adaptive capacity and climate resilience. ▪ The norms under emergency maintenance and special repairs take care of reconstruction of fully damaged roads due to floods, earthquakes, landslides, and cloudbursts, and clearance of landslips, construction of damaged drains and retaining walls which should be strictly enforced.

Road Infrastructure Protection Act, 2014	Section 4 stipulates that the executive engineer shall prepare a road infrastructure map. Under this provision, a climate and disaster vulnerability mapping of road infrastructure can be conducted such that the road infrastructure map includes all the critical infrastructures and in the process the criticality of the roads can be determined. The executive engineer should be bestowed with this additional responsibility of identifying vulnerable road stretches under this provision.

Energy

At the state level, the Uttarakhand Power Corporation Limited (UPCL) is responsible for electricity distribution and the Power Transmission Corporation of Uttarakhand Limited (PTCUL) is responsible for power transmission within the periphery of the state. The Uttarakhand Renewable Energy Development Agency (UREDA) is the nodal agency for promotion and development of renewable energy in the state.

Potential for Mainstreaming

Climate change impacts have clear implications on energy production and use, such as increased energy demand due to rising temperatures and power disruptions due to storms, to name a few. Energy services are a necessary input for development and growth. Therefore, there is a need to consider emerging climate conditions and impacts on the design, construction, operation, and maintenance of existing energy infrastructure, new infrastructure, and future planning. Table 7 lists the potential entry points for mainstreaming climate resilience in the energy sector.

Table 7: Energy

Regulations	Entry Points/Recommendations/Action Points
Solar Energy Policy of Uttarakhand, 2013	Enforcement of the policy to ensure the promotion of clean and renewable energy.
The Electricity Act, 2003	▪ The Act facilitates development of renewable energy options, hence the enforcement of the same. ▪ Provision for enabling development of decentralized smart grids based on renewable energy at neighborhood/community level ▪ Climate proofing power transmission and distribution infrastructure by using the appropriate construction techniques and materials to minimize the impacts of climate change which include: - Elevating or relocating important electrical equipment along the coasts, to protect it from flooding - Underground transmission and distribution lines where feasible - Reinforcing overhead poles with sturdier materials, to reduce damage during storms.

Goa

In the state of Goa, a road map was proposed that allows for a multi-sectoral policy with a focus on urban climate resilience and includes and integrates other relevant sectors, such as environment, disaster management, water resources, and parastatal bodies. Hence the preparation of the policy road map was a two-pronged process wherein:

i. The regulatory and institutional setup at both the national and state level under each sector was studied through an extensive review of policies, to identify entry points with a potential for mainstreaming climate change adaptation,

ii. For the new urban climate resilience policy proposed at the state level, key components were identified, based on the learning and experiences from the ACCCRN process.

Additionally, multiple stakeholder consultations were also conducted at various stages of preparation of the road map to receive inputs and comments which were incorporated in the same.

Sectoral Overview

Urban Planning and Housing

Urban development and housing being a state subject falls under the purview of the state government. The state government is empowered with formulating, enacting, and enforcing all the necessary policies, laws, and regulations that support the governing function of urban development. Under the State Urban Development Department, the Town, and Country Planning Department prepares development plans in coordination with the respective development authorities as per the provisions of the Goa, Daman and Diu Town and Country Planning Act, 1974, Amendment Act 2011. The urban development authority is in charge of the implementation of the development plans where the financial outlay is by sector. Hence, for implementation of the plan, the urban development authority identifies by sector infrastructure projects, which are then undertaken by the respective sectoral departments of the state. The implementation of infrastructure and services projects identified in the City Development Plan (CDP), prepared under JNNURM, was also done sector-wise through the state line departments.

Typically, there are state line departments under each sector, that are responsible for undertaking planning, development, execution, operation and maintenance of infrastructure, and services in urban and rural areas within the state. However, for speedy implementation and coordination of large infrastructural projects, envisaged by the government, such as roads, bridges, flyovers, bus-stands, hospitals, tourism projects, etc., the Goa State Infrastructure Development Corporation Limited (GSIDC) has been constituted as a Special Purpose Vehicle (SPV). Apart from this, for implementation of the centrally sponsored schemes, the state urban development agency is the coordinating agency. The Goa State Urban Development Agency is the nodal agency for co-ordination, monitoring, and implementation of various centrally sponsored schemes implemented by the MoUD and MoHUPA. The Agency is a society registered under the Societies Registration Act, 1860, and is under the administrative control of the Directorate of Municipal Administration, Urban Development Department, Government of Goa.

To provide for the urban functions, the local governing bodies are regulated by the Goa Municipalities Act, 1968 (Amendment Act 2010), wherein all local governing bodies are responsible for providing necessary urban and community services such as water supply, solid waste management, health centers, educational institutes, and housing and property tax.

In the housing sector, it is the Goa Housing Board, an autonomous body constituted under Goa, Daman & Diu Housing Board Act, 1968, that is the nodal agency that looks at the housing requirements of the people. Through different housing scheme, such as EWS, LIG, MIG, HIG, etc., and by taking up other activities as per the provisions of the Act and Goa State Housing and Habitat Policy, 2010, the housing requirements of the people are met. The objective of the Board is to provide residential housing sites and facilities to the people at affordable prices, with the fund available from the State Plan and borrowed from financial institutions such as HUDCO, LICI etc for both urban and rural areas of the state. The Goa Housing Board also takes up commercial schemes and allots land for institutions, commercial buildings, etc. Besides separate entitities like GSIDC, central government organizations also provide for housing in their jurisdiction area.

Potential for Mainstreaming

Under the urban planning and housing sector, a gamut of policies and regulations were reviewed. Entry points which displayed a potential for integrating climate change adaptation in the process of urban planning and development, were identified. Annexure 3 provides an overview of all the relevant policies and regulations that were reviewed under the ambit of the sector under consideration. The provisions of the Goa Town and Country Planning stipulate

the preparation of a Regional Plan. One of the key recommendations is the need to incorporate a chapter on climate change resilience and introduce climate change considerations and resilience as mandatory criteria for the approval of the Regional Plan. Under the housing sector, building bylaws and various policies of the government that steer housing projects could promote green and energy efficient buildings and affordable housing targetted for the urban poor. Also, some of the coastal housing projects could look into the choice of materials, design, and construction techniques that help adapt to climate impacts such as increased flooding, storm surges, and sea level rise. Table 8 elaborates the scope for mainstreaming climate resilience in the urban planning and housing sphere.

Table 8: Urban Planning and Housing

Regulations	Entry Points/Recommendations/Action Points
Goa Town & Country Planning Act, 1974 (last amended in 2011)	▪ The Act stipulates the preparation of the regional plan for the state of Goa. A chapter on urban climate change resilience, which includes present vulnerabilities of all the key urban centers of the state, may be incorporated in the Plan. This will also include a climate vulnerability assessment to identify the vulnerable hotspots, communities and assets. The outcomes of the vulnerability assessment must be taken into consideration while formulating and evaluating land use plans prepared as part of the regional plan. ▪ The Act provides for the procedure to be followed for the preparation and approval of the Plan. Under this provision the state government should make climate change considerations and resilience integration mandatory in the preparation and approval process of the Master Plans.
Goa (Regulation of Land Development and Building Construction) Act, 2008	Prior to planning and siting of land use and development schemes, climate vulnerability assessment to identify the vulnerable hotspots, communities, and assets may be undertaken.
Goa, Daman and Diu Housing Board Act, 1968 and Rules, 1969 (last amended in 2001)	Prior to planning and siting of housing schemes, vulnerability assessment for risks including floods, water logging, and impacts of sea-level rise should be undertaken. Currently, building bylaws do not specifically cover flood risk management or Urban Heat Island issues though Rainwater recharging has been addressed to a certain extent. These aspects need to be addressed in the planning process for housing development and the building byelaws for urban areas. The Rules and byelaws under the Act should enable promotion and development of green and energy efficient buildings based on Energy Conservation Building Code (ECBC) and GRIHA (Green Rating for Integrated Habitat Assessment), India's indigenous green rating system for built environment.
Goa Housing and Habitat Policy, 2010	The policy primarily outlines the procedure to be followed for the preparation, approval and financing of housing schemes. Under this provision integration of climate change considerations and resilience building measures may be made mandatory in the preparation and approval process. Also, the policy should incentivize and enable financing mechanisms for development of resilient housing.

