Assessing and Managing Loss and Damage

Local-level evidence to inform global-level action in Gujarat

PART III

Institutional and Governance Framework for City-level Loss and Damage Assessment



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Disclaimer

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Abbreviations

ACCCRN	Asian Cities Climate Change Resilience Network
ADB	Asian Development Bank
ADM	Additional District Magistrate
AMC	Ahmedabad Municipal Corporation
BBB	Build Back Better
CBO	Community-Based Organization
CCG	City Crisis Group
CDMP	City Disaster Management Plan
CDRFI	Climate and Disaster Risk Finance and Insurance
CER	Certified Emission Reduction
CFO	Chief Fire Officer
CIF	Climate Investment Funds
COP	Conference of the Parties
CoR	Commissioner of Relief
CRCAP	Climate Resilient City Action Plan
CMG	Crisis Management Group
CMRF	Chief Minister's Relief Fund
CPMF	Central Paramilitary Forces
CRM	Climate Risk Management
CSS	Centrally Sponsored Schemes
CWC	Central Water Commission
DaLA	Damage and Loss Assessment
DCG	District Crisis Group
DDMA	District Disaster Management Authority
DDMC	District Disaster Management Committee
DDMP	District Disaster Management Plan
DDO	District Development Officers
DEOC	District Emergency Operations Centre
DM	Disaster Management
DMA	Disaster Management Act
DRR	Disaster Risk Reduction
DRTPS	Disaster Risk Transfer Parametric Insurance Solution
ELD	Economic Loss and Damage
EOC	Emergency Operations Centre
ERCs	Emergency Response Centres
ESCO	Energy Service Companies
ESF	Emergency Support Functions
F&ES	Fire & Emergency Services
FRLD	Fund for Loss and Damage

GCF	Green Climate Fund
GEF	Global Environment Facility
GIDM	Gujarat Institute of Disaster Management
GIF	Global Infrastructure Facility
GR	Government Resolutions
GSDMA	Gujarat State Disaster Management Authority
GSDMP	Gujarat State Disaster Management Plan
HAP	Heat Action Plan
HLC	High-Level Committee
HRVA	Hazard Risk and Vulnerability Atlas/Assessment
IACU	Inter-Agency Coordination Unit
IC	Incident Commander
ICAT	Initiative for Climate Action Transparency
ICCC	Integrated Command and Control Centres
ICS	Incident Command System
IDRN	India Disaster Resource Network
IDSP	Integrated Disease Surveillance Programme
IEC	Information, Education, and Communication
IMD	India Meteorological Department
INCOIS	Indian National Centre for Ocean Information Services
ISR	Institute of Seismological Research
ISRO	Indian Space Research Organisation
IRS	Incident Response System
L&D	Loss and Damage
LCG	Local Crisis Group
MHA	Ministry of Home Affairs
MHT	Mahila Housing SEWA Trust
MIS	Management Information System
MoEFCC	Ministry of Environment, Forest and Climate Change
MoHUA	Ministry of Housing and Urban Affairs
NAFCC	National Adaptation Fund for Climate Change
NCDC	National Centre for Disease Control
NCMC	National Crisis Management Committee
NCS	National Centre for Seismology
NDEM	National Database for Emergency Management
NDF	Natural Disaster Fund
NDMA	National Disaster Management Authority
NDMP	National Disaster Management Plan
NDMIS	National Disaster Management Information System
NDRMF	National Disaster Risk Management Funds
NDMF	National Disaster Mitigation Fund

NDRF	National Disaster Response Force
NDSAP	National Data Sharing and Accessibility Policy
NEC	National Executive Committee
NELD	Non-Economic Loss and Damage
NIC	National Informatics Centre
NIDM	National Institute of Disaster Management
NIUA	National Institute of Urban Affairs
NGO	Non-Governmental Organization
NPDM	National Policy on Disaster Management
NRSC	National Remote Sensing Centre
NSDMA	Nagaland State Disaster Management Authority
PCDIP	Philippine City Disaster Insurance Pool
PDNA	Post-Disaster Needs Assessment
PIO	Public Information Officer
PMNRF	Prime Minister's National Relief Fund
PPP	Public-Private Partnership
RRT	Rapid Response Teams
SAPCC	State Action Plan on Climate Change
SCCT	Surat Climate Change Trust
SDM	Sub-Divisional Magistrates
SDMA	State Disaster Management Authority
SDMP	State Disaster Management Plan
SDMF	State Disaster Mitigation Fund
SDRF	State Disaster Response Force
SDGs	Sustainable Development Goals
SDRMF	State Disaster Risk Management Funds
SDRN	State Disaster Resource Network
SEC	State Executive Committee
SEOC	State Emergency Operation Centre
SFDRR	Sendai Framework for Disaster Risk Reduction
SMC	Surat Municipal Corporation
SOPs	Standard Operating Procedures
SPV	Special Purpose Vehicle
TEOC	Taluka Emergency Operation Centre
UDMA	Urban Disaster Management Authority
UDMP	Urban Disaster Management Plan
UHCRC	Urban Health & Climate Resilience Centre
ULBs	Urban Local Bodies
UNFCCC	United Nations Framework Convention on Climate Change
VDMC	Village Disaster Management Committee
WIM	Warsaw International Mechanism

Executive Summary

This report, **Assessing and Managing Loss and Damage: Local-Level Evidence to Inform Global-Level Action in Gujarat, India - Part III,** builds on the findings of Part I, which examined retrospective Loss and Damage (L&D), and Part II, which analysed systems adaptation scenarios, adaptive capacities, and limits. Part III focuses on strengthening the institutional and governance architecture for city-level L&D assessment, proposing a structured framework to systematically assess, document, and manage L&D, while enabling improved access to climate finance. By focusing on Ahmedabad and Surat, the report situates L&D within urban contexts and develops lessons transferable to other Indian and global south cities.

While L&D, the third pillar of global climate action, continues to evolve rapidly within international climate negotiations and institutional mechanisms, there remains a critical need for robust, locally grounded evidence to inform global policy and operational frameworks. Ahmedabad and Surat in Gujarat demonstrate how city-level climate impacts can be systematically assessed, governed, and documented to generate actionable evidence. The insights from Gujarat are intended to contribute to and inform global processes under the Warsaw International Mechanism (WIM) and the Santiago Network, supporting the translation of international L&D commitments into context-specific, implementable action on the ground.

Climate change is intensifying the frequency and severity of extreme weather events and slow-onset hazards across Indian cities, resulting in growing L&D that extends beyond immediate physical destruction to include long-term economic, social, health, and environmental impacts. Despite India's robust Disaster Risk Reduction (DRR) and response, L&D assessment remains focused on physical damage, fragmented, relief-centric and insufficiently embedded within urban governance systems. This report responds to this gap by examining the existing disaster management framework at the national and state levels in Gujarat, and at the district level in Ahmedabad and Surat, and proposing a framework for comprehensive L&D assessment.

L&D in Policy and Disaster Management Landscape

The study reviews the policy and institutional landscape for disaster management in India and Gujarat, spanning national, state, district, and city levels. While the Disaster Management Act (2005) and its subsequent institutional arrangements have strengthened preparedness and response capacities, L&D is not explicitly articulated as an assessment or governance function.

Situating L&D within national and sub-national policy frameworks highlights how current disaster management systems are oriented towards preparedness, emergency response, relief, and compensation. While these systems are critical, they do not adequately capture

indirect losses, non-economic losses (NELDs), residual impacts, or cumulative climate risks, particularly in dense urban settings. The analysis underscores the need for a dedicated institutional approach to L&D assessment at the city level.

Existing frameworks prioritise:

- immediate physical damage,
- relief eligibility, and
- short-term recovery.

They offer limited mechanisms to capture:

- indirect and cascading losses,
- -NELD, and
- long-term and residual climate impacts.

Systems, Data, and Operational Gaps

The analysis identifies that substantial disaster- and climate-related data is already generated across multiple platforms, including hazard monitoring systems, National Database for Emergency Management (NDEM), the National Disaster Management Information System (NDMIS), sectoral Management Information Systems, departmental health and education databases, relief portals such as the Rahat Portal, and operational platforms such as Integrated Command and Control Centres (ICCCs). These systems operate in silos and lack standardised indicators for L&D, particularly for NELDs, and do not support comprehensive L&D assessment.

As a result, cities are unable to consolidate this information across sectors, hazards, and timeframes. The report identifies three interrelated categories of gaps:

- **Institutional:** including unclear ownership of L&D data and limited recognition of cities as primary data generators.
- **Operational:** such as non-standardised indicators, limited urban granularity, and weak integration of hazard, vulnerability, and impact data.
- **Capacity:** particularly at the municipal level, related to technical skills, staffing, and digital infrastructure.

The report assesses how existing city-level plans, such as Climate Resilient City Action Plans (CRCAPs), Urban Flood Management plans, and Heat Action Plans (HAP), already address climate risks and vulnerability but do not systematically translate impacts into L&D assessment.

While these plans generate valuable risk and adaptation data, they are not institutionally linked to loss assessment, recovery tracking, or financial compensation. Strengthening these linkages can enhance the effectiveness of ongoing climate investments and improve the evidence base for future funding.

Learning from Case Studies

National and international case studies illustrate diverse approaches to L&D data generation, insurance mechanisms, anticipatory action, and community-led loss documentation. Key lessons emphasise the importance of clarity on what needs to be assessed, appropriate scale and granularity, institutional ownership of data, validation mechanisms, and strong links between assessment, governance, and financing.

Recent policy developments, mainly the Disaster Management (Amendment) Act, 2025, mandate the establishment of the UDMA for state capitals, enabling new opportunities to embed L&D assessment within statutory disaster databases and urban disaster governance structures.

Proposed City-Level L&D Assessment Framework

Building on the policy analysis, systems review, and case study lessons, the report proposes a city-level L&D Assessment Framework anchored within a dedicated UDMA. The framework leverages the statutory opportunity created by the Disaster Management (Amendment) Act, 2025, which mandates the establishment of UDMAs in cities, to embed L&D assessment within formal urban disaster governance structures.

The framework outlines recommended institutional composition and clearly defined roles and responsibilities across state, district and municipal actors. Indicator-based data collection, participatory reporting, grievance redress mechanisms, and structured

engagement with non-government actors comprise the components of the framework.

At the core of the report is the Proposed L&D Assessment Framework anchored within a dedicated UDMA. The framework:

- Builds on existing district-level disaster assessment, focusing on the urban sector
- Clearly outlines the responsible departments and personnel in the state-appointed expert committee
- Integrates sectoral data across health, housing, infrastructure, livelihoods, ecosystems, and social systems, for data collection, validation, and reporting
- Enables engagement with NGOs, CBOs, academia, and the private sector,
- Leverages Integrated Command and Control Centres (ICCCs) for real-time monitoring and coordination.

Importantly, the framework is designed for scalability and interoperability, allowing cities to progressively expand indicators, improve data quality, and align with national and global L&D reporting requirements.

Financing Loss and Damage

The report examines existing public, private, and other financing mechanisms relevant to disaster response and recovery, including state transfers, contingency funds, insurance, PPPs, and emerging climate finance instruments.

It highlights how a robust city-level L&D assessment framework can:

- Address vulnerable communities and support through L&D finance,
- Strengthen access to climate risk insurance and adaptation finance,
- Generate credible evidence for engagement with international L&D funding mechanisms.

It identifies barriers to accessing and leveraging finance for L&D and highlights opportunities to align city-level L&D assessment with evolving national and global climate finance mechanisms, including climate funds for loss and damage (FRLD).

Way Forward

The report concludes that embedding L&D assessment within urban disaster governance is both feasible and urgently needed to address the residual climate impacts. Gujarat has the opportunity to serve as a demonstration state, showcasing how city-level institutional reforms, data integration, and capacity building can generate in-depth information on the disaggregated L&D, both economic and non-economic, impacting cities.

By combining retrospective loss documentation with forward-looking climate risk projections, the proposed framework can support:

- more equitable recovery,
- better-informed urban planning, and
- stronger national and international climate finance engagement.

By leveraging existing disaster management systems, strengthening data integration, building local capacity, and aligning with the Disaster Management (Amendment) Act, 2025, Gujarat can demonstrate a scalable city-level L&D framework that can be replicated in other cities. Such an approach can generate robust local evidence and strengthen India's engagement in global L&D discourse.

1.

Introduction

Loss and Damage (L&D) has emerged as the third pillar of international climate action[1], alongside mitigation and adaptation, addressing climate change impacts that persist despite or in the absence of mitigation and adaptation efforts. The Warsaw International Mechanism for Loss and Damage (WIM)[2], established in 2013 at COP19, was the first formal institutional mechanism under the UNFCCC dedicated entirely to addressing climate-related L&D. It played a foundational role in shaping the global L&D agenda under WIM's mandate, in generating knowledge, and in coordinating and supporting the global framework for understanding climate-induced losses, including slow-onset events, non-economic losses, and displacement. Subsequently, the Santiago Network3 paved the way for operational and financial mechanisms by establishing the L&D Fund within the international climate agenda. It is the dedicated institutional mechanism for providing technical assistance, capacity-building, and institutional strengthening to developing countries facing climate-induced losses. Its creation signalled global recognition that vulnerable countries required practical, context-specific operational support to assess risks, design early warning systems, conduct L&D assessments (including ELD and NELD), and integrate L&D into national planning and governance systems. The ICAT L&D Guide4 provides the guiding framework for addressing L&D associated with climate change impacts, including both extreme events (such as floods, cyclones, and heatwaves) and slow-onset events (such as sea-level rise, glacial retreat, and desertification). The Loss and Damage Fund, created at COP27 (2022) and operationalised at COP28 (2023)5, marks a historic climate-justice milestone by delivering rapid aid for unavoidable climate impacts and allocating at least half of the initial funds to Small Island Developing States and Least Developed Countries.

To support the ongoing global climate dialogues, this study is part of a broader initiative to build a practical, city-level L&D assessment framework. This is being led by ICLEI South Asia, Transitions Research and the Gujarat Institute of Development Research (GIDR), and is supported

1 Sharma, S., Ormond-Skeaping, T., & Achampong, L. (2024, October 31). Loss and damage as the third pillar of climate action: Delivering a loss and damage sub-goal under the NCQG at COP29. Loss and Damage Collaboration. https://www.lossanddamagecollaboration.org/publication/loss-and-damage-as-the-third-pillar-of-climate-action-delivering-a-loss-and-damage-sub-goal-under-the-ncqg-at-cop2

2 United Nations Framework Convention on Climate Change. (n.d.). Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts (WIM). Retrieved October 28, 2025, from https://unfccc.int/topics/adaptation-and-resilience/workstreams/loss-and-damage/warsaw-international-mechanism

3 Santiago Network. (n.d.). Home [Website]. https://santiago-network.org/

4 Puig, D. (2023). Assessing climate change-driven losses and damages [Guidance note]. UNEP Copenhagen Climate Centre & Initiative for Climate Action Transparency (ICAT). https://climateactiontransparency.org/resources/assessing-climate-change-driven-losses-and-damages/

5 United Nations Environment Programme – Copenhagen Climate Centre. (2023, December). Loss and damage at COP28: A historic step forward for loss and damage [Policy brief]. https://unepccc.org/wp-content/uploads/2023/12/loss-and-damage-at-cop28-web.pdf

by UNOPS Copenhagen Climate Centre.