Environment, Climate Change, and Disaster Management

The Department of Science Technology and Environment (DST), Government of Goa, is the nodal agency for environment-related aspects and pollution control in the state. Its powers and functions are guided by the following acts and programs at the national level (environment being a Central subject):

- River Board Act, 1966
- Water (Prevention and Control of Pollution Act), 1974
- Water (Prevention and Control of Pollution) Rules, 1975
- Hazardous waste (management and handling) amendment rules, 2003
- Air (Prevention and Control Act), 1971
- Environmental (Protection) Act, 1986
- Municipal solid waste management and handling rules, 2000 (last amended in 2016)
- National Action Plan on Climate Change

DST is also responsible for carrying out all activities pertaining to conservation of natural resources and Environmental Impact Assessment of industrial/development projects, among other things. The Department has also constituted a State-level Steering Committee as well as State Advisory Group (SAG) and is in the process of preparing the State-level Climate Change Strategy and Action Plan in consultation with the National Institute of Oceanography (NIO), Dona Paula and National Council of Antarctica and Ocean Research (NCAOR), Vasco.

The Goa State Disaster Management Authority (GSDMA), constituted under the National Disaster Management Act, 2005, is the nodal agency in the state and is responsible for disaster preparedness, management, response, and recovery. Apart from GSDMA, the Department for Fire and Emergency Services of the Government of Goa is also entrusted to coordinate and execute the Standard Operational Procedures with NDMA in case of disaster events.

Potential for mainstreaming

Annexure 3 gives an overview of all the relevant policies and regulations that have been reviewed under this sector. The Indian Forest (Goa Amendment) Act, 1988, and the Goa State Forest Policy, 2009, deal with the conservation, protection, preservation, and management of forest areas in Goa, including mangroves and eco-tourism areas. Under the provisions of this Act, the land use and development of built structures in areas that provide natural buffers for flood management and storms should be regulated. The state disaster management plans, prepared under the provisions of the Disaster Management Act, 2005, should entail city/ micro-level emergency management and resilience plans. Disaster risk reduction should be coupled with climate change adaptation in order to enhance climate resilience planning. To this end, the policy and institutional framework should enable efficient data management, sharing, and coordination amongst all relevant departments. Apart from this, the coastal regulation zone notification also plays, an important role in regulating development along the coast. Goa is faced with problems of depleting mangroves and eroding beaches along with disturbance in the sand dunes (also known to be nature's first line of defence to storms). Considering this, it is imperative that enforcement and implementation of the coastal regulation zone notification and other development and building regulations become part of soft solutions required to build urban resilience. The proposed plan of developing sand dune park at two sites—one in north and other in south Goa— is a right step towards building climate resilience. Table 9 lists the potential entry points for mainstreaming climate resilience planning under this sector.

Table 9: Environment, Climate Change, and Disaster Management

Regulations	Entry Points/Recommendations/Action Points
Indian Forest (Goa Amendment) Act, 1988 and Goa State Forest Policy, 2009	Regulation of land use and development of built structures and infrastructure in areas that provide natural buffers for management of floods and storms, for instance, mangroves.
District Disaster Management Plan for North Goa and District Disaster Management Plan for South Goa	▪ The Plan should enable detailing out and preparation of city/micro-level emergency management and resilience plans including strategies for community sensitization, SOPs, identification evacuation routes and gathering points, etc. ▪ Integration of disaster management as a key component of resilience planning, especially for risk reduction in the case of climate change induced extreme events.
Coastal Regulation Zone Notification	Enforcement and implementation of the Coastal regulation zones.

Solid Waste, Sanitation, and Public Health Management

Solid waste management is one of the essential obligatory functions of the urban local bodies and municipal authorities, under the provisions of the Goa Municipalities Act, 1968 (amended in 2010) and at the state level, the Urban Development Department is responsible for implementation of waste handling and management rules by the ULBs and municipal authorities. The Goa State Pollution Control Board monitors the compliance of standards regarding groundwater, ambient air, leachate quality, and compost quality, including the incineration standards as laid out under the Municipal Solid Waste (Management and Handling) Rules, 2016, and thereby is in charge of matters pertaining to management of solid waste under the provision of the Water (Prevention & Control of Pollution) Act, 1974; Air (Prevention & Control of Pollution) Act, 1981; Biomedical Waste (Management & Handling) Rules, 2016; the Hazardous Waste (Management & Handling) Rules, 2016; and the Municipal Solid Waste (Management and Handling) Rules, 2016.

Under the Department of Science and Technology, a Solid Waste Management Cell (SWMC) has been constituted to facilitate the setting up of two solid waste management facilities in the state. To this end, two municipal waste management plants have been planned at Calangute/Saligao in north Goa and at Cacora in south Goa. The SWM plant at Saligao has started operating in May 2016 and work is in progress to establish the other plant in Cacora. The SWMC also conducts workshops to generate awareness and sensitize the citizens on waste segregation. The SWMC also plans on coming up with a biomedical waste management plant in Goa. The Directorate of Health Services is the nodal agency for all matters pertaining to public health system and services in the state. In case of emergency response, this department is one of the coordinating departments for the state level and district-level disaster management authorities. The department functions, through a network of health centres and hospitals, in the urban and rural areas of the state, and few specialised clinics for implementation of various health programs.

Potential for mainstreaming

Climate change impacts a broad spectrum of city functions, infrastructure, and services and can lead to aggravating the existing stress in the city. The impacts of climate change are often worsened more due to the lack of provisions for solid waste management and sanitation, as it makes a conducive enviroment for the outbreak of epidemics and other health risks. Some of the impacts of sea-level rise and high precipitation on disposal/landfill activities are inundation of sites near the coast and possibility of increased damage to site facilities, such as weighbridge, roads, and offices, etc. breaks in the containment structure causing debris and leachate to escape from the landfill and contaminate local resources, deterioration of the the impermeable lining of sanitary landfill facilities due to salt water infiltration. (Bebb and Kersey, 2003), (USAID, 2012) Further the changes in site hydrology and temperature also impacts the landfill degradation rates, leachate production, and composition, etc. Thus, from the policy and

regulation point of view, it becomes necessary that guidelines are constantly updated to incorporate the knowledge on these impacts. Sensitization of all waste management stakeholders on the impacts of climate change should be done through capacity building programs. For instance, feedback can be taken from site operators and regulators on recent climate related events (closure due to storms, flood events, etc.) and their impact on waste management activities (Bebb and Kersey 2003). The provision of reporting accidents in the MSW Rules is a welcome step in this direction as the feedback received from these reports will update the understanding of policy makers. Table 10 elaborates the potential for mainstreaming climate resilience under this sector.

Table 10: Solid Waste, Sanitation, and Public Health Management

Regulations	Entry Points/Recommendations/Action Points
The Municipal Solid Waste (Management & Handling) Rules, 2016	▪ The MSW Rules, 2016, specify the municipal authorities to prepare a municipal solid waste management plan as per policy or strategy of the concerned State government or Union Territory. The Rules must also be incorporated in the Municipal bylaws of all the ULBs. These plans and bylaws potentially provide entry points for adaptation options. ▪ Schedule I- Specifications for Landfill Sites in the Rules, specify the criteria for site selection. While they mention that selection of landfill sites shall take into consideration the relevant environmental issue, there is a need to define these issues and elaborate their implications in the respective state plans. For instance, for coastal cities the municipal authorities might need to assess vulnerable areas with respect to impact of sea level rise and storm surges and consider the results while siting for landfill sites; compost stations; sorting centres and other disposal/ processing stations. ▪ The impacts of sea-level rise and high precipitation on disposal/landfill activities should be thoroughly studied and the existing guidelines should be constantly updated to include knowledge about these impacts. ▪ The municipal authorities must bring in capacity building for all waste management stakeholders to create awareness on the potential impacts of climate change that could influence their service delivery responsibilities and contractual commitments. It is recommended that awareness activities for site operators are conducted for increasing their preparedness to weather-related impacts on the waste management sector. ▪ SWMC has acquired land in Kundaim industrial estate to establish a biomedical waste management plant. Climate proofing of the proposed infrastructure should be included from the planning to the implementation stage.
Goa Municipalities Act, 1968 (last amended 2010)	▪ Key functions of municipalities being sanitation, solid waste and drainage management, and building permissions and approvals, integration of resilience building measures, such as siting of buildings and infrastructure assets as per vulnerability assessment, standard operational procedures for efficient management of services, such as drainage and solid waste and enforcement of amended building bylaws for resilience building should be put in place. ▪ As of present the 74th Constitutional Amendment Act has not been fully implemented in the state as a result of which the municipalities are not currently carrying out all the functions listed under Schedule XII. With the dissolution of urban planning and management functions to the municipalities, local climate resilience efforts may be better implemented.
Goa Health Services Development Act, 2008 (Goa Act 13 of 2009)	Augmenting health facilities and improving its accessibility to urban poor along with standard operational procedures for public health management during emergency and non-emergency situations.

Water Supply Sewerage and Drainage

At the state level, the urban water supply and sewerage schemes are prepared and executed by the PWD under the Goa Provision of Water Supply Act, 2003, the Goa, Daman and Diu Public Health Act, 1985 and Rules, 1987, and the Goa Sewerage System and Sanitation Services Management Act, 2008 & Rules, 2010. The Public Health Engineering (PHE) wing of the PWD is responsible for all matters pertaining to water supply and sewerage in the urban and rural areas of the state. The Sewage and Infrastructure Development Corportaion of Goa Limited (SIDGCL) is responsible to develop sewerage facilities in the state. The Department of Water Resources, Government of Goa, is the nodal department for matters related to conservation and development of water resources for domestic and industrial use, watershed management, irrigation, flood control, and anti-sea erosion. The provisions of the State Water Policy and the Goa State Ground Water Policy, 2013, are being undertaken by this department.

Potential for mainstreaming

Water supply in urban areas can be severely compromised due to climate change. Changes in precipitation pattern, reduction in river flows, and groundwater tables all affect water supply. In the event of floods, water supply networks and sewerage systems are often disrupted, particularly in low- lying coastal regions where it is more prone to sea level rise and flooding. Annexure 3 provides an overview of all the policies and regulations, studied and reviewed under this sector, in order to identify entry points which facilitate integration of climate change considerations in the system. Considering Goa is a coastal state, it is important that the process of planning and siting of sewerage systems, should be on the basis of vulnerability assessment and also taking into consideration low-lying zones, so that risks to public health are minimized. In coastal regions, the sea-level rise, storm surges, and flooding, impacts the waste water systems in numerous ways such as the waste water systems can get flooded due to back flow caused by high tide or SLR, the debris caused due to flooding can cause blockages within the inlets, outlets, and pipelines etc. The design features of new drains should take into account the vulnerable zones of the city and appropriately inbuilt resilience features into the system. Further, the design of the sewer drains should accommodate design parameters that take into account climate resilience building features to address the above mentioned impacts. Additionally, the possibility of decentralized systems and DEWATS can be explored. Table 11 lists the potential entry points that can adopted for mainstreaming climate resilience under this sector.

Table 11: Water Supply, Sewerage, and Drainage

Regulations	Entry points/Recommendations/Action Points
Goa Provision of Water Supply Act, 2003 Goa Ground Water Regulation Act, 2002 and Rules, 2003	▪ The Act should ensure departmental coordination and sharing of information with the concerned departments developing and managing urban water supply. For example, the Ground Water Cell should assist the Public Works Department and city municipalities in quality monitoring and assessment at locations of bulk withdrawal.
Goa Sewerage System and Sanitation Services Management Act, 2008 & Rules, 2010	▪ The process of planning and siting of sewerage systems should take the vulnerability assessment and low-lying zones into consideration to minimize risks to public health. ▪ The design features of new drains need to appropriately build in resilience features into the system, for instance, slopes, building materials, etc. to manage damage and corrosion risks as a result of floods, water logging, and sea-level rise and ingress. ▪ Use of DEWATS and other suitable decentralized sewage management systems

Tourism

The tourism sector in the state is managed by the Department of Tourism, Government of Goa. The Department is headed by a Director who also functions as the Joint Secretary to the state government and reports to the Secretary

(Tourism). The Director of Tourism exercises the statutory powers of the "Prescribed Authority" under the Goa Registration of Tourist Trade Act, 1982, and as the 'Competent Authority' under the Goa Tourist Places (Protection & Maintenance) Act, 2001. The Director is involved in policy formulation, planning and development of basic infrastructure, promotion, publicity, and marketing of Goa, as a prime tourist destination, both within and outside the country.

Apart from this, the Goa Tourism Development Corporation (a Government of Goa undertaking)deals with the operations in the tourism sector and provides budget accommodation, sightseeing tours, and river cruises.

Potential for Mainstreaming

Being a tourist destination, the economy of Goa is heavily dependent on the tourism sector. However, high tourist inflow and allied tourism activities negatively impact the overall ecosystem and pose an additional burden on the infrastructure of the state. Climate change impacts, such as sea-level rise, and flooding, threatens coastal tourism infrastructure, and natural attractions. It is important that the tourism infrastructure provision is keeping in mind the future climate change impacts as well future tourist demand. Annexure 3 provides an overview of all the policies and regulations that have been reviewed under this sector.

As per the Goa Tourist Places (Protection and Maintenance) Act, 2001, the competent authority may declare any place, monument, site, location to be a tourist place for the purposes of this Act, including any river, riverbed, beach, water spring, lake, water course or land, etc. This provides a most appropriate entry point for adaptation wherein vulnerable built heritage/precincts, ethnic communities or natural assets such as beaches, Khazans or Salt Pans, which are also of tourist importance, may be brought within the purview of the Act for protection and conservation. Under the provisions of the Goa, Daman and Diu Registration of Tourist Trade Act, 1982 and Rules, 1985 (last amended in 2011), the siting and location of tourist activities should be such that the vulnerable hotspots are avoided. The Beach Shack Policy (as amended in 2012/13) under the Goa Registration of Tourist Trade Act, 1982, governs the allotment and erection of private shacks and tourist shacks on beaches of Goa. The integration of climate adaptation should be through the siting and location of shacks; avoiding vulnerable hotspots; regulation of water and energy consumption and use of efficent and renewable services; and erecting resilient structures in view of the flood and sea level rise vulnerability. Table 12 further elaborates the potential entry points that can enhance the resilience of the sector to the impacts of climate change.

Table 12: Tourism

Regulations	Entry Points/Recommendations/Action Points
Goa Tourist Places (Protection and Maintenance) Act, 2001	Vulnerable built heritage/ precincts, ethnic communities or natural assets, such as beaches, Khazans or Salt Pans, which are also of tourist importance, may be brought within the purview of the Act for protection and conservation.
Goa, Daman and Diu Registration of Tourist Trade Act, 1982 and Rules, 1985 (last amended in 2011)	▪ Siting and location of tourist activities, for instance, avoiding vulnerable hotspots. ▪ Regulation of water and energy consumption and use of efficient and renewable services. ▪ Enforcement of building bylaws to ensure resilient building construction in terms of setbacks, plinth levels, use of basements and building materials in view of the flood and seas-level rise vulnerability in coastal areas.
Beach Shack Policy (as amended in 2012/13) under the Goa Registration of Tourist Trade Act, 1982	▪ The policy provides guidelines on locations and materials for building shacks. These should be strictly enforced for building resilient structures. ▪ It is recommended that an inventory of registered and approved shack owners is maintained and updated regularly to regulate the construction and use of beaches.

Road Transport

At the state level, the Department of Transport is the competent authority that governs the roads and highways sector. PWD is the nodal agency for the development and management of highways. Besides, in urban areas, the urban development authorities and the city municipalities also develop and maintain the roads within their jurisdiction.

Potential for Mainstreaming

Goa being a coastal state is highly vulnerable to sea level rise. Roads and the allied infrastructure are exposed to the risks of sea-level rise and associated flooding and inundation. Roads establish connectivity and are crucial for transport, logistics, business and commercial activities, and for emergency and relief operations. Thereby it is integral that the roads and highways networks are climate proofed and do not fail in the event of an extreme climatic event. Climate and disaster vulnerability mapping of roads and associated infrastructure would be right step in the direction of enhancing the climate resilience of roads and highways. Table 13 lists the entry points with a potential for mainstreaming climate change adaptation in the road transport.

Table 13: Road Transport

Regulations	Entry Points/Recommendations/Action Points
Goa, Daman and Diu Highways Act, 1974	▪ Climate and disaster vulnerability mapping of road infrastructure should be conducted such that the road infrastructure map includes all the critical infrastructures. This assessment will also help in making a plan for maintenance of existing roads alignment and design of new roads and highways. ▪ Formulating standard operational procedures for routine maintenance and emergency maintenance. Routine maintenance would include provisions for cleaning of drains, culverts and soil erosion control to prevent the choking of drains and flooding for building climate resilience of highways. On the other hand, emergency maintenance and special repairs will take care of reconstruction of damaged highways due to floods, sea water ingress, etc.

Energy

In the state of Goa, the Electricity Department is the nodal agency for transmission and distribution of power supply in the state, including all urban areas. Besides, the Goa Energy Development Agency (GEDA) is the nodal agency for setting up renewable energy units in the state.

Potential for Mainstreaming

Energy services are a necessary input for development and growth. Changes in seasonal and geographical variation of climate-related parameters affect the productivity of power plants. In the occurrence of an extreme event such as storms and floods, the power supply is often disrupted for days disabling the entire city. It is imperative that energy systems do no fail during an extreme event and if they do, a back-up system is in place. The Electricity Act, 2003, facilitates development of renewable energy options within the state. The enforcement of the Act will enable appropriate adaptation options within the power sector by providing alternate sources of energy. The provision for enabling development of decentralized smart grids based on renewable energy at neighbourhood/ community level is another potential mainstreaming option that can be addressed by the Act. This will help in addressing the power supply needs in case of disruptions in the network caused due to damage to key electricity infrastructure, both at the generation (power plants) and transmission levels (transmission lines, transformers, substations) in the event of extreme events, such as storms and floods. Some of the other climate change impacts includes flooding of power substations in extreme rainfall and storm surge events; wind damage to transmission poles; eventually leading to increase in cost of power and infrastructure maintenance (HM Government 2011). These could be addressed

by utilizing appropriate construction techniques and materials to minimize the impacts. Table 14 illustrates the potential entry points for climate change adaptation in this sector.