To ground and contextualise L&D studies in India, the focus is on Ahmedabad and Surat, two of Gujarat's most urbanizing cities, which are faced with extreme climate events. The first and second reports of this study highlight that Gujarat's temperatures are projected to rise by 1.5–5°C and rainfall by 15–25%, increasing flood risks.

By 2070, both Ahmedabad and Surat are expected to experience substantial warming, with temperatures rising by 1–3°C in Ahmedabad and 0.5–3°C in Surat across RCP 2.6, 4.5, and 8.5 scenarios. The frequency of hot days is projected to increase by 15–60 days in Ahmedabad and 20–60 days in Surat, while hot nights may rise by 30–110 nights and 35–110 nights, respectively. Correspondingly, cold days and nights are expected to decline in both cities.

Heatwave events in both cities are projected to increase by 5–30 days by 2070, indicating intensified heat stress. Extreme rainfall behaviours diverge: Ahmedabad may see a slight increase in extreme rainfall events (0 to 0.25 increase), whereas Surat may witness a marginal decline (0 to 0.5 events). Overall, rainfall in both cities is expected to increase by 20–60 mm, signalling shifting monsoon patterns despite fewer extreme events.

Higher temperatures are projected to impact thermal comfort and deplete water resources, while increased precipitation variability will heighten flood risks. Both reports focused on generating local evidence on the impacts of climate and the resulting ELD and NELD from extreme climate events (heatwaves, flooding).

1.1 L&D Assessment in the Policy Landscape

At the international level, L&D is addressed through WIM[6] under UNFCCC. Article 8 of the Paris Agreement formally integrates L&D as a distinct pillar alongside mitigation and adaptation. The L&D policy landscape continues to evolve, particularly with respect to capacity building, data collection, monitoring and mobilizing finance distribution fairly and efficiently.

In the Indian and Gujarat context, while L&D is not explicitly articulated as a separate policy domain, its core elements are embedded within the disaster risk reduction (DRR) and disaster management framework. The Disaster Management Act, along with supporting policies, institutional and governance mechanisms, anchors DRR in India, as detailed in Chapter 2. Within this framework, India has established systems for damage, loss, and needs assessment at the district and state levels, although these are not explicitly labelled as L&D-related processes.

For systematic reporting and detailed assessment, India primarily uses the Post-Disaster Needs Assessment (PDNA) and Damage and Loss Assessment (DaLA) frameworks.

a) Post-Disaster Needs Assessment (PDNA)

The PDNA framework[7] provides a comprehensive approach for assessing disaster-induced losses, damages, and recovery needs following large-scale disasters. It deploys a detailed assessment of losses and damages from climate events at the state or regional level, not at the city level. The current disaster management framework includes provisions for the post-disaster evaluation at multiple levels:

- **Detailed loss surveys and damage assessments:** Comprehensive assessments conducted by district and local authorities immediately following disaster events to determine compensation and reconstruction needs.
- **Sector-wise Analysis:** Specific evaluations for different sectors (housing, infrastructure, agriculture, health) and cross-cutting issues (gender, vulnerable groups, DRR integration)

6 United Nations Climate Change. (n.d.). Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts. https://unfccc.int/topics/adaptation-and-resilience/workstreams/loss-and-damage/warsaw-international-mechanism

7 National Institute of Disaster Management. (n.d.). Standard operating procedure – Post disaster needs assessment (PDNA) [PDF]. https://nidm.gov.in/PDF/pubs/sop_pdna.pdf

- **NELD** are partly estimated under socio-economic impacts (income loss, service disruption, social and psychological impacts) through selected sample surveys, focus group discussions, and discussions with the local, state and national NGOs in the affected areas.
- **Recovery and Rehabilitation:** Quantifies financial requirements to restore livelihoods, rebuild infrastructure to safer standards, revive economic activity, and ensure access to basic services.

b) Damage and Loss Assessment (DaLA)

The DaLA methodology also provides a structured approach to quantifying disaster impacts, as explained in the previous report. It uses objective, quantitative information on the value of destroyed assets and temporary production losses to estimate government interventions for short-term response and post-disaster financing needs.

Outputs of PDNA and DaLA can establish credible evidence for national L&D accounting, informing insurance mechanisms, compensation, and prioritization under national disaster relief and L&D funds. However, the PDNA methodology does not capture detailed non-economic losses, marginalised communities, small businesses, and environmental impacts, areas that are critical for advancing L&D policy and funding access.

While PDNA is initiated in the event of a large-scale disaster, the existing Emergency Response centres (ERCs) established by GSDMA, (detailed in Section 2.1.7) support response coordination and situational monitoring following extreme climatic events. The relief memorandum for relief measures and compensation (detailed in Section 2.23), immediately after any extreme climatic event, to enable rapid response, is prepared by the State Revenue Department. The District Emergency Operations Centre (DEOC) is responsible for assessment, and the Revenue Department for compensation and relief systems. Broadly, areas covered in such cases are:

- Compensation for Loss of Life
- Compensation for Injuries
- Clothing and Utensils/Household Goods relief
- Cash Doles
- Compensation for Loss of Animals
- Compensation for Damage or Destruction of Cattle Sheds
- Fully/Partially Damaged Pucca Houses
- Animal and Poultry Loss
- Damage to Power Sector, Agriculture Sector, Roads and Buildings, Forests and Environment Sector, Health Sector, Education (Schools), Women and Child Development Sector (Anganwadis), Fisheries sector, Food and Civil Supplies, Transport, Water Supply

Statutory relief and compensation (ex gratia, house damage, crop loss) are primarily sanctioned and disbursed through the Revenue Department. The disbursement is carried out through the district revenue administration involving District Development Officers (DDO), Sub-Divisional Magistrates (SDM), and Mamlatdars, and is detailed in the next section.

1.2 Emerging Approaches to L&D

Gujarat, during the 2024 floods, prepared a detailed flood memorandum outlining losses and damages across all sectors.[8] The document is accessible through the Commissioner of Relief's official website.[9] This memorandum reflects the state's established practice of documenting sector-specific damage and losses following extreme events.

Recently, L&D Assessment has been addressed in the Climate Risk Management (CRM) Framework for India (2019)[10], a comprehensive, multi-level approach developed to address

8 Government of Gujarat. (2024). Memorandum: Gujarat Flood 2024 (Y_778). Directorate of Relief & Disaster Management. Y_778_Memorandum_Gujarat_flood_2024.pdf

9 Downloads | Commissioner of Relief

10 Mechler, R., Awasthi, K., Bhatt, S., Chaturvedi, A., Toast, J., Ederer, W., & the International Institute for Applied Systems Analysis (IIASA) & Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)-India, in collaboration with the National Institute of Disaster Management (NIDM) (2019). Climate Risk Management (CRM) Framework for India – Addressing Loss & Damage [Technical report]. MoEFCC/GIZ/IIASA/NIDM. https://nidm.gov.in/PDF/pubs/GIZ_NIDM_Climate%20RiskManagementFramework.pdf

climate-related risks. The framework aims to support national institutions to assess and determine their response to climate-related risks, explicitly addresses "residual risks", risks that remain after adaptation and risk reduction efforts and frames these in terms of L&D. The use of "impact chains" connects economic and non-economic aspects, enabling identification, quantification, and prioritization of risks and losses across the full spectrum (NIDM & GIZ, 2019). This is foundational to the international L&D agenda, as articulated by UNFCCC and COP decisions.

While L&D is not explicitly mentioned separately in the policy domain, its elements are embedded within the DRR framework. Building on the previous two studies, this report will focus on developing the institutional and governance framework to assess, finance, and manage L&D at the city scale in Ahmedabad and Surat.

1.3 Need for institutional framework for city-level L&D assessment

Rising climate hazards intersect with rapid urbanization, informality, and infrastructure dependencies. While existing district disaster management authorities (DDMA) are responsible for disaster management planning (DDMP) and implementation within district boundaries, districts often encompass both urban and rural areas, requiring differentiated approaches. Cities face unique challenges[11] that require urban-specific assessment approaches, such as:

- **Population and Infrastructure density:** Urban areas concentrate high population density, infrastructure and services, creating complex interdependencies. Urban areas concentrate economic activity, employment, and assets. Damage to one system (e.g., electricity) can cascade to affect other systems (water supply, transportation, communications), amplifying total losses.
- **Differentiated Vulnerability:** Urban L&D assessment must disaggregate impacts across different population groups (low-income, informal settlements, elderly, differently-abled, children) to ensure equity considerations. For example, slum dwellers with inadequate housing and services, outdoor workers exposed to heat and weather extremes, the elderly and children with heightened health vulnerabilities and migrants with limited social support networks are exposed to higher risk and are more vulnerable to climate impacts.
- **Urban Services:** Cities depend on the continuous provision of urban services, water supply, sanitation, waste management, healthcare, and education. Disruption of these services during climate events creates both immediate health risks and long-term developmental impacts that must be captured.
- **Co-located hazards:** Cities impacted by two or more different types of hazards (natural or human-induced) that occur in the same location, either simultaneously, sequentially, or in close succession, amplifying risks and compound impacts. Urban areas with their dense infrastructure may see cascading impacts, where, for example, heavy rainfall can lead to urban flooding, which can trigger landslides or dam failures, or flooding can destabilise buildings, disrupt transport, and spark disease outbreaks.

L&D assessment in cities must account for residual risk that persists even with adaptation, and offer a planning and financing lens for what remains. At the city level, L&D assessment can be addressed most explicitly through detailed urban infrastructure assessments, service-disruption analyses, ward-level granularity, and municipal service-delivery impacts. This report will explore mechanisms for anchoring L&D within existing disaster management policies in India and develop a comprehensive framework for the Gujarat context.

11 Archer, D. (2014, October 23). Climate-related "loss and damage" in cities: Exploring a new urban frontier. International Institute for Environment & Development. https://www.iied.org/climate-related-loss-damage-cities-exploring-new-urban-frontier

2.

Existing Disaster Management Framework: Policies, Institutions, Systems and Gaps

While the existing L&D policy is still rapidly evolving in terms of mechanisms for capacity building, data collection, monitoring, and mobilizing finance, India's disaster management policy landscape provides a strong base for developing a L&D assessment framework embedded within existing mechanisms. In India's policy and institutional framework, there are existing methods for data collection, assessment, reporting and relief and compensation mechanisms at the state and district level that are detailed in this chapter.

2.1 Policy Landscape and Institutional Framework for Disaster Management

2.1.1 Legal and Policy Frameworks

India's disaster management policy landscape is anchored in the Disaster Management Act, 2005 and strengthened by the Disaster Management (Amendment) Act, 2025, which together create a comprehensive framework for preparedness, response, recovery, and resilience. The Disaster Management Act, 2005[12], represents a paradigm shift in India's approach to disaster management, moving from a 'reactive and relief-centric' to a more holistic one, with greater emphasis on preparedness, prevention and mitigation.

The Act establishes a comprehensive legal and institutional framework at four levels, national, state, district, and urban, for effective disaster management. The breakdown of all the Acts, plans, policies and guidelines, both at the national level and state level, has been detailed in Report-1.[13] It covers the NDMA Act (2005), National Policy on Disaster Management (NPDM), 2009, and at the state level, the Gujarat Disaster Management Act, 2003, Gujarat State Disaster Management Plan (GSDMP 2023-24), and Ahmedabad/Surat District Disaster Management Plan (DDMP).

The system is coordinated by national, state, district, and, more recently, urban disaster management authorities, with an emphasis on decentralization, urban focus, risk assessment, data-driven planning, and integration of climate risks. This section will explore the institutional arrangement at the national, state, district, and sub-district levels. The report will analyse key policy instruments, including the NDMP , State and District Management plans, specialised

12 Government of India. (2005). The Disaster Management Act, 2005 (No. 53 of 2005). Ministry of Home Affairs. https://ndma.gov.in/sites/default/files/PDF/DM_act2005.pdf

13 United Nations Environment Programme – Copenhagen Climate Centre. (December, 2024). Assessing and Managing Loss and Damage: Local Level Evidence to inform Global Level Action – Gujarat, Deliverable-1 https://unepccc.org/wp-content/uploads/2025/03/phase-1-deliverable-ld-assessment-gujarat-final-dec12.pdf

frameworks for climate risk management, L&D, data collection templates, disaster reporting assessment and relief and compensation mechanisms.

2.1.2 National-Level Institutional System

India's disaster management system is structured under the Disaster Management Act, 2005, which establishes a multi-tiered institutional and planning framework extending from the national to the local level. At the national level, the framework provides overall policy direction, coordination mechanisms, and specialised support systems for DRR, preparedness, and response. Figure 1 illustrates the governance framework for disaster management in India.

A. National Institutional Framework and Coordination Mechanisms

1. **National Disaster Management Authority** The National Disaster Management Authority (NDMA), headed by the Prime Minister of India, is the apex national body for disaster management. NDMA is mandated to lay down policies, plans, and guidelines for disaster management. The NDMA guidelines assist central ministries, departments, and the states in formulating their respective disaster management plans.
2. **National Executive Committee** Constituted under Section 10(1) of the Disaster Management Act, the National Executive Committee (NEC)[14] is tasked with formulating the NDMP and ensuring its annual review and updates, under the chairmanship of the Union Home Secretary. It oversees the implementation of disaster management plans, ensures compliance with central directions, and leads coordination during disasters. It mobilises ministries, state agencies, armed forces, scientific institutions, and response forces to provide resources, early warnings, and emergency support in accordance with protocols.
3. **Ministry of Home Affairs (MHA):** The MHA is the nodal ministry for disaster management, and is responsible for national coordination, fund administration (National Disaster Response Fund / State Disaster Response Fund), and approval of NDRF deployment.
4. **Cabinet-Level Committees:**

- Cabinet Committee on Management of Natural Calamities (CCMNC): Oversees major policy decisions for managing large-scale disasters.
- Cabinet Committee on Security (CCS): Addresses disasters with security implications.
- High-Level Committee (HLC): Approves financial assistance to states from the National Disaster Response Fund based on NEC recommendations.