Table 14: Energy

Regulations	Entry Points/Recommendations/Action Points
The Electricity Act 2003	▪ The Act facilitates development of renewable energy options, hence the enforcement of the same. ▪ Provision for enabling development of decentralized smart grids based on renewable energy at neighborhood/ community level ▪ Climate proofing power transmission and distribution infrastructure by using the appropriate construction techniques and materials to minimize the impacts of climate change which include: - Elevating or relocating important electrical equipment along the coasts, to protect it from flooding - Underground transmission and distribution lines where feasible - Reinforcing overhead poles with sturdier materials, to reduce damage during storms.

Implementation of Policy Road map

In the policy road map, the inherent gaps and opportunities existing in the urban climate governance mechanism have been identified to come out with recommendations for mainstreaming climate adaptation for each sector. This includes identification of entry points in specific sections of some policies. The states will need to determine timelines for implementation, institutional set ups, and mechanisms for the policy while also spelling out incremental targets and deadlines for achieving the goals inherent to the policy. While recommendations have been made on institutional and regulatory mechanisms for each sector considered under this study, there are broad issues that need equal attention. To this end, overarching recommendations need to be adapted to facilitate an enabling environment required for climate resilience planning. These have been highlighted in Chapter 4.

Given the cross-sectoral purview of the urban climate resilience policy and the kind of inter-departmental coordination that would be required, one of the challenges in institutionalizing the proposed policy would be in terms of the time that will be taken to formulate and institutionalize it. To bring about such a change in the governance system is a complex and time consuming process. Thereby an incremental approach is required by identifying priority action points in a time-bound and phased manner in terms of short-, mid- and long-term objectives and activities that need to be undertaken. It is suggested that the proposed policy should be kept in the open domain to seek public opinion and then placed before the Cabinet for approval. After approval, a dedicated entity/department should be formed for inter-departmental co-ordination and execution of the policy.

The suggestive institutional architecture for implementation of the policy in Goa could start with establishing a state-level climate resilience cell in the ambit of the urban development department of the state. The cell then coordinates with the entire urban development machinery which includes Directorate of Municipal Administration, Goa State Urban Development Authority, North and South Goa Planning and Development Authority, Town and Country Planning Organization, Goa State Industrial Development Corporation, to name a few. The cell can act as an interface for a state level high powered steering committee chaired by the Chief Secretary of the state and comprising the head of the different state line departments, parastatals, and PSUs. The steering committee can play a key role wherein projects and actions on climate resilience will be developed, and implementation and financing of the same will be sought. The steering committee can also facilitate interface between external aid agencies and technical agencies such as research and academic institutes that brings in knowledge and technical capacities

for building resilience. The policy should encourage and allow for preparation of joint proposals with the urban development department and other state-level departments to achieve desired resilience goals. If needed, formal approvals and notification processes could be devised for smooth functioning of such an interface between various departments. Figure 4 presents the suggested framework for institutionalization of the policy.

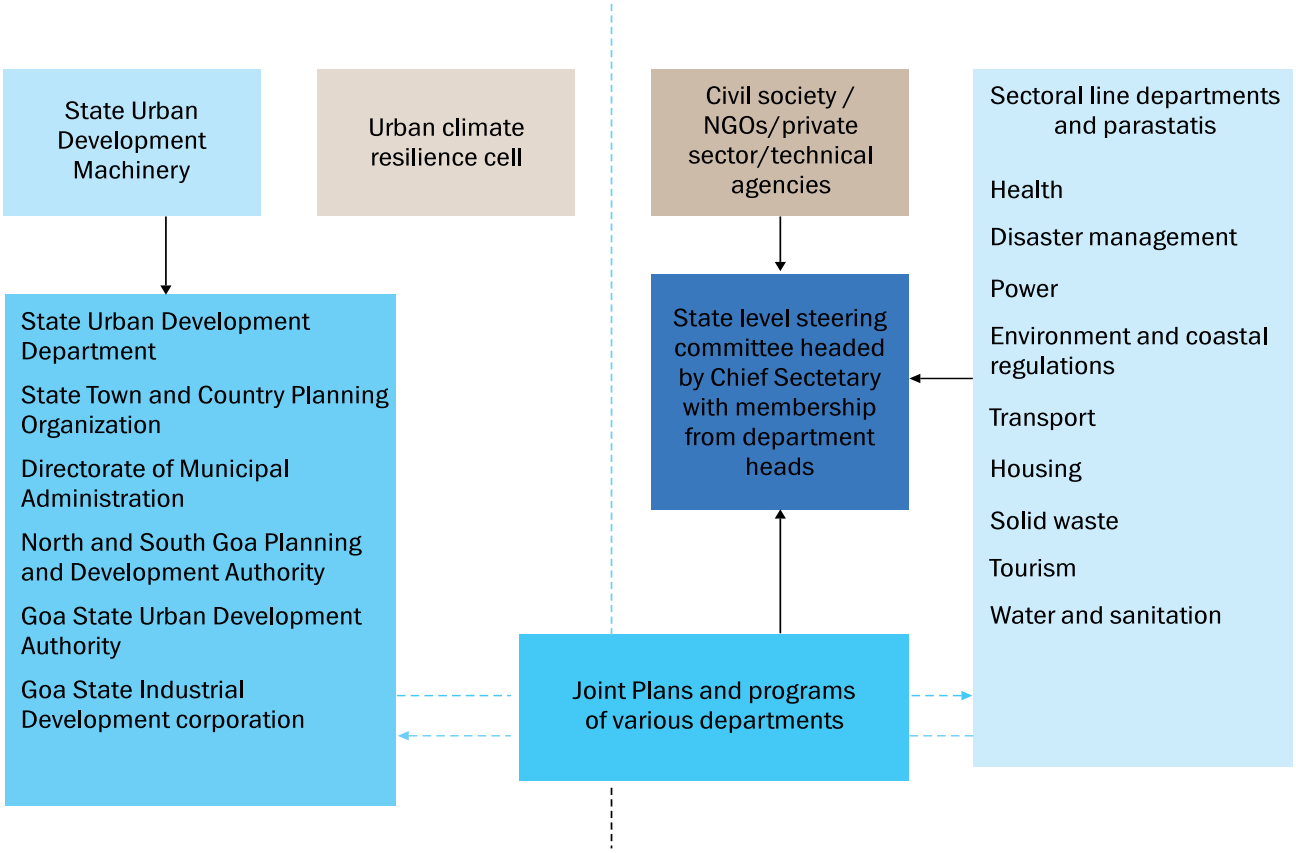


Figure 4: Proposed framework for institutionalization of the policy in Goa

In Goa, the institutionalization plan needs to be taken up on an immediate basis. For Uttarakhand, considering the topographical and climatic variability of the plains and hilly regions, the policy mainstreaming entry points and recommendations need to be further refined and it is proposed that a similar framework for the implementation of the road map is constituted.

Chapter - 4

Overarching Lessons and the Way Forward

The current study has resulted in policy road maps that present ways for addressing climate change concerns in urban areas in the states of Goa and Uttarakhand. It is now envisioned that the recommendations proposed in this road map are implemented by the state governments. The policy road maps are based on the principle that action to address climate change in urban areas should be multi-level, involving national-, state-, and city-level governments, as well as multi-sectoral, including sectors such as infrastructure and services, urban planning, transport, disaster risk reduction, and housing. The road maps also inform the sector-specific interventions needed for resilience building and inter-departmental coordination that would be needed to achieve the same. For cities to internalize resilience planning into the urban development process, an effective policy will be the one which provides for capacity building, mainstreaming, facilitating data, tools, and techniques to enable risk assessment and climate projections (TERI, 2014). One of the challenges in institutionalizing the proposed policy would be in terms of the time taken to formulate and institutionalize, given its cross-sectoral purview and the kind of inter-departmental coordination required. The study realizes that such a change in the governance system is a complex and time-consuming process. It may also not be possible to bring about all the changes in one go and it is expected that the policy would have a relatively longer gestation period. To this end, an incremental approach is required by identifying priority action points in a time-bound and phased manner in terms of short-, mid- and long-term objectives and activities to be undertaken. While it is understood that an intensive policy analysis is required to identify detailed entry points in the present institutional and regulatory mechanisms for each sector, there are some overarching policy and governance issues that require equal attention by the State and need to be addressed. To this end, this chapter discusses the key lessons, overarching recommendations and the way forward to operationalize the proposed road maps and further strengthen this research.

Institutionalizing Decision Support Systems

Data repository

A knowledge repository of climate data should be established at the state level which can be utilized for climate modelling to project future climate change scenarios and associated impacts. The State government should put in place a mechanism that facilitates the dissemination of climatic data and information to the cities for developing their Master Plans. The climatic data collated at the state level should be spread over a longer time span as it will help in studying and establishing climatic patterns in the region. The data parameters should be rudimentary in nature and should focus on local parameters in the lens of climate change rather than parameters being solely specific to climate change. It is also important that data and information is spatially translated (e.g. GIS maps) and is utilized for the purpose of urban planning.

Vulnerability analysis and risk profiles for the urban areas in the State

To create an enabling environment to mainstream climate resilience it is important that disaster and climate risk assessment are the key inputs to urban and infrastructure planning. To this end, the focus should be on developing detailed hazard, risk, and vulnerability studies. The outcome should be a detailed risk profile of the State in terms of climate impacts and extreme events. This requires past climate data and future projections of climate and various

other sectoral datasets, to help assess the vulnerability and coping capacity of city systems to climate events. During the consultation in Uttarakhand, it was suggested that one could also utilize locally identified parameters, such as slope gradient, distance from the river, angle of dip, embodied geology, etc., for defining vulnerabilities. For instance, the urban planning exercises in the State recognize and record few environmentally vulnerable sites (as per the local ecology). However, it was pointed out that many a times, flooding incidents occur due to the risk posed by urban sprawl issues like hard surfaces and encroachments rather than the natural terrain. Hence, it is important to understand the hazards and stressors through localized studies like environmental impact studies. Governance mechanisms should enable a culture wherein all urban institutions and departments are abreast with the latest technologies and best practices in the realm of urban climate adaptation planning.

Capacity Building

Sensitization and skill development of urban practitioners and decision makers is an absolute necessity for bringing about requisite changes in the existing urban governance mechanisms and systems. Capacity building programs help in bringing in knowledge and facilitate cities to efficiently deal with present and future challenges. Mandates and mechanisms that foster an environment of skill building and learning have to be created. A planned mechanism should be institutionalized to ensure regular training programs. During stakeholder consultations, the suggested themes for the capacity building programs were climate change and its impacts, disaster management, and risk and vulnerability assessments. It was also suggested that as part of the capacity building programs, mock drills and mock exercises need to be conducted so that the officials are better prepared to deal with situations during events of actual crisis. In order to incentivize the department personnel to participate in the capacity building programs, an appropriate accreditation policy can be introduced so that the officials are motivated to participate.

Aligning Local Guidelines and Policies

It is essential that mechanisms and institutions are aligned not only to ensure quality and reliable services but also to account for future vulnerabilities, such as climate change. The policies and regulations governing urban development in the State should be revised to incorporate all sustainability measures required for urban centers,and it should be ensured that its provisions are implemented in totality. Efforts also need to be directed toward improving the existing state of affairs with regards to urban climate resilience and disaster preparedness, by updating and refining disaster management plans, climate change action plans, reviewing and formulating improved building bylaws, and strengthening operational efficiency of the State and district emergency centers.

The Acts must be translated in terms of implementable guidelines that specify important questions, such as who will do what (institutional mechanisms), how this will be done (technical capacity and know-how), where will the funds come from (economic and financial considerations), and necessary timelines and schedules to be able to monitor results. A city level charter of activity that draws from all of the regulations and comes up with a clear plan of action with defined responsibilities could also help to achieve this.

Inter-departmental Coordination

Urban climate resilience being a cross-sectoral subject requires inter-linkages through coordination and dialogue amongst the concerned departments and agencies. However, the inherent fragmented institutional structure and multiplicity of agencies makes it difficult to achieve this, especially with respect to data sharing activities. This was cited as a common issue during the Policy Dialogue Forums in both the states. For instance, data sharing between the irrigation department and town and country planning department was cited as an important enabler for implementing flood resilience planning activities. Identification of a nodal agency at the city level within the Municipal Corporation or the Deputy Commissioner's office to would enable inter-departmental coordination for resilience planning efforts.

Implementation and Enforcement

The policy review also revealed presence of policies, plans, programs, and systems that may enable mainstreaming climate resilience in the urban space. The State Climate Change Action Plan, State Disaster Management Plans, and Flood Management Plans are all effective instruments for climate adaptation planning. However, due to lack of its enforcement and implementation, the purpose is often dissolved. In order to extract maximum benefits and optimum results, it is important that the implementation and enforcement of these plans and strategies is ensured. The inherent constraints and challenges in the system that prevent the implementation of these policies, plans, and programs, need to be addressed to ensure strict enforcement.

Financing Urban Resilience

Reinforcing and climate proofing existing infrastructure would require additional funds. Therefore, financial allocation for resilience building and adaptation projects should also be addressed in the urban resilience policy. Establishing national- and state-level climate funds and resource planning under various national schemes, such as Smart Cities and AMRUT can go a long way in this direction.

Presently, there are no financing mechanisms marked for urban climate resilience currently at the city or the state level. In the stakeholder consultation, it was suggested that direct funding should be allowed from multi-lateral/ bilateral sources for the implementation of infrastructure projects at the city level which will help in building climate resilience in the long run. However, it is only possible to implement a few pilot projects through external funding, and large-scale replication of such an exercise is only possible with government support and by strengthening financial capacity of urban local bodies. This would require a detailed budget analysis of various public agencies including the Municipal Corporation at the city level to enable formulation of a finance mobilization plan for resilience building.

Way Forward

The objective of the road map is to integrate the resilience agenda in the process of urban planning and development. To this end, an incremental approach is suggested, wherein immediate and long-term measures need to be taken up to implement the road maps. As an immediate measure, a nodal agency within the urban planning and development framework needs to be identified to implement the policy road map. The other measures that need to be taken up on an immediate basis are the inclusion of a chapter on climate resilience in the Master Plans, incorporation of resilience agenda into the preparation process of the development plans by conducting vulnerability assessment, and bringing in a mechanism that ensures regular training and capacity building on building urban resilience for decision-makers and urban practitioners. As long-term measures, amendment of specific legislation to integrate climate adaptation options and the convergence of the resilience agenda into the centrally sponsored and state-driven schemes to institutionalize the resilience agenda needs to be undertaken. In the case of Uttarakhand, as a way forward, the proposed policy mainstreaming options have to be further refined in bylaws and regulations specific to hilly regions and the plains, considering the topographical and climatic variability of these regions. Through the suggested measures, it is envisaged that the operationalization of the road map would go a long way in mainstreaming urban climate resilience in the urban planning and development process in the states of Goa and Uttarakhand.

Annexures

Annexure 1: Round-table Consultation with ACCCRN partners

Round-table consultation with ACCCRN partners on TERI–Rockefeller project on "Policy Engagement with State Governments on Urban Climate Resilience" on November 12, 2014 (11:00 a.m.–1:00 p.m.) at TERI, New Delhi.

List of Participants

- Mr Anup Karanth, Associate Director, TARU Leading Edge Pvt. Ltd
- Ms Shruti Sadhukhan, ICLEI South Asia
- Ms Mani Dhingra, Integrated Research and Action for Development (IRADe)
- Ms Nivedita Mani, Coordinator–Networking and Liaison, Gorakhpur Environmental Action Group (GEAG)
- Ms Zeba Aziz, Research Associate, Indian Council for Research on International Economic Relations (ICRIER)
- Mr Indro Ray, Fellow, ICRIER
- Ms Flavy Sen, Intern, ICRIER
- Ms Mili Majumdar, Director, Sustainable Habitat Division, The Energy and Resources Institute (TERI)
- Dr Divya Sharma, Fellow, TERI
- Dr Hina Zia, Fellow, TERI
- Ms Raina Singh, Associate Fellow, TERI
- Ms Rozita Singh, Research Associate, TERI

Annexure 2: Stakeholder Consultations Questionnaire

Uttarakhand

- Keeping in mind the current functions of your department, how do you perceive them to be affected by climate change impacts, such as increase in rainfall, rise in temperature, increase in extreme events, such as cloud burst, floods and landslides.
- How does your department currently respond in the event of hazards (e.g., floods and landslides)?
- In reference to the policy road map, are there any other regulations that govern or hold relevance to your department?
- Are there any existing Standard Operating Procedures (SOPs) in place or measures/mechanisms in place to deal with the occurrence of extreme climatic events?