B. Supporting National Mechanisms

1. **National Institute of Disaster Management (NIDM):** Serves as the foundational training institute dedicated to providing training and capacity development programs focused on effectively managing natural calamities. The institute achieved the status of a statutory organisation under Section 42(8) of the NDMA 2005. The NIDM works within the framework of broad policies and guidelines laid down by the NDMA.
2. **National Disaster Response Force (NDRF):** A specialised body formed under Section 44 of the DM Act for effective response to both natural and man-made disasters. NDRF provides specialised search, rescue, and relief services during emergencies. As per the DM Act, the general superintendence, direction and control of the NDRF shall be vested and exercised by the NDMA. The command and supervision of the NDRF shall vest with the Director General appointed by the Government of India.
3. **National Crisis Management Committee (NCMC):** Its functions include coordinating response efforts across government agencies, assessing preparedness, and directing actions to minimise loss of life and property during crises, chaired by the Cabinet Secretary.

14 Ministry of Home Affairs, Government of India. (n.d.). Power and functions of National Executive Committee [Webpage]. https://ndmindia.mha.gov.in/ndmi/functions

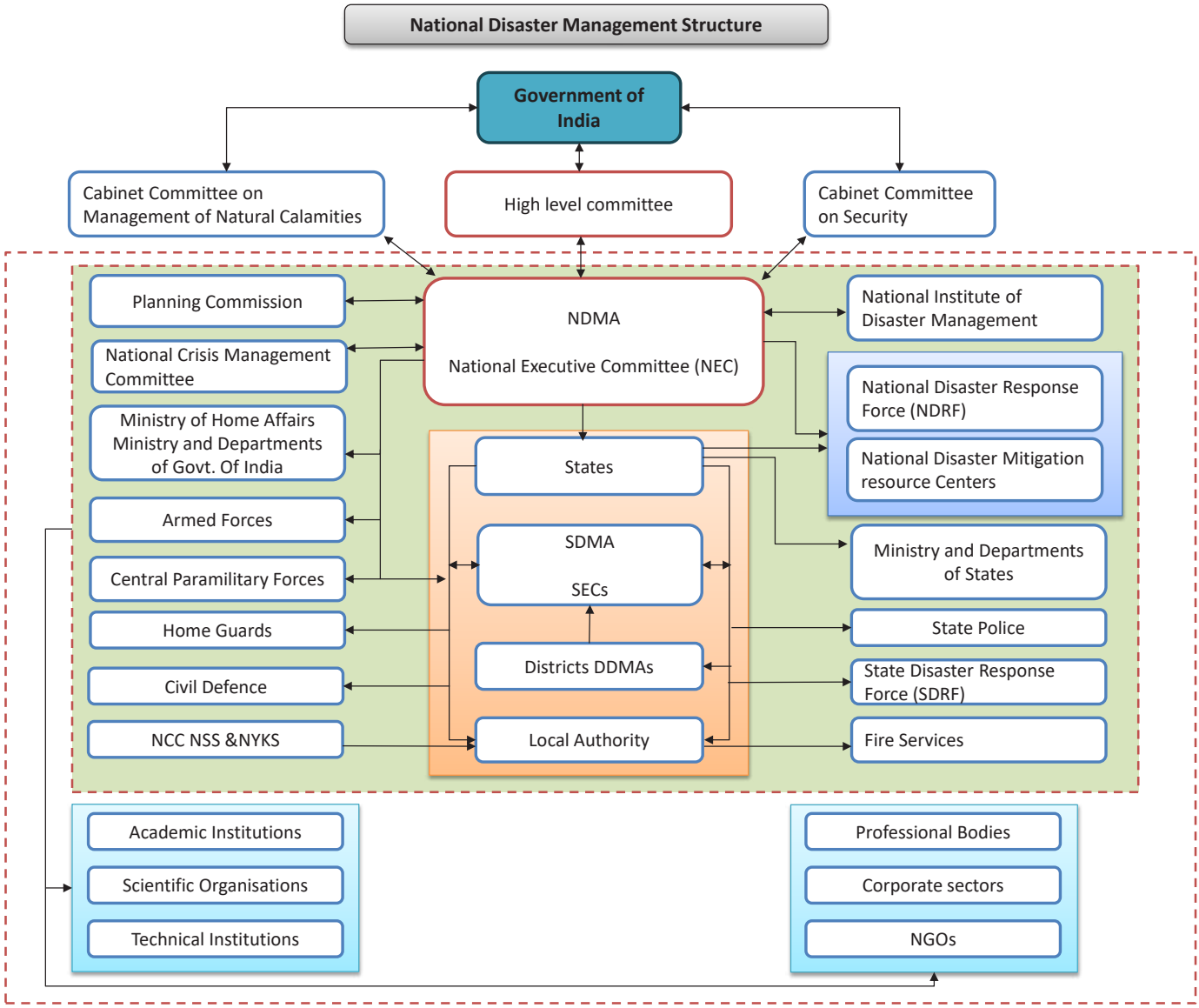


Figure 1: Governance framework for disaster management in India, depicting coordination mechanisms among national committees, NDMA/NEC, SDMAs, DDMAs, civic authorities, emergency forces, scientific institutions, and community-level partners

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Earlier, it existed without formal statutory backing; the Disaster Management 2025 Amendment Act has granted statutory status to NCMC and the High-Level Committee (HLC).[15]

4. **Planning Commission/NITI Aayog:** NITI Aayog is the apex public policy think tank of the Government of India, established in 2015 to replace the Planning Commission. NITI Aayog is a non-constitutional and non-statutory executive body established through a resolution of the Union Cabinet that provides policy and directional advice to the government.

2.1.3 State-Level Institutional System (Gujarat)

At the state level, the Gujarat State Disaster Management Act, 2003 provides the guiding principles for reducing disaster risks and preparing for and responding to disasters in Gujarat. The Gujarat State Disaster Management Authority (GSDMA), chaired by the Chief Minister, serves as the apex state-level body responsible for policy formulation, planning, coordination, and monitoring of disaster management and climate resilience initiatives in the state.

The Crisis Management Group (CMG), chaired by the Chief Secretary, functions as the central coordinating body for disaster preparedness, response, and recovery within the state. It ensures inter-departmental and inter-agency coordination through structured linkages with key entities at national, state, and local levels.

The CMG maintains coordination with the following:

- **Government of India Ministries and Agencies,** such as the Ministry of Home Affairs, NDMA, Ministry of Defence, Ministry of Agriculture, Ministry of Environment, Forest and Climate Change (MoEFCC), Ministry of

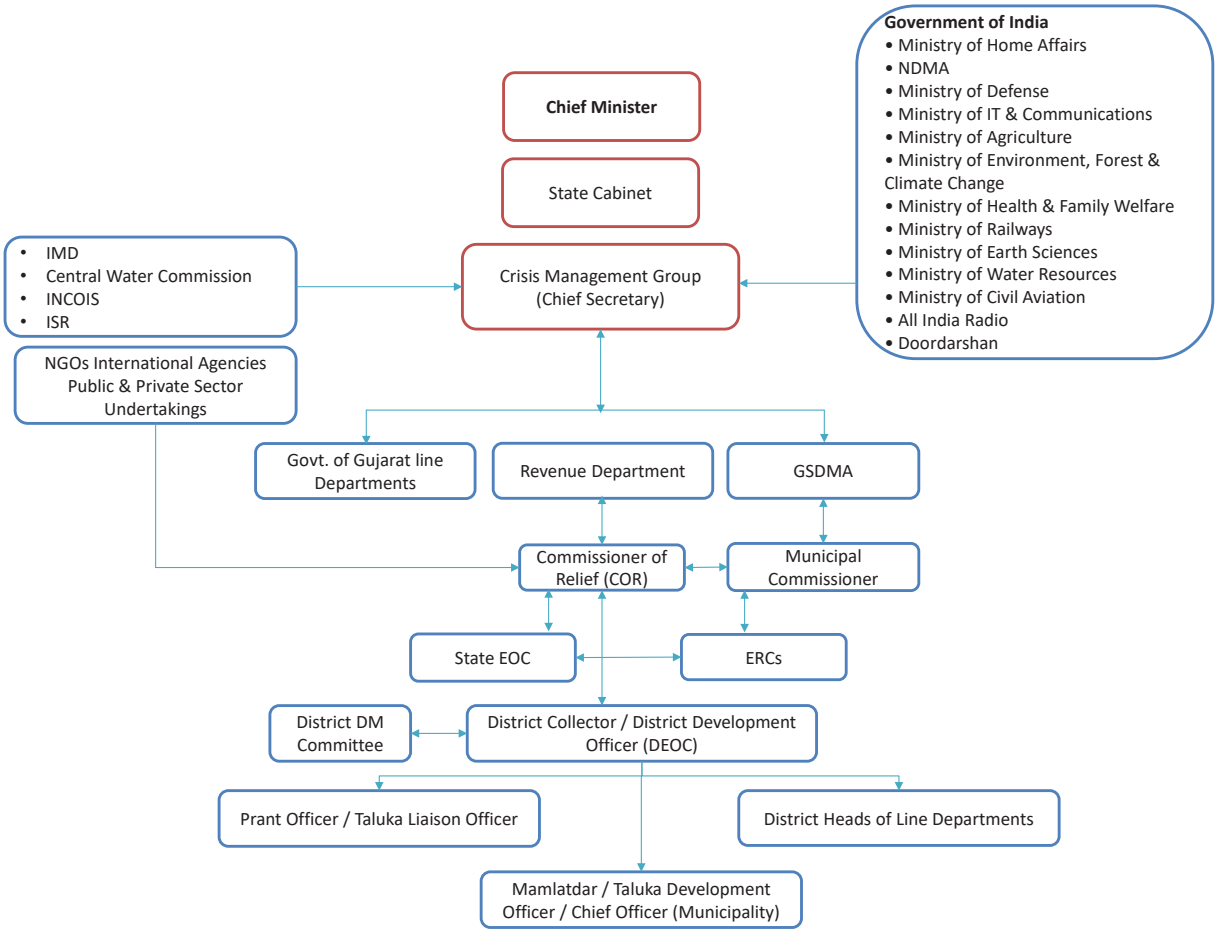


Figure 2: Institutional structure for disaster management framework in Gujarat, mapping the roles of state leadership, GSDMA, revenue and line departments, district and municipal authorities, and external agencies

15 Press Information Bureau. (2025, July 22). Disaster Management (Amendment) Bill, 2024 [Press release]. Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2146781

Health and Family Welfare, and Ministry of Civil Aviation, among others, for technical and policy support.

- **Technical and Scientific Institutions,** including the India Meteorological Department (IMD), Central Water Commission, INCOIS, and the Institute of Seismological Research (ISR) for early warning systems, data analysis, and hazard monitoring**.**

The Gujarat state has established Emergency Response Centres (ERCs) to provide rapid response capabilities at strategic locations.[16] The State Emergency Operation Centre (SEOC) serves as the state's central command and control facility for emergency preparedness and response operations.

The DM structure in the state is as per the Gujarat State Disaster Management Act, 2003, as shown in Figure 2.

Role of the Commissioner of Relief (COR)

The state government, acting on the recommendations of the COR, may formally declare a disaster and initiate state-level response measures. The COR serves as the nodal authority for coordinating disaster response and relief operations across districts.

- During a disaster, the COR provides strategic directions to District Collectors and local authorities for implementing relief measures and minimizing impacts. In consultation with relevant agencies, the COR also develops the state's relief implementation strategy, taking into account district-specific vulnerabilities, institutional capacity gaps, and resource needs to ensure an effective and equitable response across all affected areas.[17]
- To ensure continuous coordination and prompt action during emergencies, the Relief Commissioner operates a 24×7 state-level control room, SEOC, which serves as the central hub for information management, inter-departmental coordination, and real-time decision-making during disaster response and recovery operations.

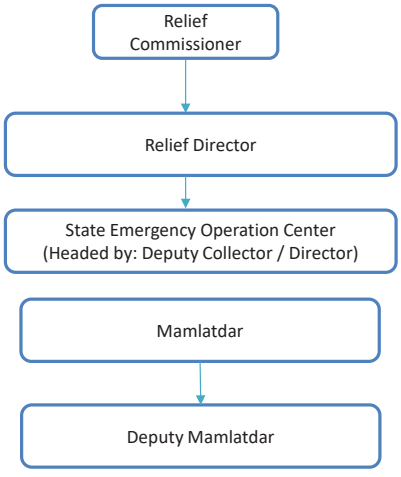


Figure 3: Administrative hierarchy for relief operations in Gujarat, outlining the reporting line from state-level leadership to taluka-level officers

Other important state-level institutions include:

Table 1: State-level institutional roles and responsibilities matrix

Agencies	Roles & Responsibilities
Gujarat Institute of Disaster Management (GIDM)	Apex State Institute for Disaster Management Capacity Building provides stakeholder training, documents best practices, and conducts research and academic programs.
State Fire & Emergency Services (F&ES)	Provides immediate disaster response and regularly trains in fire control and equipment handling.
Institute of Seismological Research (ISR)	Monitors Gujarat's seismic activity round the clock, reports earthquakes promptly, conducts micro-zonation, and offers seismic consultancy for major projects.
Bhaskaracharya Institute for Space Applications and Geo-Informatics (BISAG)	State nodal agency for geo-spatial technology; provides GIS-based planning, disaster management solutions, and e-governance support.
State Disaster Response Force (SDRF)	The state has established 11 SDRF companies with about 1,100 personnel, equipped for search and rescue; deployed based on disaster severity across key locations.
Climate Change Department	The Government of Gujarat took a pioneering step in 2009 by becoming the first sub-national government in Asia to establish a dedicated, full-fledged Climate Change Department. The department leads the state's efforts on climate change mitigation and adaptation, undertaking policies and actions to address emerging climate risks.[18]

16 The Gujarat State Disaster Management Authority (GSDMA) has established five regional Emergency Response Centres (ERCs) across the state, equipped with advanced tools and technology to enable rapid rescue operations during natural or human-made disasters. These centres are strategically positioned in Gandhidham, Gandhinagar, Rajkot, Vadodara, and Surat.

17 Gujarat State Disaster Management Authority. (2024). Gujarat State Disaster Management Plan 2024-25. https://www.gsdma.org/uploads/Assets/sdmp/y177volumn2106062024024941137.pdf

18 Climate Change Department, Government of Gujarat. (n.d.). Home [Website]. Retrieved November 25, 2025, from https://ccd.gujarat.gov.in/

2.1.4 District and Sub-District-Level Institutional Arrangements

At the district and sub-district levels, disaster management functions through a structured administrative system that ensures coordinated planning, preparedness, and response. The District Collector or District Development Officer (DDO) heads the DDMA and provides overall leadership in disaster preparedness and emergency response, as shown in Figure 4.