- What are the current challenges in implementing existing state policies?
- If a state level policy is formulated for responding to the climatic events in urban areas (i.e., building climate resilience):
  a. What should be the key elements in this climate resilience policy?
  b. How do you see your department's role in it? What current actions in your department can come under the purview of this State policy? What should be the action points for your department in this new policy?
  c. What kind of support will be required for your department in order to implement this policy?
     - » Capacity building support
     - » Finance
     - » Human resources/Additional staff
     - » Technology/IT support
- Are there any existing regulations that can play an important role in complimenting this policy?
- Do you feel the need for capacity building programs
  - » Yes
  - » No
- If, yes then on what topics/issues would you like to be trained on?
- What mechanism and incentive system should be followed to ensure your participation?
- How frequently should these training programs be organized?

Goa

- What are the current functions of your department?
- What are the current regulations governing or relevant to your department?
- In case of floods and other extreme events, how are these functions affected?
- Explore whether any existing SOPs or measures/mechanisms are in place to deal with such events. What is your department's role in that SOP?
- If a state level policy is formulated, then what will be the role of your department?
- What should be the action points for your department?
- What kind of support will be required for your department in order to implement the policy?
- What current actions in your department can come under the purview of this state policy? Any current policy that can address these problems? Are there any existing regulations that can play an important role in complimenting this policy?
- How is an existing state policy being implemented by your department? What are the current challenges in implementing these?
- What are the current constraints under which the department functions?
- Based on this, how is the proposed urban resilience policy to be steered at the state level? What are institutional mechanisms to steer a State level policy? Give an example.

- What should be the reporting structure and organizational hierarchy of the steering committee/body?
- What kinds of capacity needs are required to be able to implement the policy or action points?
- What kind of data each department requires in order to link to climate change issues?
- Will there be any value addition in conducting training programs? Is there a culture of imbibing this?
- What are the current measures and mechanisms in place toward disaster preparedness? Classify the measures at state, district, and city level.
- Is there any existing micro-preparedness plan for disaster management?
- Are any measures, towards building climate resilience being adopted in older developments?
- In the housing sector are any retrofitting measures being adopted? How will the new development be planned or regulated?

Annexure 3: List of Policies Reviewed

Uttarakhand

Regulation	Purview	Governing Institution/Agencies
Urban Planning and Housing		
Uttarakhand Urban and Country Planning and Development (Amendment) Act, 2013	▪ Declaration of development areas ▪ Master Plans and Zonal Developmental Plans ▪ Arterial roads in development areas—Maintenance and improvement of facade of certain buildings abutting arterial roads ▪ Development of land in developed area ▪ Regulating land use—Use of land and buildings in compliance with the plans ▪ Acquisition and disposal of land	Town and Country Planning, Uttarakhand
Special Development Areas—Uttarakhand (UP Special Area Development Authorities Act, 1986) Adoption & Modification Order, 2006	▪ Establishment of special area development ▪ Establishment of special development authorities ▪ Master Plan for special development areas ▪ Development of land in developed area ▪ Acquisition and disposal of land	Town and Country Planning, Uttarakhand
Regulated Areas—Uttarakhand (UP Regulations of Building Operation Act, 1958) Adoption & Modification Order, 2006	▪ Power to issue directions in respect of regulated area ▪ Master Plan for the regulated area ▪ Control of development and building operations in regulated area	Town and Country Planning, Uttarakhand

Regulation	Purview	Governing Institution/Agencies
Uttaranchal (UP Nagar Nigam Act, 1959) Act 2002 Uttaranchal (UP Municipalities Act, 1916) Act, 2002	▪ Local governing bodies that work for providing necessary urban and community services, such as water supply, solid waste management, health centers, educational institutes, and housing and property tax.	State Government of Uttarakhand
Uttarakhand River Valley Protection Act, 2005	▪ Regulating sustainable development and proper management of river valley with special reference to Bhagirathi river valley up and down stream of Tehri Dam including catchment and command areas ▪ Development of River Development Authority	Bhagirathi River Valley Development Authority, Government of Uttarakhand
The Uttarakhand District Planning Committee Act, 2007	▪ Constitution of a District Planning Committee to consolidate the plans prepared by Panchayats and municipalities in the district and to prepare a draft development plan for the district as a whole	State Government of Uttarakhand
Building Byelaws 2011	▪ Rules and regulation governing construction of buildings	Town and Country Planning, Uttarakhand
Uttarakhand Urban Sector Development Investment Program (UUSDIP)	▪ Aimed at promoting balanced regional socio-economic development and poverty reduction through improvements in urban governance, management and infrastructure and service provision throughout the urban sector in Uttarakhand	Town and Country Planning, Uttarakhand; Urban Development Department (UDD) of Government of Uttarakhand
Uttarakhand Flood Plain Zoning Act, 2013	▪ Development zoning of flood plains of rivers	Uttarakhand Irrigation Department
Environment Health and Disaster Management		
Notification Declaring Watershed of the Bhagirathi an Eco-sensitive Zone, 2012 (under the Environment Protection Act, 1986)	▪ Maintenance of environmental flow and ecological balance of Bhagirathi river from Gomukh to Uttarkashi	Ministry of Environment, Forest and Climate Change, Government of India
Doon Valley Notification 1989, (under the Environment Protection Act, 1986)	▪ Notification restricting location of industries, mining operations, and other development activities in the Doon Valley	Ministry of Environment, Forest and Climate Change, Government of India

Regulation	Purview	Governing Institution/Agencies
The Indian Forest (Uttaranchal Amendment) Act, 2002	▪ Conservation, protection, preservation, and management of forest areas in Uttarakhand	Department of Forest, Government of Uttarakhand
Uttarakhand State CAMPA Action Plan, 2010 (for period of 10 years)	▪ Natural resource management and wildlife conservation and eco restoration and biodiversity conservation with livelihood support and strengthening of infrastructure	Forest Department, Government of Uttarakhand
The Uttaranchal Disaster Mitigation, Management and Prevention Act, 2005	▪ To provide disaster mitigation management and prevention in the state and the matters concerned therewith and incidental thereto	Uttaranchal State Disaster Management Authority, Disaster Mitigation and Management Centre
Uttarakhand Disaster Recovery Initiative : Uttarakhand Disaster Recovery Project (World Bank funded) Uttarakhand Emergency Assistance Project (ADB funded)	▪ To rebuild basic public and social infrastructure that were damaged aftermath 2013 Uttarakhand disaster	State Government of Uttarakhand
Solid Waste Management, Public Health, and Sanitation		
The Municipal Solid Waste (Management & Handling) Rules 2016	▪ To regulate solid waste management	Environment Protection and Pollution Control Board, Government of Uttarakhand
Uttar Pradesh Plastic and Other Non-biodegradable Garbage (Regulation of Use and Disposal) Act, 2000 (applicable to Uttarakhand)	▪ To regulate plastic, non-biodegradable waste	Urban Development Department, Government of Uttarakhand
Uttarakhand Plastic and Biodegradable Waste Use and Disposal Regulatory Bill, 2013 (The Bill could not be operational in the absence of rules and guidelines for its implementation)	▪ To regulate plastic, biodegradable waste	Urban Development Department, Government of Uttarakhand

Regulation	Purview	Governing Institution/Agencies
Water Supply and Sewerage		
Uttar Pradesh Water Supply and Sewerage Act, 1975 (applicable to the State of Uttarakhand)	▪ Provision and management of water supply and sewerage and sanitation services in the state	Pey Jal Nigam, Department of Drinking Water, Government of Uttarakhand
Tourism		
Uttaranchal Tourism Development Board Act, 2001	▪ Promotion of tourism development activities in Uttarakhand in a regulated manner	State Government of Uttarakhand
The Uttarakhand Tourism Policy 2001	▪ Establish world-class infrastructure ▪ Development of new tourism destinations and tourists' circuits ▪ Bring in private players in the tourism sector	Uttarakhand Tourism Development Board (UTDB)
Uttarakhand Tourism Development Master Plan 2007–2022	▪ Envisages development of high quality sustainable tourism infrastructure, facilities and products in the prime tourism zones of Uttarakhand.	In association with the United Nations Development Plan and Government of India
Road Transport		
Road Maintenance Policy, 2015	▪ Management and maintenance of road network	Public Works Department (PWD), Government of Uttarakhand
Road Infrastructure Protection Act, 2014	▪ Prevention of misuse, damage, unauthorized use, and encroachment of road infrastructure	Public Works Department (PWD), Government of Uttarakhand
Energy		
Solar Energy Policy of Uttarakhand, 2013	▪ Creation of an enabling environment to attract public and private investments that support solar energy generation projects	The Uttarakhand Renewable Energy Development Agency (UREDA)
The Electricity Act, 2003	▪ The Electricity Act, 2003, was enacted by the Government of India to consolidate the laws relating to generation, transmission, distribution, trading, and use of electricity	Electricity Department, Government of Uttarakhand