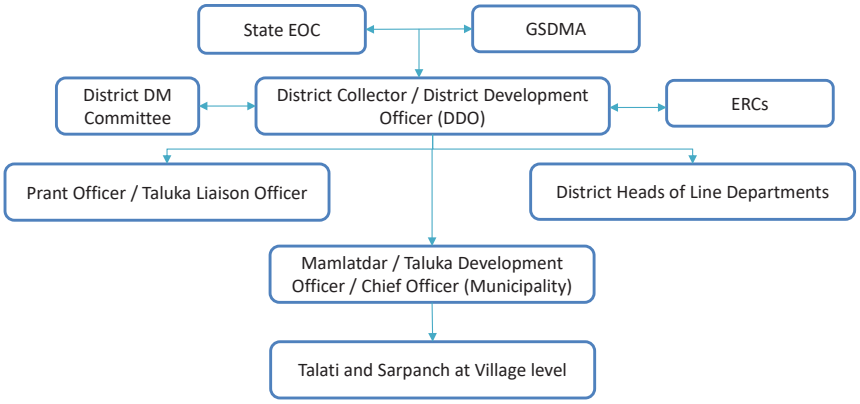


Figure 4: District-level disaster management coordination structure in Gujarat

District Disaster Management Committee (DDMC)

The DDMC functions as an operational coordination mechanism at the district level under the overall authority of DDMA, chaired by the District Collector. The Additional District Magistrate (ADM) serves as convener, with support from the GSDMA-appointed District Project Officer and Mamlatdar (Disaster Management).

District Crisis Group (DCG)

- Serves as the district-level coordination body responsible for ensuring that disaster management activities align with state directives. The DCG periodically reviews the DDMP, oversees preparedness measures across local groups, coordinates the mobilization of state resources, identifies key operational assets, maintains communication systems, and ensures timely reporting to state authorities. It also supports community awareness and readiness initiatives.

District Emergency Operations Centre (DEOC)

- The DEOC functions under the supervision of the District Collector as the hub for real-time coordination and resource management during disasters. It serves as the central platform for information collection, analysis, and dissemination, enabling informed decision-making. Based on information processed at the DEOC, key strategic decisions are made to effectively address the emergency situation.
- The Prant Officer functions as an intermediary between the District Collector and multiple talukas, typically overseeing four to five talukas within a prant (sub-division). The Prant Officer facilitates upward reporting, coordinates relief operations, and monitors field-level implementation across talukas (sub-districts).
- At the sub-district level, Mamlatdars, Taluka Development Officers, and Chief Officers (Municipalities) lead the implementation of disaster preparedness, response, and relief measures.

2.1.5 Urban and Rural Disaster Governance Systems

Gujarat's disaster management system between urban and rural administrative arrangements maintains a unified coordination mechanism through the District Collector and the Relief Commissioner. This integrated structure is particularly relevant for cities like Ahmedabad and Surat, where urban centres are embedded within wider district and sub district jurisdictions,

making coordination across administrative tiers essential for effective disaster response and compensation.

Village Level (Rural Administration)

At the village level, disaster management activities are embedded within the Panchayati Raj system:

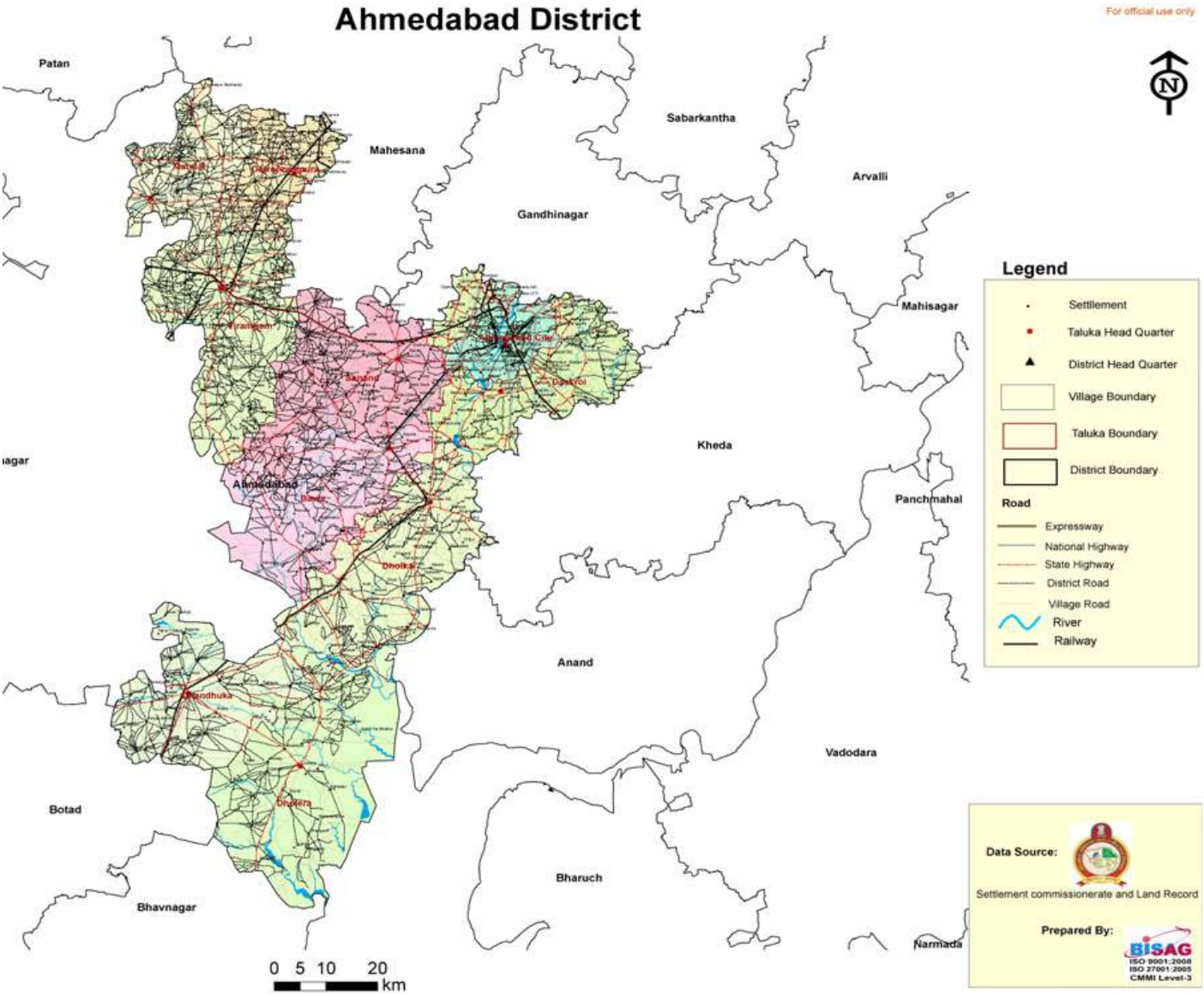
- The Talati (Village Revenue Functionary) maintains village-level records on population, land, and damages. The Talati plays a vital role in damage assessment, relaying information to the Mamlatdar's office, and distributing relief assistance.
- The Sarpanch (Elected Head), as the elected head of the Gram Panchayat, provides leadership in community mobilization, public awareness, and local-level decision-making during emergencies.
- The Sarpanch coordinates with the Talati and other village functionaries to disseminate early warnings, organise evacuation and relief camps, and ensure community participation in recovery and resilience-building initiatives. Together, the Talati and Sarpanch form the first line of response in the disaster management chain, ensuring that local needs and damages are promptly communicated to higher authorities for timely relief and assistance.

Urban Level (Urban Local Bodies)

- In urban areas, disaster management functions are coordinated primarily through ULBs, such as Municipal Corporations, under the overall supervision of the District Collector and the Commissioner of Relief (COR) at the state level. The Municipal Commissioner is supported by the Chief Fire Officer, City Engineer, Health Officer, and respective Deputy/Assistant Commissioners. Each line department handles sectoral preparedness and response, ranging from drainage and fire services to health surveillance and infrastructure repair.
- The Integrated Command and Control Centre (ICCC) serves as the city's central platform for real-time monitoring, data integration, early warning dissemination, and coordination during emergencies. It connects control rooms and key municipal departments, enabling quick decision-making and efficient incident management.
- ULBs prepare city-level disaster management plans aligned with the DDMP and GSDMA guidelines, ensuring synchronised planning and response across all agencies.

In both Ahmedabad and Surat, disaster-related compensation is not confined to the State Disaster Response Fund norms alone. Multiple parallel schemes, such as road repair programmes and municipal-level relief provisions, may also be activated depending on the nature and scale of the event. More information on other financial mechanisms is explained in Section 2.4.3. Despite this, only a limited number of compensation cases originate from urban wards. This is largely due to difficulties in verifying highly localised damages, and frequent under-reporting at the neighbourhood level.

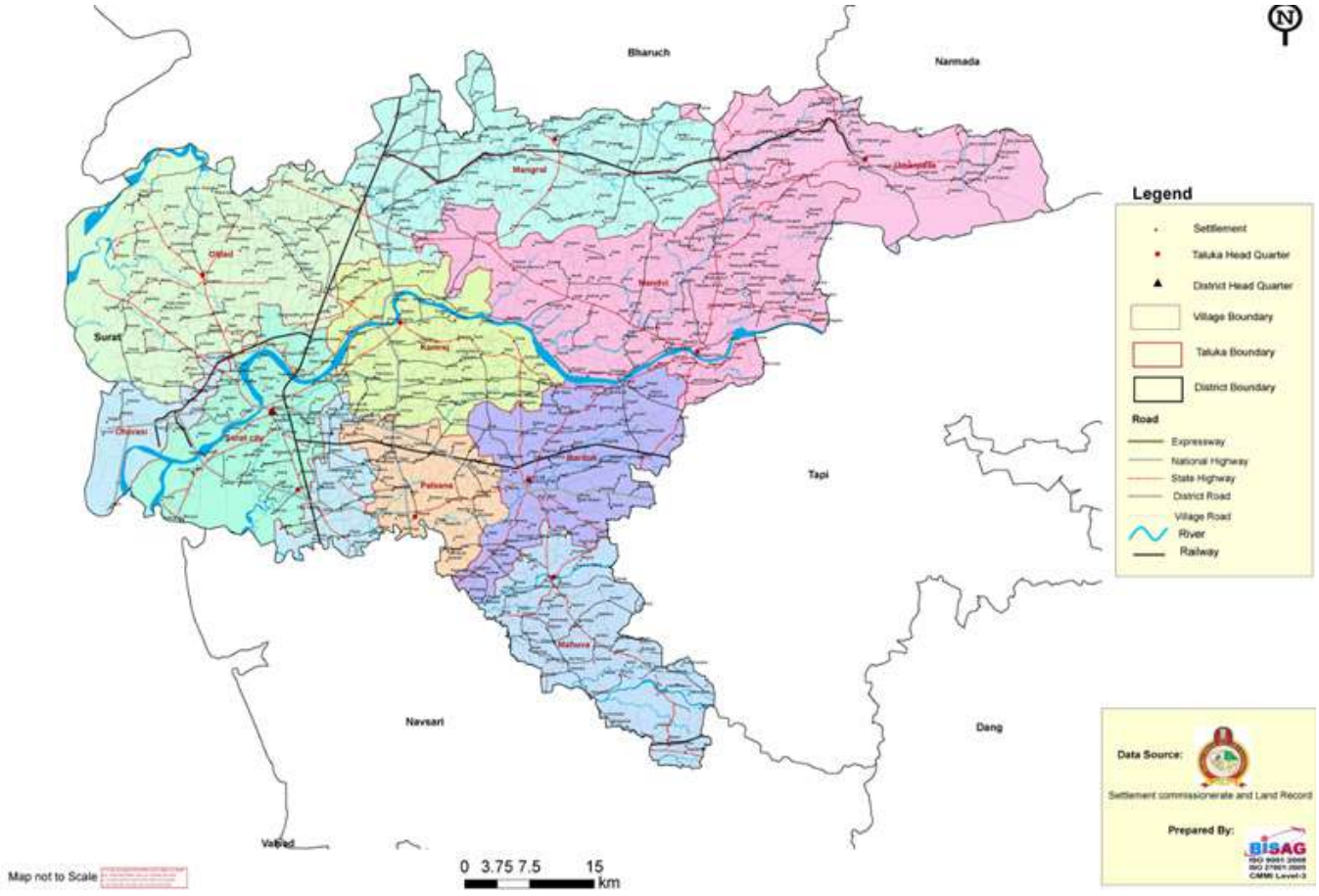
Box 1: Ahmedabad district comprising 15 talukas (sub districts)



Ahmedabad District has 15 talukas, including (1) Maninagar (2) Asarva (3) Vatva (4) Sabarmati (5) Vejalpur (6) Ghatlodiya (7) Daskroi (8) Sanand (9) Dholka (10) Bavla (11) Viramgam (12) Detroj-Rampura (13) Mandal (14) Dhandhuka (15) Dholera. The district comprises 1 corporation, 1 cantonment area and 7 municipalities: Bareja, Dholka, Bavla, Sanand, Dhandhuka, Bopal-Ghuma and Viramgam (DDMP Ahmedabad). The district also has an Urban Development Authority, namely the Ahmedabad Urban Development Authority (AUDA), responsible for planning and development in the surrounding urbanizing areas.

Box 2: Surat district comprising 10 talukas (sub districts)

Surat



Surat district consists of 10 Talukas:Olpad, Mangrol, Chorasi, Umarpada, Mandvi, Kamrej, Palsana, Bardoli, Mahuva and Surat City. Surat City is the district headquarters, and has 7 Urban Local Bodies, namely Surat Municipal Corporation, Bardoli Municipality (Bardoli), Kadodara Municipality, Sachin Municipality, Mandvi Municipality (Mandvi), Tarsadi Municipality (Mangrol) and Kansad-Kanakpur Municipality (Choryasi). Surat has also an Urban Development Authority, namely the Surat Urban Development Authority.

2.2 Current Operationalisation Plan for Disaster Management

India operates a multi-tier Emergency Operations Centre (EOC) system designed to ensure coordinated preparedness, response, and recovery at state, district, taluka, and urban levels. An EOC is an off-site facility located at state, district, or taluka headquarters, equipped with the necessary space, communication infrastructure, and coordination mechanisms to support emergency information management and multi-agency response. It brings together key line departments and agencies whose services are required during disaster response.[19]

Gujarat operates an SEOC located in Gandhinagar. The SEOC also anchors a larger statewide communication and response network comprising:

- **33 District Emergency Operation Centres (DEOCs)**
- **252 Taluka Emergency Operation Centres (TEOCs)**

19 Gujarat State Disaster Management Authority. (2025). Gujarat State Disaster Management Plan 2025–26: Volume 1. sdmpvol-107142025060338723.pdf

- **5 Emergency Response Centres (ERCs)** located at Gandhinagar, Vadodara, Rajkot, Surat, and Gandhidham

This network ensures a seamless flow of information and rapid mobilization of resources across administrative levels.