Goa

Regulation	Purview	Governing Institution/Agencies
Urban Planning and Housing		
The Goa, Daman and Diu Town and Country Planning Act, 1974 and Rules, 1976 (last amended in 2011)	▪ Provisions for preparation, implementation, and enforcement of comprehensive Master Plans for urban areas of various states ▪ Constitution of development authorities in the state	Town and Country Planning Department, Government of Goa
The Goa, Daman and Diu Housing Board Act, 1968 and Rules, 1969 (last amended in 2001)	▪ Provides for the constitution of Housing Board in Goa and its mandate and functions governing urban housing, housing for urban poor, and housing finance	Housing Board, Government of Goa
Goa Housing and Habitat Policy (Draft), 2010	▪ Provisions for Urban housing, housing for urban poor, and housing finance	Housing Board, Government of Goa
The Goa (Regulation of Land Development and Building Construction) Act, 2008	▪ Provides for the regulation and control on building construction and land development in Goa. Impacts micro-level planning in urban areas	Town and Country Planning Department, Government of Goa; North Goa Planning and Development Authority ; Corporation of the city of Panaji
Environment, Climate Change, and Disaster Management		
The Indian Forest (Goa Amendment) Act, 1988	▪ Conservation, protection, preservation, and management of forest areas in Goa state, including mangroves and eco-tourism areas	Department of Forest, Government of Goa
The Goa State Forest Policy, 2009	▪ Conservation, protection, preservation, and management of forest areas in Goa state, including mangroves and eco-tourism areas	Department of Forest, Government of Goa
District Disaster Management Plan for North Goa	▪ Disaster risk reduction plan for North Goa district ▪ Suggests prevention and response strategies and institutional arrangements in the event of disasters, such as earthquakes, floods/heavy rains, cyclones, landslides, tsunami, or any man-made disasters	District Administration, North Goa
District Disaster Management Plan for South Goa	▪ Disaster risk reduction plan for South Goa district ▪ Suggests prevention and response strategies and institutional arrangements in the event of disasters, such as earthquakes, floods/heavy rains, cyclones, landslides, tsunami, or any manmade disasters.	District Administration, South Goa

Regulation	Purview	Governing Institution/Agencies
Coastal Regulation Zone Notification, 2011	▪ Notification delineating coastal area of India in various zones and regulating the land use, setting up and expansion of industries, operations or processes in these coastal regulation zones (CRZ). Also regulates activities along water bodies influenced by tidal activities – such as creeks, estuaries and rivers.	Ministry of Environment, Forest and Climate Change, Government of India
Solid Waste Management, Public Health, and Sanitation		
The Municipal Solid Waste (Management & Handling) Rules, 2016	▪ To regulate solid waste management	Environment Protection and Pollution Control Board, Government of Goa
The Goa, City of Panaji Corporation Act, 2002	▪ Constitution of municipal body and definition of municipal functions, including provision and maintenance of civic infrastructure and utilities	Government of Goa and Corporation of the City of Panaji
Goa Health Services Development Act, 2008 (Goa Act 13 of 2009)	▪ Provides for securing the establishment and orderly development of health institutions, services, and facilities in Goa	Department of Health, Government of Goa
Water Supply and Sewerage		
The Goa Provision of Water Supply Act, 2003	▪ Provision for the supply of water in Goa, including water for domestic as well as industrial purpose in urban and rural areas	Public Works Department, Government of Goa; Corporation of the City of Panaji
The Goa Ground Water Regulation Act, 2002 and Rules, 2003	▪ Provides for the regulation and control of the development of groundwater resources and related matters	Department of Water Resources, Government of Goa
Goa Ground Water Policy, 2013	▪ Provides for the regulation and control of the development of groundwater resources and related matters ▪ Water resources planning & management, water harvesting, Resettlement & Rehabilitation, Preparation & implementation of Flood & Drought Management Plans	Department of Water Resources and Irrigation Department, Government of Goa
The Goa Sewerage System and Sanitation Services Management Act, 2008 and Rules, 2010	▪ Provision and management of sewerage system and sanitation services in Goa and city of Panaji	Public Works Department, Government of Goa and Corporation of the City of Panaji

Regulation	Purview	Governing Institution/Agencies
Tourism		
The Goa Tourist Places (Protection and Maintenance) Act, 2001	▪ Provides for the protection and maintenance of tourist places from deterioration and erosion and preserve their tourism potential	Department of Tourism, Government of Goa
The Goa, Daman and Diu Registration of Tourist Trade Act, 1982 and Rules, 1985 (last amended in 2011)	▪ Provide for the registration of establishments dealing with tourists, such as hotels, restaurants, etc.	Department of Tourism, Government of Goa
Beach Shack Policy (as amended in 2012–13) under the Goa Registration of Tourist Trade Act, 1982	▪ Governs the private shacks and tourist shacks on beaches of Goa ▪ Guidelines, norms, and standards for construction of shacks and regulation of activities	Department of Tourism, Government of Goa
Road Transport		
The Goa, Daman and Diu Highways Act, 1974	▪ Provides for the development and maintenance of national and state highways in Goa	Directorate of Transport, Government of Goa
Energy		
The Electricity Act, 2003	▪ The Electricity Act, 2003, was enacted by the Government of India to consolidate the laws relating to generation, transmission, distribution, trading, and use of electricity	Electricity Department, Government of Goa

Annexure 4: State Policy Dialogue Forum, Goa—List of Participants

State Policy Dialogue Government of Goa—TERI–Rockefeller Project on 'A Road Map for State Urban Climate Resilience Policy'

Date: September 9, 2015 I **Venue:** Taj Vivanta, Panaji, Goa

Registration List

S.No.	Name	Designation	Organization
1.	Dr S T Puttaraju	Chief Town Planner	Town and Country Planning Department, Government of Goa
2.	Mr Anil S Ringane	Deputy Chief Project Officer (CPO)	Goa State Urban Development Agency (GSUDA)
3.	Mr Uday Lawande	Chief Project Officer (CPO)	Goa State Urban Development Agency (GSUDA)
4.	Mr Bharat Pereira	CCP	Corporation of City of Panaji (CCP)
5.	Mr Shrikant Lawande	Junior Engineer	Corporation of City of Panaji (CCP)
6.	Mr M K Shambhu	Conservator of Forests (CF)	Forest Department
7.	Ms Radha Pamnani	Chief Architect	Public Works Department (PWD), Goa
8.	Mr J S Hosamani	Additional Chief Engineer	Department of Water Resources (WRD), Goa
9.	Mr Umesh Kulkarni	Superintendent Engineer	Public Works Department (PWD), Goa
10.	Mr Pravin Barad	Assistant Director (Administration Department)	Directorate of Industries, Trade and Commerce
14.	Mr Vishwendra A Naik	Technical Officer Solid Waste Management Cell	Department of Science and Technology, Government of Goa
15.	Ms Sanisha M Naik	Scientific Assistant	Department of Science and Technology, Government of Goa
16.	Mr Elvis Gomes	Director of Urban Development	Department of Urban Development, Government of Goa
17.	Ms Anupa V P Khorjuvekar	Junior Engineer	Goa Energy Development Agency (GEDA)
18.	Mr Vinayak P Volvoikar	Mamlatdar/Executive Magistrate	District Collectorate South Goa
19.	Ms Lisa Monteiro	Reporter	The Times of India
20.	Mr Shoaib Shaikh	Reporter	Navhind Times
21.	Mr Atri Kamble	Photographer and Reporter	Lokmat
22.	Mr Prakash Kamat	Reporter	The Hindu
23.	Mr Anil Mishra	Reporter	United News of India (UNI)

Annexure 5: State Policy Dialogue Forum, Uttarakhand—List of stakeholders

State Policy Dialogue Forum—Government of Uttarakhand–TERI–Rockefeller Project on "A Road Map for State Urban Climate Resilience Policy",

Date: April 18, 2016 I **Venue:** Four Points by Sheraton Hotel, Rajpur Road, Dehradun, Uttarakhand

Registration List

S.No.	Name	Designation	Organization
1.	Mr N K Sharma	Chief Engineer	Irrigation Department, Government of Uttarakhand
2.	Mr B K Pandey	Executive Engineer	Irrigation Department, Government of Uttarakhand
3.	Dr Rajendra Singh	S A	Uttarakhand Environment Protection and Pollution Control Board (UEPPCB)
4.	Mr Bhavesh Kumar	Team Leader	Mott Mac Donald
5.	Mr J K Tripathi	Executive Engineer	Public Works Department (PWD)
6.	Dr M K Pant	CCO	State Planning Commission
7.	Mr Ravi Pandey	Executive Engineer	Urban Development Directorate
8.	Mr Raman Diwaker	Senior Accounts Officer	Uttarakhand Urban Sector Development Investment Programme (UUSDIP)
9.	Mr Akshay Sharma	Environmental Officer	Uttarakhand Urban Sector Development Investment Programme (UUSDIP)
10.	Dr S K Singh	Deputy Director	Watershed Development
11.	Mr Jagbir Singh	MIS Expert	Urban Development Directorate
12.	Mr C P Agrawal	Deputy CPO	Uttarakhand Renewable Energy Development Agency
13.	Mr S K Pant	Chief Town and Country Planner	Town and Country Planning Department, Government of Uttarakhand
14.	Mr V P Sharma	Town Planner	Town and Country Planning Department, Government of Uttarakhand
15.	Mr Vinod Kumar	Senior Project Manager	Uttarakhand Urban Sector Development Investment Programme (UUSDIP)
16.	Mr Vinay Mishra	Project Manager	Uttarakhand Urban Sector Development Investment Programme (UUSDIP)
17.	Mr R P Mamgain	Assistant Engineer	Uttarakhand Jal Sansthan
18.	Mr Rajiv Pandey	Project Officer	State Urban Development Authority (SUDA)
19.	Mr Piyoosh Rautela	Executive Director	Disaster Mitigation and Management Centre (DMMC)