During normal circumstances, the SEOC functions under the supervision of the Relief Commissioner at the state level and under the District Collector at the district level. During a major disaster, it comes under the direct command of the Chief Secretary or the designated Chief of Operations, enabling faster high-level decision-making.

Activation of EOC: The EOC is a nodal point for the overall coordination and control of response and relief work. In case of an L1 Disaster, the DEOC will be activated; in case of an L2 disaster, SEOC will be activated along with the DEOC.

2.2.1 Emergency Response Centres (ERCs)

To strengthen field-level response, GSDMA has established five ERCs, which are equipped with trained manpower, state-of-the-art vehicles and equipment to provide support to District EOCs to fight the local emergency, if any.

ERCs:

- Provide rapid search, rescue, and relief support
- Are equipped with trained personnel, specialised vehicles, and state-of-the-art equipment
- Enhance preparedness through regular capacity-building activities
- Support DEOCs during incidents requiring specialised skills

ERCs are activated when:

- An event is, or has the potential to become, an L2 disaster
- Specialist rescue operations are needed
- Local response capacities are inadequate

During emergencies, ERCs work under the direct control of the Commissioner of Relief; during peacetime, they function under the respective Municipal Corporation or District Administration.

Level of Disasters

The disaster management system uses the "**L concept**" to categorise disasters by severity and response requirements, as presented in Table 2. This graded approach ensures that emergencies are managed using appropriate resources, with district authorities handling minor events, states supporting larger incidents, and national agencies stepping in for major calamities.

Table 2: Disaster levels categorised in India under the L Concept based on severity and response requirements

Level	Description	Activities / Requirements
L0	Normal-time activities	Focus on prevention, preparedness, and capacity building: training, updating disaster plans, conducting mock drills, procuring equipment.
L1	Situation can be managed at the district level	The District manages the response; the State and Central Governments remain on standby to provide support if required.
L2	Situation exceeds district capacity	Active involvement of the State Government is required, including mobilization of additional resources.
L3	Situation surpasses both District and State capacity	Central Government intervention is needed to restore the State/District systems and support rescue, relief, response, and recovery operations.

2.2.2 Incident Command/Response System (ICS/IRS)

Under the NDMA guidelines, emergency response is organised through a system in which various departments, agencies, and private stakeholders, including industries, temporarily come together and align their functions under a unified command to achieve a shared response objective. This arrangement is referred to as

the Incident Response System (IRS). The IRS operates in harmony with the existing Local Crisis Group (LCG) and District Crisis Group (DCG) structures and does not conflict with them.[20] The unified command system ensures a single, authorised, and accountable incident commander, with provisions for the transfer of command as emergencies escalate. In addition, the IRS mandates systematic documentation of decisions, actions, and lessons learned, to support continuous improvement and accountability. The Incident Response System (IRS) is a key mechanism for coordinated on-site disaster management. It ensures:

- Pre-defined roles and responsibilities
- Deployment of trained personnel
- A clear chain of command
- Avoidance of duplication of efforts
- Accountability across responding teams

The response to disasters in the district will be organised according to the Incident Command System, as adapted to conditions in Gujarat State.

In Surat district, the multi-hazard response plan focused on sector-specific action plans, unlike the department-specific planning approach. The organizational structure of the Incident Command System of Surat district is shown in Figure 5.

A single Incident Commander (IC) – The District Collector holds overall responsibility for managing the response operations within a defined area and operational period. The IC ensures coordinated decision-making, optimal use of resources, and effective communication across all response activities, as shown in Figure 5.

If an incident escalates in scale or spans multiple jurisdictions, multiple Incident Commanders may be designated, and an Area Command Authority can be established to ensure unified coordination among incidents.[21]

Command Staff

To support the Incident Commander, specific Command Staff positions are designated:

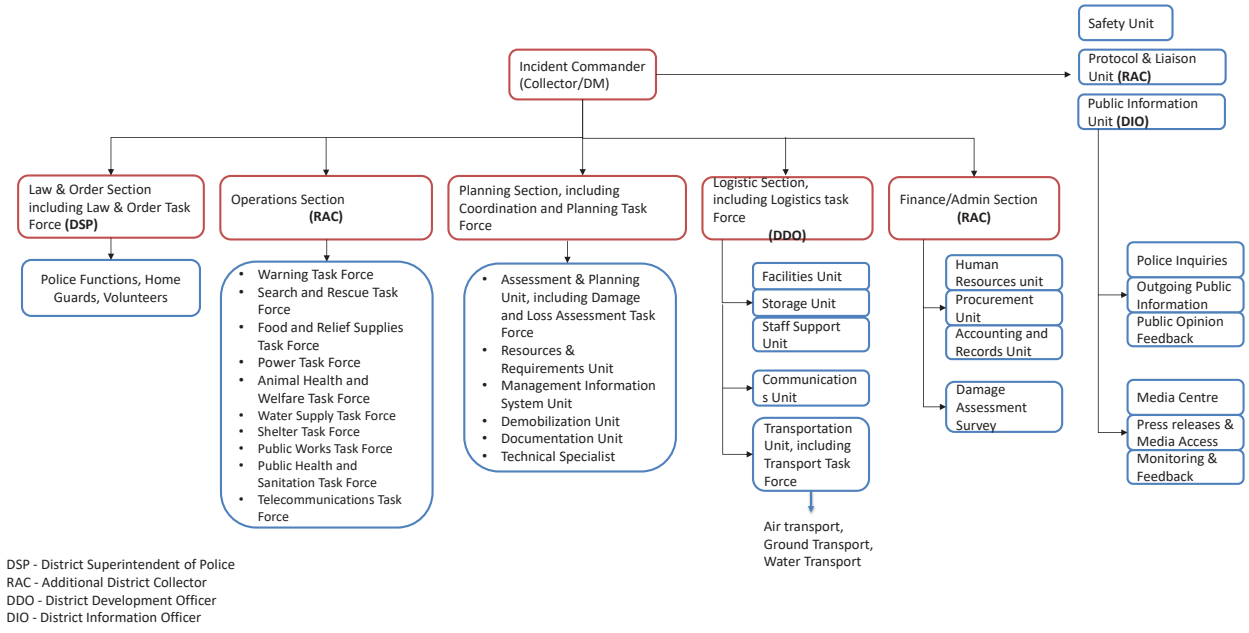


Figure 5: District Incident Response System organizational structure, showing coordination between command, operations, planning, logistics, finance, safety, protocol, and public information functions.[22]

20 Gujarat State Disaster Management Authority (GSDMA). (2024). District Disaster Management Plan: Ahmedabad District. Retrieved from ahmedabad-ddmp-20240620202403533029O.pdf

21 National Disaster Management Authority. (2010). Incident Response System (IRS) guidelines. incidentresponsesystemjuly.pdf

22 Surat District Disaster Management Authority. (2024). Surat District Disaster Management Plan 2024–25. surat-ddmp-20240620202404213118 1.pdf

- **Public Information Officer (PIO):** Serves as the single point of contact for media and public communication, ensuring accurate and timely dissemination of information.
- **Safety Officer:** Monitors operational safety conditions and identifies hazardous situations. The officer has the authority to pause or stop operations that pose imminent risks to personnel or the public.
- **Liaison Officer:** Acts as the primary contact point for inter-agency coordination, facilitating communication and cooperation among participating organizations.

The Incident Command System (ICS) is structured around four key functional sections: Operations, Planning, Logistics, and Finance/Administration, each led by a Section Chief reporting directly to the Incident Commander.

a. Operations Section

This section is responsible for executing tactical field operations. It manages on-ground response activities and deploys available resources to address the incident. Sub-sections or task forces may include emergency services, law enforcement, public works, relief distribution, public health, and related operational functions.[23]

b. Planning Section

The Planning Section supports overall disaster management by gathering, evaluating, analysing, and documenting information. It develops the Incident Action Plan (IAP), which outlines response objectives and operational strategies. Key responsibilities include:

- Collecting, analysing, and displaying incident intelligence and information
- Preparing and documenting IAPs
- Conducting long-range and contingency planning
- Developing demobilization plans
- Maintaining incident records and documentation
- Tracking and managing resource status

More about the Loss and Damage Assessment task force in Section 2.4.2

c. Logistics Section

The Logistics Section ensures that all operational and support needs are met. It is responsible for the **acquisition, transport, and distribution** of personnel, equipment, vehicles, and supplies, as well as providing **food, water, medical services, and facilities** necessary for response continuity.

d. Finance and Administration Section

This section tracks all financial and administrative aspects of the response, including cost accounting, procurement, and reimbursement processes. It becomes particularly crucial when emergency funds or government reimbursements are activated to cover local and regional response expenditures, ensuring accountability and transparency in the use of resources.

Note: Local authorities often lack trained personnel, dedicated disaster units, and reliable communication systems to support DEOC operations effectively. Their reliance on district-level directives delays field reporting and coordinated responses. To bridge this gap, the ***DEOC deploys its own trained field teams*** and establishes an ***Incident Command System (ICS)*** at the site. This ensures organised command, real-time information flow, and coordinated management of operations, logistics, planning, and finance functions.[23]

Other Stakeholders in Disaster Management

- **Private Sector:** The private sector is expected to participate in pre-disaster preparedness activities in coordination with GSDMA or the District Collector. They must adhere to building codes, safety standards, and other norms issued by local authorities.
- **Community Groups and Voluntary Agencies:** Local community groups, Aapda Mitra volunteers, NGOs, and civil society organizations support prevention, mitigation, and response efforts under the guidance of GSDMA or the Collector. They are encouraged to take part in training activities and remain

23 Gujarat State Disaster Management Authority & District Disaster Management Authority, Surat. (2024). District Disaster Management Plan: Surat (DDMP 2024–25). surat-ddmp.pdf

familiar with their designated roles during disasters.

- **Citizens:** Every citizen has a responsibility to cooperate with the Commissioner, Collector, or designated authorities and provide assistance whenever required for disaster management purposes.
- **Armed Forces:** The Armed Forces are typically deployed when a disaster exceeds the coping capacity of civil administration. They provide critical emergency support functions, communications, search and rescue, medical assistance, logistics, transportation, and large-scale relief operations such as airlifts and cross-border humanitarian support.
- **Central Para Military Forces (CPMFs):** As Armed Forces of the Union, CPMFs play an essential role during the immediate response phase by supporting rescue, evacuation, and other emergency operations.

2.3 Disaster Management Plans

The Disaster Management (DM) Act, 2005, defines a **"disaster" as any catastrophic event, natural or human-made, that causes significant loss of life, property, or environmental damage and exceeds the coping capacity of the affected community".**[24]

Disaster management plans in India provide a structured, multi-level approach to reducing disaster risks, preparing for emergencies, and ensuring effective response and recovery. Anchored by the DM Act, 2005, these plans are developed and implemented at the national, state, district, and urban levels, integrating risk assessment, early warning, preparedness, relief, and assistance.

A. National Disaster Management Plan (NDMP): Purpose and Scope

Section 11 of the DM Act mandates the preparation of an NDMP applicable across India. The plan aligns with the National Policy on Disaster Management (2009) and conforms to the provisions of the DM Act, requiring all central ministries and departments to prepare their respective DM plans. As per Section 37, hazard-specific nodal ministries must develop detailed plans for disasters assigned to them (refer to Annexure 8.1).

The NDMP serves as a national framework guiding government agencies across all stages of the disaster management cycle, mitigation (prevention and risk reduction), preparedness, response, and recovery (immediate restoration to long-term building back better). It outlines clear roles and responsibilities, enables rapid resource mobilization, and provides direction for coordinated action by central and state governments, communities, and non-government agencies as potential users.

Evolution and Global Alignment

The NDMP,[25] prepared in 2016 and updated in 2019, provides a framework and incorporates key global frameworks adopted post-2015 associated with DRR, including:

- Sendai Framework for Disaster Risk Reduction (SFDRR),
- Sustainable Development Goals (SDGs), and
- Paris Agreement on Climate Change.

Recognizing the increasing impact of climate change on disaster frequency and intensity, the updated NDMP introduced Climate Change Risk Management as a sixth thematic area of focus, supplementing the existing five, which are:

1. Understanding Risk
2. Inter-Agency Coordination
3. Investing in DRR – Structural Measures
4. Investing in DRR – Non-Structural Measures
5. Capacity Development

The NDMP also integrates the Prime Minister's Ten-Point Agenda for Disaster Risk Reduction, announced during the Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR) in 2016. This agenda emphasises mainstreaming DRR into development planning, leveraging technology, strengthening resilience, and enhancing community-level disaster preparedness.

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24 National Disaster Management Authority. (2019). National Disaster Management Plan (NDMP 2019). Government of India. https://ndma.gov.in/sites/default/files/PDF/ndmp-2019.pdf

25 National Disaster Management Authority. (2019). National Disaster Management Plan (NDMP 2019). Government of India. https://ndma.gov.in/sites/default/files/PDF/ndmp-2019.pdf

B. State Disaster Management Plan

Disaster risk reduction in Gujarat is anchored in a multi-tiered governance framework, with responsibilities distributed across state agencies, district administrations, and urban local bodies. The overarching objective is to deepen risk understanding, strengthen preparedness, enhance the resilience of infrastructure and services, and ensure that climate adaptation is mainstreamed across development planning.

The preparation of the Gujarat State Disaster Management Plan 2025-26 (GSDMP)[26] is mandated under Section 20 of the Gujarat State Disaster Management Act, 2003. The plan (Volume I and Volume II) is developed by the Gujarat State Disaster Management Authority (GSDMA) in consultation with the NDMA.

C. District Disaster Management Plan

Every district in Gujarat is required to prepare a DDMP[27] under the GSDMA 2003. The District Collector serves as the chief custodian of the DDMP and is responsible for regular review and updates. Each district's DDMP integrates hazard-specific sub-plans such as those for heatwaves, floods, industrial accidents, and epidemics. It delineates the roles of line departments, including Health, Urban Development, Fire Services, Irrigation, and Police. It specifies how these agencies coordinate with local bodies during different phases of disaster management.

Both Ahmedabad and Surat have DDMPs and plans emphasizing a multi-hazard and multi-agency approach, promoting synergy between government agencies, non-government organizations, and community-based groups. These city administrations operate Emergency Operations Centres (EOCs)/ICCC (nomenclature might be different in different cities) that coordinate local response and communication during extreme events. These facilities maintain operational linkages with the District EOCs, particularly during severe weather or flood situations.

Traditional disaster assessments have largely concentrated on tangible and easily quantifiable economic losses, such as damage to infrastructure, crops, housing, and public utilities. At the district and taluka levels, standardised data templates are used to record damages during monsoon and heavy rainfall events, primarily to support relief distribution, compensation processing, and payment disbursal. The templates are included in Annexure 8.2. However, climate change also causes significant non-economic losses, including loss of cultural heritage, traditional knowledge, biodiversity, health impacts, and social disruption that require specific attention. WIM's focus on NELD has elevated these considerations in international climate policy.