S.No.	Name	Designation	Organization
20.	Mr Mukesh Maan	Senior Project Manager	Uttarakhand Urban Sector Development Investment Programme (UUSDIP)
21.	Mr Sultan Singh	Assistant Engineer	Uttarakhand Urban Sector Development Investment Programme (UUSDIP)
22.	Mr Amit Kumar	Assistant Engineer	Uttarakhand Urban Sector Development Investment Programme (UUSDIP)
23.	Mr Prabhat Raj	Chief Engineer	Uttarakhand Pey Jal Nigam (UKJN)
24.	Mr Sachin Chahu	Solid Waste Management Expert	State Urban Development Authority (SUDA)
25.	Mr Kamal Bhatt	IEC Expert	State Urban Development Authority (SUDA)
26.	Mr Navneet Pande	Additional Director	Department of Urban Development, Government of Uttarakhand

Bibliography

- ACCCRN. (2013). "Background Paper—National Conference on Emerging Mechanisms and Responses of Cities to Climate Change". New Delhi.
- Batra, L. (2009). "A Review of Urbanisation and Urbanisation and Post-Independent India". Retrieved from <http://www.jnu.ac.in/cslg/workingPaper/12-A%20Review%20of%20Urban%20(Lalit%20Batra).pdf>.
- Bebb, J., and Kersey, J. (2003). "Potential Impacts of Climate change on Waste Management". Bristol, UK: Environment Agency Technical Report X1-042. Retrieved from <https://www.gov.uk/government/uploads/system/>.
- CCP. (2006). Panaji City Development Plan. Corporation of the City of Panaji.
- Census 2011. (2011). "Goa Population Census Data 2011". Retrieved from Census 2011 <http://www.census2011.co.in/census/state/goa.html>.
- Census 2011. (2011). "Uttarakhand Population Census data 2011". Retrieved from Census 2011 <http://www.census2011.co.in/census/state/uttarakhand.html>.
- Disaster Management Community. (2013). "Floods in Uttarakhand—A New Relief Deal", Solution Exchange Community.
- Down to Earth. (2013, June 20). "Uttarakhand Government Ignored Met Warning. Retrieved from *Down to Earth* <http://www.downtoearth.org.in/news/uttarakhand-government-ignored-met-warning-41421>.
- Government of Uttarakhand. (2014). Uttarakhand Action Plan on Climate Change.
- Gupta V, Dobhal, D. P., and Vaideswaran, S. C. (2013). "August 2012 Cloudburst and Subsequent Flash Flood in the Asi Ganga, a Tributary of the Bhagirathi River, Garhwal Himalaya, India: *Current Science*, Vol. 105.
- Gupta, K. (November 2013). "Rebuilding Uttarakhand: Challenges Ahead", New Generation of Risk Reducers, from southasiadisasters.net.
- Hai, P. D. (2016). Process of Public Policy Formulation in Developing Countries. Retrieved from <http://www.icpublicpolicy.org/IMG/pdf/panel_11_s1_hai_phu_do.pdf>.
- HM Government. (2011). Climate Resilient Infrastructure: Preparing for a Changing Climate. Presented to Parliament by the Secretary of State for Environment, Food and Rural Affairs by Command of Her Majesty London, UK: TSO (The Stationery Office). Retrieved from <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69269/climate-resilient-infrastructure-full.pdf>.
- India Today. (2013, June 28). "Bahuguna Kept Eyes Wide Shut as Uttarakhand got Ignored Experts Warning of Catastrophe in 2012",from India Today <http://indiatoday.intoday.in/story/uttarakhand-government-ignoredexperts-warning-of-catastrophe-in-2012/1/285715.html>.
- IPCC. (2014). "Climate Change 2014: Impacts, Adaptation, and Vulnerability". Retrieved from http://www.ipcc.ch/report/ar5/wg2/ (accessed on May 2016).
- Kumar, Jagdeep, D. G. (2015). Spatial Patterns of Urbanization in Uttarakhand 2011. *International Journal of Scientific Research, 4*(1), 201–202 pp.

- MHFW. (2005, April 12). National Rural Health Mission 2005–2012. Retrieved from National Health Mission <http://nrhm.gov.in/images/pdf/about-nrhm/nrhm-framework-implementation/nrhm-framework-latest.pdf> (accessed on June 22, 2016).
- MHRD. (2016). Ministry of Human Resource Development. Retrieved from http://mhrd.gov.in/consultation-framework (accessed on June 22, 2016).
- Ministry of Urban Development, Government of India. (n.d.). "Urban National Transport Policy". Retrieved from <http://www.urbantransport.kar.gov.in/National%20Urban%20TransportPolicy.pdf>.
- MoUD. (2015). Smart City—Mission Statement and Guidelines. Ministry of Urban Development, Government of India. Retreived from <http://smartcities.gov.in/writereaddata/SmartCityGuidelines.pdf> (accessed on June 16, 2016).
- National Institute of Disaster Management. (August 2013). Proceedings, National Workshop on "Uttarakhand Disaster 2013—Lessons Learnt".
- Patra, J., and Kantariya K. (2014). Science–Policy Interface for Disaster Risk Management in India: Toward an Enabling Environment: *Current Science*, Vol. 107, No. 1, July 10, 2014.
- Ramachandran, R. (1989). *Urbanization and Urban Systems in India*. New Delhi: Oxford.
- Rao, M. V. (2011). "Public Policy Formulation Role of Different Agencies". Retrieved from Shodh Ganga—A Reservoir of Indian Theses <http://shodhganga.inflibnet.ac.in/bitstream/10603/1918/9/09_chapter4.pdf>.
- Rao, V. M. (2009). "Policy Making in India for Rural Development: The Contextual Limits to Quantitative Approaches. Quantitative Approaches to Public Policy"—Conference in Honour of Prof. T. Krishna Kumar. Bangalore. Retrieved from <http://www.igidr.ac.in/pdf/publication/PP-062-07.pdf>.
- RTCC. (July 2013). "Climate Adaptation Planning 'Could Have Prevented' Uttarakhand Deaths", July 2013, <http://www.rtcc.org/2013/06/21/climate-adaptation-planning-could-have-prevented-uttarakhand-deaths/#sthash.RMXTGepW.dpuf>.
- SANDRP. (2013, June 21). "Uttarakhand Deluge: How Human Actions and Neglect Converted a Natural Phenomenon into a Massive Disaster".
- SANDRP. (2015, June 18). "Two Years of Uttarakhand Flood Disaster of June 2013: Why is State and Centre Gambling with the Himalayas, the Ganga and Lives of Millions?"
- Somanathan, O. P. (2005). "Public Policy Making In India: Issues and Remedies". Retrieved from <http://www1.ximb.ac.in/users/fac/shambu/sprasad.nsf/0/e78490ff090249d06525730c0030abf9/$FILE/Public_Policy_Making_in_India_TV_SOMANATHAN.pdf>.
- TERI. (2011). "Mainstreaming Urban Resilience Planning in Indian Cities: A Policy Perspective". New Delhi: TERI Press.
- TERI. (2014). "Climate Proofing Indian Cities: A Policy Perspective". New Delhi: TERI Press.
- TERI. (2015a). "Towards a Policy for Climate Resilient Infrastructure and Services in Coastal Cities". New Delhi: TERI Press.
- TERI. (2015b). "Directions, Innovation and Strategies for Sustainable Development in Goa". The Energy and Resources Institute. New Delhi: TERI Press.
- The Times of India. (2013, June 21). "Uttarakhand Disaster Plan doesn't Exist, CAG Warned in April". Retreived from Times of India <http://timesofindia.indiatimes.com/india/Uttarakhand-disaster-plan-doesnt-exist-CAG-warned-in-April/articleshow/20690268.cms>.
- Uttarakhand State Council for Climate Change. (November 2010). Report on Brainstorming Session on Impact of Climate Change on Himalayan Livelihood.