2.4 Data Systems, Reporting and Relief Mechanisms for Disaster Response

In India, disaster response relies on a robust system for data collection, disaster reporting, assessment, and relief mechanisms at the national, state, and district levels. This section will detail the existing process of data gathering by disaster management authorities, using a combination of field reports, real-time monitoring and disaster databases at various levels. From an L&D perspective the data that is important to be collected includes:

- Hazard (Type, frequency, intensity and duration and spatial extent)
- Exposure Data (hazard prone areas)
- Vulnerability Data (socio-economic aspects)
- Damage and Impact Data (ELD and NELD)

For effective L&D reporting, it is essential to understand the current reporting and assessment methods, templates, and associated gaps. These insights must be considered when developing a robust L&D reporting assessment methodology.

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26 Gujarat State Disaster Management Authority. (2025). Gujarat State Disaster Management Plan (2025-26). https://www.gsdma.org/uploads/Assets/sdmp/sdmpvol-107142025060338723.pdf

27 Gujarat State Disaster Management Authority. (n.d.). DDMP [Web page]. https://www.gsdma.org/Content/ddmp-4246

Box 3: Details of Ahmedabad District Disaster Management Plan

Ahmedabad

The **Ahmedabad District Disaster Management Plan** (Ahmedabad DDMP, 2024-25) is structured around chapters on hazard–vulnerability–risk assessment, institutional arrangements, prevention and mitigation, preparedness, response, recovery, financial arrangements, and plan maintenance.

The plan explicitly recognises that Ahmedabad's rapid growth is accompanied by "potential risks and challenges that can arise due to climate change and other factors, and lists key hazards as cyclones, heavy rainfall, floods, earthquakes, heat waves and industrial chemical disasters. This multi-hazard orientation is directly relevant for an L&D assessment, which must account for both rapid-onset and climate-influenced events.

Institutionally, the Ahmedabad DDMP outlines:

- A District Disaster Management Committee (DDMC), chaired by the District Collector, which oversees prevention, mitigation and emergency response, and its members are embedded in Emergency Support Functions (ESFs).
- A formal Incident Response System (IRS), under which the Commissioner of Relief is Incident Commander for the State and the District Collector is Incident Commander at the district level, with roles and responsibilities of DDMA members and line departments pre-defined in the DDMP.
- A DEOC at the Collector Office, operating 24×7 throughout the year. Taluka EOCs and departmental control rooms are activated during the monsoon, with liaison officers coordinating between field task groups and the DEOC.

The DDMP also details response planning and preparedness as continuous processes aimed at minimising loss of life, livestock, property, infrastructure and adverse health impacts, and restoring normalcy as quickly as possible.

Box 4: Details of Surat District Disaster Management Plan

Surat

The Surat District DDMP outlines the district's exposure to multiple hazards: floods, heavy rainfall, industrial accidents, fires, cyclones and public health emergencies, but reaffirms that flooding remains the most severe and recurring urban hazard, impacting densely populated wards, industrial estates, transport corridors, and critical public utilities (Surat DDMA, 2024–25).

The DDMP contains a detailed flood sub-plan, covering:

- historical flood timelines and damages across major events,
- hydrological dependence on inflows and reservoir levels at Ukai,
- discharge thresholds that trigger different levels of warning and evacuation,
- estimated inundation patterns across city zones and, and
- lists of flood-prone villages/wards requiring priority attention.

This flood management is accompanied by a clearly defined early warning chain, beginning with the Irrigation Department and Ukai Dam authorities, and routed through the DEOC to the Surat Municipal Corporation (SMC), taluka offices, line departments, and ward-level teams. The DDMP sets out department-specific responsibilities for pre-release alerts, pump readiness, shelter management, evacuation support, traffic diversions, protection of utilities, and health/emergency response.

Institutionally, the plan follows the Incident Response System (IRS), with the District Collector as Incident Commander, supported by Operations, Planning and Logistics Sections. Departmental responsibilities are mapped under Emergency Support Functions (ESFs), assigning clear roles for SMC's water supply, drainage, fire services, public health, transport, food and civil supplies, and information/dissemination functions. The DDMP also includes Rapid, Preliminary and Detailed Damage Assessment formats, providing standard templates for post-event reporting on household damage, infrastructure loss and service disruptions.

2.4.1 Data Collection Systems

An effective disaster management requires timely, accurate information that integrates risk, impact, and recovery information across time, sectors, and governance levels. Gujarat's system integrates resource inventories, hazard monitoring platforms, early warning agencies, and national digital databases to support preparedness and response.

A. Resource Inventory Systems

The India Disaster Resource Network (IDRN)[28] is an online platform used to maintain an updated inventory of equipment, trained personnel, and essential supplies required for emergency response. Its primary function is to support decision-makers by providing quick access to information on the availability of critical resources and by helping assess preparedness levels for various disaster scenarios. At the national level, the National Institute of Disaster Management (NIDM) oversees the overall administration, monitoring, and maintenance of the portal.

District administrations are responsible for entering and regularly updating resource data, including information from both government and private-sector sources within their jurisdiction. Only authorised government officials can access and upload data to the portal, with district authorities coordinating data collection and ensuring timely updates, preferably every quarter.

The State Disaster Resource Network (SDRN) serves as the state-level counterpart, enabling Gujarat to maintain an updated repository of district-wise resources. It becomes critical during major emergencies (L2/L3 disaster) when inter-district resource mobilization is required.

B. Hazard Monitoring & Early Warning Systems

Gujarat relies on a combination of national and state agencies for hazard monitoring, early warning dissemination, and technical advisories. These agencies generate hazard-specific data essential for preparedness and timely response, as shown in Table 3.

Upon receipt of a disaster warning, EOCs at the state, district, and block levels are activated. The Incident Commander assumes charge of the EOC and ensures that warnings are communicated



Figure 6: India Disaster Resource Network (IDRN) Dashboard

28 National Institute of Disaster Management. (n.d.). India Disaster Resource Network (IDRN) [Web portal]. Ministry of Home Affairs, Government of India. https://idrn.nidm.gov.in/

Table 3: Lead agencies for different disaster categories in Gujarat, showing the designated nodal departments and institutions for hazard-specific management

Disaster Type	Nodal Agencies
Earthquakes	Institute of Seismological Research (ISR), National Centre for Seismology (NCS)
Floods	India Meteorological Department (IMD), Irrigation Department, Central Water Commission (CWC)
Cyclones	India Meteorological Department (IMD)
Tsunami	Indian National Centre for Ocean Information Services (INCOIS), Institute of Seismological Research (ISR), National Centre for Seismology (NCS)
Drought	Agriculture Department
Epidemics	Health & Family Welfare Department
Industrial & Chemical Accidents	Directorate of Industrial Safety and Health (DISH), Labour & Employment Department
Fire	Director, State Fire Prevention Services

to communities. The District Collector alerts the DDMC , which, in turn, informs local and village-level disaster management committees and teams. Based on the severity of the situation, the State Relief Commissioner issues instructions, including evacuation orders, which are implemented and supervised by the District Collector. In emergencies, the District Collector may exercise discretion in preparedness actions. At the village level, Disaster Management Committees and Teams coordinate evacuations to designated shelters, with special attention to vulnerable groups.

C. National-Level Digital Platforms

India operates multiple centralised systems to integrate multi-sectoral data for decision-making:

i. National Disaster Management Information System (NDMIS)

NDMIS[29] is a comprehensive online application developed by the Ministry of Home Affairs to serve multiple critical functions in India›s disaster management ecosystem. It was developed in line with the Sendai Framework›s requirement for systematic disaster damage and loss tracking, establishing a standardised mechanism for capturing and consolidating disaster impact data across the entire country up to the district level. It is designed to capture comprehensive data on disaster damage and loss while monitoring progress against SFDRR (Targets A-D and monitor fund disbursement under National Disaster Response Fund / State Disaster Response Fund / State Disaster Mitigation Fund.

There are several gaps ranging from implementation, institutional and governance methods adopted across different states. Most states have not yet developed robust baseline databases, and where databases exist, they are often partial, outdated, or not regularly updated. The slow uptake by states/districts limits its effectiveness. SDMAs frequently lack direct access to consistent district-level damage and loss data, leading to parallel reporting channels and weak integration with NDMIS.

There are also gaps in the standardisation of definitions, formats, and disaggregation (e.g., by hazard type, sector, gender, and vulnerability) across states, which reduces comparability across states and over time. There are limited skills in disaster database management and statistics at the state and district level, further constraining accurate, timely entry of data into NDMIS. More broadly, disaster-related data sit in multiple sectoral systems (weather, health, agriculture, infrastructure) with limited interoperability.

29 Ministry of Home Affairs, Government of India. (n.d.). National Disaster Management Information System (NDMIS) [Webpage]. https://ndmindia.mha.gov.in/ndmi/ndmis

The system is also largely viewed as a compliance/reporting tool for central requirements (Sendai and fund monitoring), rather than as an operational decision-support platform embedded in state and district disaster management authorities for regular data maintenance.

ii. National Database for Emergency Management (NDEM)

The National Database for Emergency Management (NDEM)[30] is a geospatial platform and national repository developed by the Indian Space Research Organisation (ISRO) through its National Remote Sensing Centre (NRSC) that integrates multi-scale satellite data with decision support tools to assist disaster managers in preparedness, hazard zonation, damage assessment, and emergency response. Operationalised since 2013, NDEM serves as India's central hub for space-based disaster intelligence, but it faces gaps in coverage, standardisation, interoperability, access, and institutional uptake that are impacting its potential.

NDEM supports pre-disaster planning through hazard assessment, vulnerability mapping, and resource positioning analysis to optimise emergency facility locations and capacity. NDEM maintains a structured, multi-scale geospatial database organisation. The platform incorporates comprehensive data, including satellite imagery, Digital Elevation Models (DEM), land-use and land-cover (LULC) data, infrastructure layers, administrative boundaries, and hazard-specific thematic layers.

NDEM uses national and state-level layers, where coverage and update frequency are uneven across hazards and regions, and but fine-resolution micro-level spatial data is required in cities (wards, slums), which limits downscaled risk analysis and micro-planning. NDEM's spatial layers are not updated in real time for smaller events.

While NDEM has hazard maps, NDMIS has loss reporting, but the two are not interconnected in a way that enables risk modelling or L&D attribution. Both systems are designed for sudden-onset disasters (floods, cyclones), not climate-driven slow-onset impacts. Both systems depend on official reporting; there is no mechanism to integrate community or CBO/NGO generated data or any crowd-sourced data.

iii. National Data Sharing and Accessibility Policy (NDSAP) and Open Government Data (OGD) Platform

The National Data Sharing and Accessibility Policy (NDSAP) (2012) provides the overarching framework for proactive, open access to non-sensitive data generated by government entities using public funds. Its objective is to promote transparency, innovation, and evidence-based economic, scientific, and social development. In principle, NDSAP establishes data as a public good and mandates the timely sharing, standardization, and interoperability of government datasets across sectors and levels of governance.

The Open Government Data (OGD) Platform India (data.gov.in), developed and managed by the National Informatics Centre (NIC) under the Ministry of Electronics and Information Technology (MeitY), operationalises NDSAP by enabling Ministries, Departments, States, and public agencies to publish and manage datasets through designated Chief Data Officers (CDOs). All datasets released on the platform are made available free of cost under the Government Open Data License (GODL), allowing reuse by citizens, researchers, civil society, and the private sector.

However, despite the policy mandate, disaster- and climate-related datasets are unevenly published across ministries and states. Limited incentives for proactive disclosure, and institutional concerns about data ownership and sensitivity further constrain systematic data sharing. As a result, high-value district- and city-level information, particularly on economic and non-economic losses, service disruptions, and post-disaster assessments, remains insufficiently accessible for longitudinal L&D analysis.

30 National Remote Sensing Centre. (n.d.). National Database for Emergency Management (NDEM) [Web portal]. https://ndem.nrsc.gov.in/

iv. Integrated Command and Control Centre ICCC

ICCC, developed under the Smart Cities Mission, acts as a multi-department coordination and monitoring platform at the city level. The ICCC integrates live data from water supply, drainage networks, solid waste systems, traffic management, emergency response units, public health surveillance and citizen grievance portals.[31] ICCC has been instrumental in disaster management in cities across India.[32]

The system facilitates:

- Real-time situational awareness through integrated dashboards,
- Cross-departmental coordination during routine operations and emergencies,
- Automated triggers for field team mobilisation,
- Analytics for service performance improvement, and
- Unified communication channels for disseminating alerts and advisories.

During climate-related events such as extreme rainfall or heatwaves, the ICCC functions as the operational hub for monitoring disruptions, emergency response, field deployment and public communication (NIUA, 2024). The platform's integrated data flows offer a strong foundation for embedding L&D-relevant indicators such as service outage durations, pump failure logs, water supply variability, emergency call volumes and congestion patterns.[33]

In the context of Loss and Damage (L&D) assessments, the ICCC provides:

- A central data repository that can support systematic collection of disruption indicators, including tracking the scale, frequency, and duration of climate-related service disruptions and infrastructure stress, as well as spatially disaggregated information at ward and neighbourhood levels to assess uneven and disproportionate impacts on vulnerable areas;
- Operational logs that can be used to quantify the scale and duration of service impacts and to generate baseline and historical service performance data;
- A technical backbone that can be extended to integrate city-level L&D dashboards in future phases and to serve as an interface for linking city-level disruption data with state and national disaster information systems; and
- A convergence platform that brings together municipal departments, utilities, and disaster management authorities to enable coordinated consolidation of service-level and spatial impact information for integrated city-level L&D assessments.

At present, ICCCs are primarily oriented towards real-time operations and service continuity, and they do not have an explicit mandate for systematic L&D assessment or reporting. Data standards, retention practices, and data-sharing arrangements vary across cities, and institutional linkages with state- and national-level disaster and climate information systems remain limited. Strengthening policy guidance, standardising indicators, and establishing formal data-sharing protocols would be necessary for ICCCs to evolve from operational control rooms into strategic urban observatories that can reliably support city-level climate risk and L&D assessment.

Other National and State-Level Digital Dashboards Relevant to Climate and Loss & Damage

The review of existing digital dashboards highlights a fragmented data ecosystem, with sector-specific platforms operating in parallel across energy, power, climate, and disaster management domains. Although these systems provide valuable inputs such as real-time electricity demand, infrastructure location, climate-linked stress indicators, and administrative reporting, they are not systematically integrated into disaster reporting or L&D assessment processes at the city level.

31 Surat Municipal Corporation. (2016). Integrated Command and Control Centre (ICCC) documentation. Surat Smart City Development Limited. https://dmeo.gov.in/sites/default/files/2021-08/Package4_UrbanTransformation_CaseStudy14.pdf
32 National Institute of Urban Affairs. (n.d.). Use case [Webpage]. ICCC Portal. https://iccc.niua.org/iccc/sector/use-case/28c8edde3d61a0411511d3b1866f0636
33 National Institute of Urban Affairs. (2024). Environmental Surveillance and Management: Leveraging ICCC for Monitoring and Action (Vol. 44, Suppl. 1). National Institute of Urban Affairs. https://niua.in/sites/default/files/2025-07/2024_S1_Environmental%20Surveillance%20and.pdf

The absence of standardised indicators, interoperable data protocols, and institutional mandates for data sharing limits the usability of these platforms for comprehensive L&D assessment.

At present, data relevant to L&D in India is dispersed across multiple national, state, and city-level platforms, including hazard monitoring systems, sectoral management information systems, relief and compensation portals, health and education dashboards, and climate data repositories. While these platforms collectively contain critical information on hazards, exposure, vulnerabilities, impacts, and recovery, they operate largely in silos and are designed for specific sectoral or administrative purposes.

To enable a holistic understanding of L&D, there is a need to aggregate and harmonise relevant datasets into a common portal or integrated platform that explicitly focuses on L&D components linking hazard characteristics with sector-wise impacts, vulnerability profiles, recovery measures, and remaining irreversible losses. This will enable existing data to be standardised and analysed through an L&D lens, supporting consistent reporting across sectors and governance levels and strengthening evidence-based planning, financing, and accountability for climate-related losses and damages. The list of all the existing dashboards is detailed in Annexure 8.3.

2.4.2 Disaster Reporting and Assessment

Once hazard information begins to flow through the data systems described above, district administrations initiate a structured reporting mechanism mandated under the State and District Disaster Management Plans. Reporting follows a staged approach to capture evolving impact and resource needs.

A. Types of Disaster Assessment Reports

Three types of assessment reports are prepared at different stages after a disaster. Each report follows a distinct format for data collection and information analysis. These reports are designed to assess a) life threatening situation; b) need for emergency food, water, shelter and medical assistance; and. c) need for restoration of critical facilities and services.

1. Rapid Report

The Rapid Report provides an initial overview of the scale and nature of the damage. It should ideally be completed within 4–8 hours. Its primary purpose is to guide urgent response actions that must be taken immediately.

2. Preliminary Report

Prepared within the first seven days, this report offers more specific and refined information on damage and needs.

- An interim Situation Report (SITREP) must be submitted within 48 hours, followed by SITREPs every 24 hours thereafter.
- Wherever possible, the 48-hour report should include initial cost estimates of the damage.

3. Detailed Report

The Detailed Report is completed within 21 days of the all-clear. It involves a sector-wise assessment to determine the extent of damage and post-disaster requirements. It supports planning for **recovery and rehabilitation**, and should include the direct costs associated with each sector whenever possible.

Rahat Portal

The Rahat Portal (rahat.gujarat.gov.in) is the official digital platform of the Commissioner of Relief, Revenue Department, Government of Gujarat, serving as a centralised web-based system for disaster relief management, fund disbursement, daily rainfall data monitoring, Chief Minister's Relief Fund (CMRF) administration, and coordination of rescue and relief operations across the state. The Rahat Portal hosts the CM Relief Fund Portal, developed by the National Informatics Centre (NIC), Gujarat. Through the portal, the state manages both relief distribution (via relief funds) and information dissemination (weather forecasts, flood/river data, warnings).

Access to the portal is limited to designated officials, primarily the District Project Officers (GSDMA) and officers from the Revenue Department under the Commissioner of Relief.

Information is entered at the district level through a bottom-up reporting process and is then aggregated at the state level.

B. Responsibilities for Reporting and Assessment

The Commissioner of Relief (CoR) / Revenue Department in each state is responsible for compiling information on damages and losses and initiating necessary response measures. Relevant government departments and local authorities must undertake comprehensive assessments within their respective jurisdictions to document the extent of damage in the affected areas. While evaluating the damage and determining the needs of affected populations, assessment teams should ensure inclusive representation. The team must consider the perspectives of various communities and vulnerable groups to accurately capture the diverse impacts and requirements of the affected region.

Once the damage and need assessment activities are fully completed, the designated authority will issue formal instructions to deactivate the assessment process.

Task force of L&D Assessment

A structured field assessment is carried out by the Damage Assessment Task Force, responsible for collecting sectoral impact data and estimating relief requirements at district and state levels.

A. Roles of the Damage Assessment Task Force

- Conducts on-ground assessments
- Estimates losses and resource needs
- Prepares preliminary and detailed damage reports



Table 4: Timeline of damage assessment activities, from preparedness during normal periods to preliminary assessment at 24 hours and detailed assessment up to 72 hours post-event.

Time Frame	Activities
Normal Time	Study state damage assessment framework; train officials; identify and maintain four assessor groups; compile and update assessor contact lists
D + 24 hours	Estimate the personnel and resources needed to conduct their damage assessment.
	Make a preliminary assessment of the loss using a predefined format.
	Send the preliminary damage assessment report to the higher authorities.
	Seek feedback from the assessors conducting the preliminary assessment about the extent and complexity of the damage. Inform higher authorities of any clarification in terms of the detailed evaluation.
D +24 to + 72 hours and beyond	Prepare teams for detailed damage assessment by allocating specific sites.
	Start the data entry procedure without delay.
	Set up a grievance registration and redressal mechanism at the taluka level.
	Continue reviewing and assessing until the task is complete.
	Submit the final report as prescribed by the higher authorities.

- Coordinates with line departments, district officials, and community volunteers

Four thematic assessor groups are typically mobilized:

- Private buildings and houses
- Public infrastructure (roads, bridges, communication systems)
- Agriculture, livestock, and water resources
- Business enterprises and industries

B. Operational Timeline for Damage Assessment

2.4.3 Relief and Compensation Mechanisms

The NDMA 2005 mandates state governments to establish comprehensive guidelines specifying standards of relief for persons affected by disasters. In alignment with this mandate, the state government has developed detailed relief guidelines that govern the provision of assistance during disaster situations. This relief system functions within a structured policy framework comprising the Disaster Management Act, 2005; the norms of the State Disaster Response Fund; the National Disaster Response Fund guidelines; and various State Government Resolutions (GRs) that prescribe procedures, compensation norms, and operational protocols. Together, these instruments ensure a uniform, transparent, and accountable mechanism for delivering relief and financial assistance across all administrative levels in the State.

At the national level, key instruments include the National Disaster Risk Management Fund (comprising the National Disaster Response Fund and the National Disaster Mitigation Fund) and the Prime Minister's National Relief Fund. At the state level, financing is anchored in the State Disaster Risk Management Fund (including the State Disaster Response Fund and the State Disaster Mitigation Fund) and the Chief Minister's Relief Fund. Other funding streams include allocations from line departments, district planning funds, externally aided projects, CSR contributions, disaster bonds and other permissible sources. These financing mechanisms collectively support relief, response, recovery, preparedness, mitigation, and capacity-building activities as per approved norms and guidelines.

A detailed discussion on these funds and their relevance is provided in Section 5.1 in Chapter 5: Financing for Loss and Damage.

2.5 Alignment with other City Plans and Strategies

With the NDMP identifying *Climate Change Risk Management* as a sixth thematic priority (Section 2.3), disaster risk assessment in India is shifting from a retrospective, hazard-specific model to a climate-informed approach. Climate change is altering the magnitude, timing, and geographic spread of hazards, whether through rising temperatures, intensifying extreme rainfall events, recurrent heatwaves, sea-level rise, or increased hydro-climatic variability. While assessments based on past trends provide a reliable basis for planning, several other plans, guidelines, and strategies are evolving to address hazard identification, preparedness, coordination, and the climate vulnerability of urban services, offering elements that can be directly leveraged for L&D assessment. The application of Climate Change Risk Management to urban flood hazards is elaborated in detail in Annexure 8.4.

At the national level, India announced its commitment to achieving net-zero greenhouse gas emissions by 2070 at the 26th Conference of the Parties (COP26) in Glasgow in 2021, signalling the need for accelerated and coordinated climate action across sectors and levels of government. Translating this commitment to the state scale, the Gujarat State Action Plan on Climate Change (SAPCC), 2021, provides a comprehensive framework for addressing climate change through integrated mitigation and adaptation strategies aligned with sustainable development objectives.

To supplement urban climate action, the Ministry of Housing and Urban Affairs (MoHUA), Government of India, launched the City Investments to Innovate, Integrate and Sustain (CITIIS 2.0) Programme in 2023. Under the programme guidelines, state governments are required to establish a State Climate Centre for Cities (S-C3), alongside Municipal Climate Action Departments[34] within municipal corporations. The programme envisages the preparation of an Integrated State Climate Action Plan (ISCAP) by the S-C3 and City Climate Action Plans by municipal corporations.

In line with the CITIIS 2.0 programme guidelines, the Government of Gujarat has constituted a State Climate Centre for Cities (S-C3) at the state level and directed municipal corporations to establish Municipal Climate Action Departments.

2.5.1 Climate Resilient City Action Plan (CRCAP)

Climate Resilient City Action Plans (CRCAPs) constitute an important instrument of urban climate governance in Gujarat, responding to the need for a city-level roadmap to strengthen resilience against climate risks by integrating climate adaptation and mitigation priorities into urban planning. While DDMPs and HAPs primarily focus on preparedness, response, and recovery for specific hazards, CRCAPs are designed to assess how climate risks evolve and interact with urban systems, service delivery, and vulnerable populations under future climate scenarios. This is achieved through analyses of historical climate trends, future climate projections, and the exposure and sensitivity of urban systems and populations.

Both Ahmedabad and Surat have developed CRCAPs as long-term climate action frameworks. These CRCAPs include comprehensive assessments covering urban systems gap analysis; climate risk and vulnerability assessment (CRVA); energy profiling and greenhouse gas (GHG) emissions inventories; future projections and scenario planning for emissions reduction through Progressive Action Scenarios and Net-Zero Pathways; sectoral goal-setting and target definition; identification of adaptation and mitigation strategies and actions; and monitoring through indicators and review mechanisms (Ahmedabad Municipal Corporation, 2023; Surat Municipal Corporation, 2025).

Identification of Vulnerable Systems, Wards and Populations

Within the CRCAP framework, the CRVA assesses how climate hazards affect the functioning of urban systems and the vulnerability of different population groups. Rather than focusing on hazards alone, these assessments link climate stressors to infrastructure gaps, service delivery

34 Letter No: UDUHD/0739/06/2025 City Investments to Innovate, Integrate and Sustain (CITIIS 2.0) Program - Component 2 (State-Level Action)1_32_1_CITIIS-2-0_GR.pdf

constraints, and socio-economic conditions.

In Ahmedabad, the CRCAP[35] identifies fragile systems across water supply, drainage, health, mobility, buildings and urban ecosystems, and links these to spatial risk patterns within the city. By analysing where service deficits intersect with climate stressors and higher concentrations of vulnerable populations, particularly communities with limited access to essential services, the plan provides a basis for prioritising resilience actions in areas facing persistent or intensifying risk (Ahmedabad Municipal Corporation, 2023).

In Surat, the CRCAP[36] explicitly identifies "extremely critical wards" through an overlay of climate hazards, infrastructure and service gaps, and population vulnerability. The plan further documents community-level consultations and focus group discussions in slum and high-risk areas to capture lived experiences of heat stress and flooding impacts, particularly among informal workers, low-income households, and other vulnerable groups (Surat Municipal Corporation, 2025).

Relevance for Loss and Damage Assessment

While CRCAPs are primarily designed to guide long-term climate adaptation and mitigation, their analytical foundations are highly relevant for L&D assessment. By integrating climate projections with the identification of climate-fragile urban systems and spatially mapping vulnerable wards and populations, CRCAPs help distinguish between risks that can be managed through incremental adaptation and those that are likely to persist or intensify under future climate conditions.

The CRCAPs for Ahmedabad and Surat describe a governance and process framework oriented towards coordinated climate planning. Key features include:

- **Municipal anchoring and coordination:** In both cities, the CRCAP process is anchored within the municipal corporation and coordinated through a multi-departmental Climate Core Team, which provides overall guidance for planning, coordination, and follow-up across sectors.
- **Distributed departmental responsibility:** Sectoral departments (e.g. water supply, drainage, health, transport, housing, urban services) are identified as responsible for implementing actions within their functional mandates, reflecting a distributed responsibility model rather than a centralised command structure.
- **Stakeholder engagement and validation:** Stakeholder committees and consultation processes are used to support validation of risk assessments, prioritisation of actions, and alignment with broader urban development objectives.
- **Defined planning and implementation sequence: C**RCAP implementation follows a clearly defined planning-to-action cycle that links risk assessment with sectoral implementation, monitoring, and periodic review.

Taken together, this governance provides an enabling institutional platform for integrating forward-looking climate risk and vulnerability considerations into municipal decision-making. Although not designed as an operational response mechanism, it complements disaster management frameworks by supporting systematic identification and reassessment of persistent and emerging risks over time, which is relevant for informing city-level L&D assessments.

2.5.2 City Focus: Urban Flood Management

Urban flooding was formally recognised as a separate disaster category and addressed in India's disaster management framework in 2010, when the NDMA issued the "National Guidelines on Management of Urban Flooding"[37] in September 2010. MoHUA issued SOPs for urban flooding, detailing

35 Ahmedabad Municipal Corporation. (2023). Climate resilient city action plan (CRCAP) for Ahmedabad. Ahmedabad Municipal Corporation. https://www.ahmedabadcity.gov.in ahmedabadcity.gov.in/ViewFile/ViewFile?TYPE=FileRepository,2098

36 Surat Municipal Corporation. (2025). Draft net-zero climate resilient city action plan (CRCAP) for Surat. Surat Municipal Corporation.

37 National Disaster Management Authority. (n.d.). Urban floods [Webpage]. https://ndma.gov.in/Natural-Hazards/Urban-Floods

specific actions for urban local bodies, district administration, and state governments.

Floods remain one of the most frequent and high-impact climate-related hazards in Gujarat, intensified by changing rainfall patterns, rapid urbanisation, and increased encroachment on natural drainage systems. Urban centres such as Ahmedabad and Surat face recurrent risks from extreme precipitation, riverine flooding, poor stormwater drainage capacity, and tidal influences (in the case of Surat). Recognising these emerging climate-linked risks, flood management at the state, district, and city levels has progressively shifted from a reactive, relief-oriented approach to a more integrated framework grounded in preparedness, early warning, and systemic mitigation.

In the monsoon season, there is heavy rainfall recorded in the Surat district over time. In the study of meteorological data, due to heavy winds of the Tapi River water, the rainfall in the catchment area of the Tapi River is likely to cause heavy flooding even in low rainfall. Due to heavy rainfall, it is also flooded.

Roles and Responsibilities (Flood Management)[38]

At the urban level, disaster response for floods, heavy rainfall, and cyclones is coordinated through a centralised Emergency Control Room (ICCC). This control room functions as the command hub, integrating all major municipal departments for unified decision-making and operational coordination.

Table 5: Roles and Responsibilities Flood Management

Sr. no	Responsibility	Tasks/Activities
1	**Technical Agencies (IMD, CWC, State Irrigation Dept., SEOC)**	Generate meteorological forecasts, hydrological advisories, reservoir status updates, and issue early warning bulletins to the State and District authorities.
2	**State-Level Coordination (SEOC / State Information Dept.)**	Transmits consolidated warnings to DEOC and Collector; activates state-wide communication channels including Information Dept., media and public alert systems.
3	**District Administration**	Acts as district incident command; receives warnings from SEOC; disseminates alerts to line departments, Liaison Officers, Nodal Officers for sector-specific actions.
4	**Departmental Liaison & Nodal Officers**	Relay warnings to Taluka-level authorities; initiate department-specific preparedness, resource mobilisation, and field coordination.
5	**Taluka-Level Administration (TEOC/ Mamlatdar / Zonal Officer)**	Conduct field-level monitoring; coordinate local resources; activate Taluka Disaster Management Committees; pass information to sub-zonal and village structures.
6	**Village-Level Institutions (VDMCs / Local Leaders)**	Execute last-mile dissemination using sirens, mobile alerts; organise community preparedness and evacuation if required.

38 Gujarat State Disaster Management Authority. (2024). Surat District Disaster Management Plan (DDMP) 2024. surat-ddmp-20240620204042131181.pdf

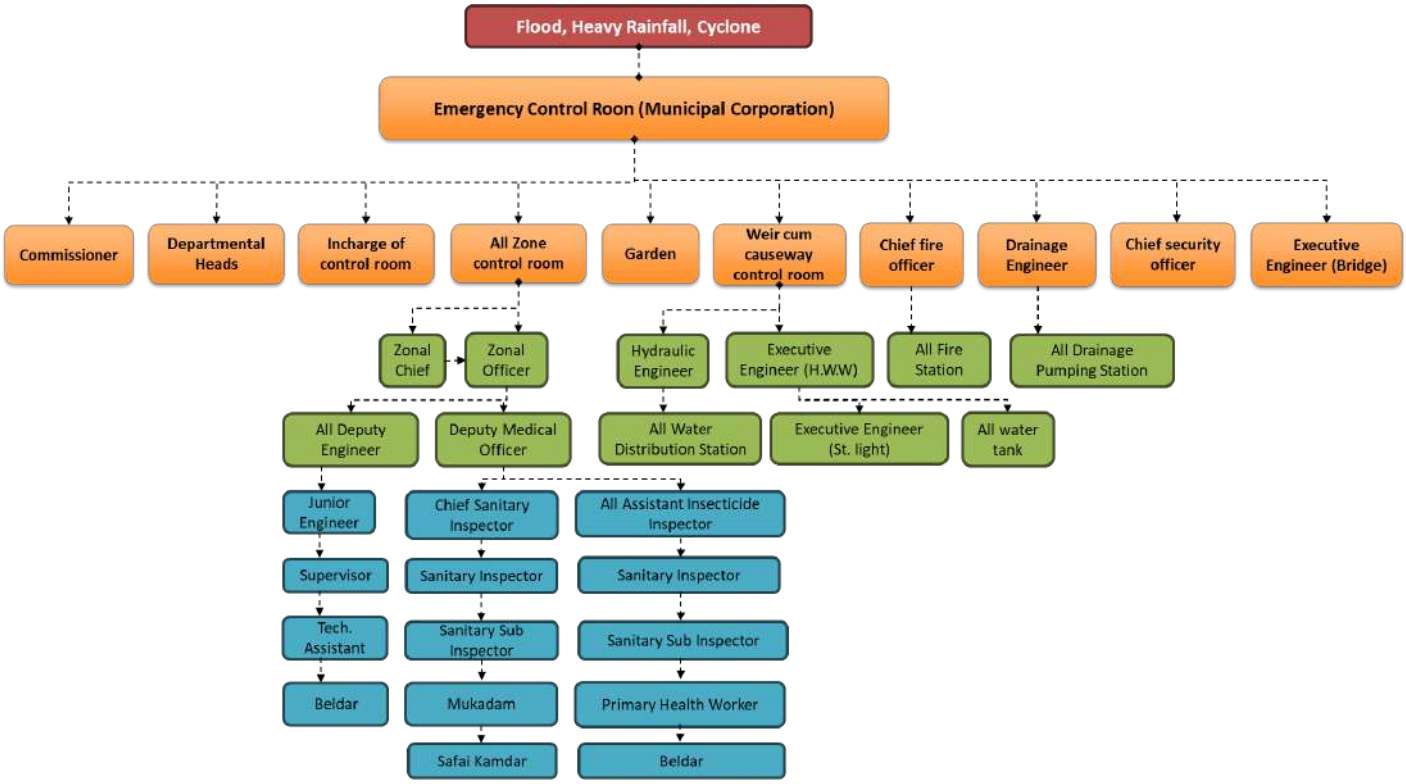


Figure 7: City-level Emergency Response Structure for Flood, Heavy Rainfall, and Cyclone Events[39]

2.5.3 City Focus: Heat Management

Background: Recognition of Heatwaves as a Hazard[40]

Until 2015, heatwaves were not recognised as a national-level disaster despite high mortality. In 2015 alone, 2,042 deaths were recorded. Heat-related deaths and illnesses received limited policy attention, and both central and state governments largely followed a response-centric approach, with minimal focus on risk reduction.

Prior to 2015, the primary responsibility for disaster risk management rested with the state governments. Several states, such as Chhattisgarh, Odisha, Kerala, Rajasthan, Andhra Pradesh, Maharashtra, and Karnataka, have independently declared heatwaves a local disaster. Under State Disaster Response Fund norms, they could spend up to 10% of funds on locally relevant disasters, but the absence of a national framework limited consistency and preparedness across states.

Policy Shift After 2015

The Central Government adopted a clear vision of reducing heatwave deaths to zero, marking a major shift in national disaster management priorities. From 2015 onward, a multi-stakeholder, prevention-oriented approach was introduced, supported by policy, planning, and capacity-building measures.

Key National Initiatives Introduced after 2015

1. National Guidelines for Heatwave Management: NDMA developed comprehensive guidelines to enable states and cities to prepare Heat Wave Action Plans (HAPs). The guidelines outline:

- Prevention and preparedness measures
- Mitigation strategies

39 Surat Municipal Corporation. (2025). Disaster Management & Preparedness Plan (DMP). Retrieved from dmp 41-42.cdr
40 National Disaster Management Authority. (2016). Beating the heat: Guidelines for preparation of action plan – prevention and management of heat-wave [PDF]. HeatWave A5 BOOK Final.cdr

- Early warning and inter-agency coordination
- Response protocols and impact evaluation

The framework serves as the national reference for planning heatwave management at state, district, and urban levels.

2. Clear Roles and Responsibilities: The heatwave guidelines and the NDMP define the responsibilities of:

- Central ministries
- State departments
- District administrations
- Urban local bodies
- NGOs and civil society

This matrix-style clarity improved coordination and accountability during the heatwave response.

3. Ground-Level Implementation and Capacity Building: To ensure adoption of the guidelines, NDMA initiated annual heatwave workshops (from 2017 onward) with heat-prone states. These workshops help states:

- Understand vulnerability
- Prepare or revise their HAPs
- Strengthen inter-departmental coordination
- Institutionalise seasonal preparedness

4. Technical Studies and Threshold Setting: NDMA conducted a preliminary study to identify temperature thresholds for 103 cities, released in 2019. By using the preliminary thresholds in early warning systems for extreme heat waves, cities prone to extreme heat can improve their existing mechanisms to deal with an impending heat disaster as soon as their specific thresholds are breached

5. Community Sensitisation and IEC Campaigns: Public awareness is a core component of the national strategy. NDMA uses:

- Social media
  - Print and electronic media
  - Advertisements
  - Short films
  - Audio-visual materials and IEC content

These campaigns circulate dos and don'ts, hydration messages, and early-warning awareness widely every summer.

Heat Management

Urban heat risks in Ahmedabad and Surat are managed through structured Heat Action Plans (HAPs) developed in line with NDMA's Heatwave Guidelines. These plans integrate IMD-based heat alerts, health department protocols, and targeted IEC campaigns to reduce heat-related illnesses and deaths. Municipal corporations coordinate across departments, health, water supply, labour, education, and disaster management to activate heat advisories, adjust work and school timings when needed, ensure drinking water availability, and strengthen surveillance for heat-related cases.

Table 6: Roles and Responsibilities Heat Management

Sr. No	Responsibility	Tasks/Activities
1	**National Disaster Management Authority**	Guideline on preparing a Heatwave Action Plan
2	**SDMA/ DDMA/ Municipal Corporation and Local Bodies**	Preparing and implementing a Heatwave Action Plan
3	**IMD**	Issue heatwave alerts and weather forecasts for the short- / medium- / long-term
4	**State Governments/ District Administration**	To disseminate the information received from IMD to the public at large
5	**Public Health and Engineering Department (State level)**	To construct shelters/ sheds, bus stands and provide drinking water points at worksites; /Stockpiling of ORS, creating medical posts at places of mass gathering of people; Training of Human Resources
6	**Department of Information and Broadcasting/ SDMAs/ Commissioners of Relief/ State Govt/ Health Department (State level)**	Extensive IEC campaigns to create awareness through print, electronic and social media
7	**Forest Department/ SDMAs and other concerned departments**	Implement afforestation and enhance green spaces in cities.

Box 5: Ahmedabad Heat Action Plan

Ahmedabad Heat Action Plan (HAP)

The Ahmedabad Heat Action Plan (AMC, 2019), developed by AMC with support from public health and research partners, operationalises heat preparedness through a set of phased, department-wise responsibilities and temperature-linked alert levels.

The HAP specifies:

- Alert thresholds (Yellow/Orange/Red) and corresponding actions for the AMC Nodal Officer and line departments. For example, under Yellow Alert (41.1–43°C), the Nodal Officer is tasked with organising preventive training and outreach for health workers and communities, distributing multilingual IEC materials, and preparing a list of high-risk areas for focused heat prevention activities.
- Under higher alert levels (Orange/Red), the plan calls for intensified coordination, special measures for the elderly and infants, workshops with doctors for identifying heat illness, daily reporting of all-cause deaths to AMC and the press, activation of cooling centres and expanded access to shaded areas for vulnerable populations.
- Sector-specific checklists for departments such as the Labour Department and 108 Emergency Services, including measures like providing water at worksites, considering extended afternoon breaks or alternate working hours for outdoor workers, ensuring adequate IV fluids and medicine stocks, maintaining accurate records of pre-hospital care, and preparing SMS templates for alerts.

In addition, the HAP includes a post-season evaluation phase, where the AMC Nodal Officer convenes an annual review with key agencies to assess plan performance, revise the plan, and post the updated version publicly before the next heat season.

The HAP also links to the Ahmedabad Cool Roofs Programme, a target-based initiative aimed at scaling cool roofs across municipal, commercial and residential buildings, with specific focus on low-income housing as part of heat resilience.

Box 6: Surat Heat Action Plan

Surat Heat Action Plan (HAP)

The Climate-Adaptive and Gender-Integrated Heat Wave Action Plan of Surat City sets out a structured approach to extreme-heat preparedness that combines early warning protocols, graded alerts, and clearly assigned roles for implementation (IRADe & UHCRC, 2023). The plan recognises that heat stress affects groups more severely, including outdoor workers and those engaged in physical labour, the elderly, children, pregnant women, and people with chronic illnesses and frames the response as gender sensitive, noting that women "pay a higher price" during extreme heat.

Operationally, the plan defines forecast and dissemination protocols (including four-day and 24-hour dissemination) and uses multiple warning levels (Green/Yellow/Orange/Red), with Surat-specific temperature thresholds informed by local analysis of temperature and all-cause mortality (IRADe & UHCRC, 2023). In line with its climate-adaptive intent, it emphasises the need to identify and prioritise the hottest pockets of the city: it maps ward-level heat hotspots using satellite-derived land surface temperature (Landsat 8 / LST) and notes that hotspot mapping helps direct interventions "where they are most needed" during heat waves.

For a city-level Loss and Damage (L&D) assessment, these components create immediate integration points:

- the plan's emphasis on health impacts and the inclusion of a dedicated morbidity–mortality surveillance component support systematic tracking of non-economic losses,
- alert-linked actions and phased roles provide an operational structure to document indirect impacts (e.g., disruption to work and essential services) alongside response measures; and
- hotspot and vulnerability mapping support spatially targeted documentation of who faces the highest residual risks within the city

Process of Heat Data Collection

The National Heat Wave Guidelines introduced a structured committee-based system for verifying and confirming heat-related deaths. This mechanism improved transparency in attributing fatalities to heatwaves and significantly reduced earlier instances of over-reporting, which were often linked to claims for monetary compensation.

In 2022, the National Centre for Disease Control (NCDC) launched the Heat and Health surveillance system. Heat-wave illness and mortality data are compiled in vulnerable states through a dedicated monitoring mechanism under the Integrated Disease Surveillance Programme (IDSP)[41], managed by the NCDC, Ministry of Health and Family Welfare. The system aims to standardise detailed data collection at the block, district, and state levels and maintain a reliable national-level database. The data collection format is attached in Annexure 8.5.

To support consistent reporting, IDSP–NCDC has established a weekly data-sharing protocol[42] for all stakeholders. Mortality figures gathered by state agencies are verified by a three-member district-level committee before being forwarded to national authorities, ensuring the accuracy and credibility of reported heat-wave impacts.

Limitations

Although the National Disaster Management Plan (NDMP) recognises heatwaves as a hazard, they are not notified as a disaster under the list of eligible disasters for assistance. This results in several structural and operational limitations:

1. No State Disaster Response Fund / National Disaster Response Fund Eligibility Because heatwaves are **not a notified disaster**, states cannot draw dedicated relief or compensation from the State Disaster Response Fund or the National Disaster Response Fund. Support for affected families (such as ex gratia payments) is therefore not permissible under existing national guidelines.

2. Dependence on the 10% Local Disaster Provision For state-specific disasters not on the nationally notified list, up to 10% of the state's annual State Disaster Response Fund allocation may be utilised. However, this is a flexible but limited window, often inadequate for:

- large-scale public health measures
- prolonged heatwave spells
- urban heat island impacts

3. Heat-related illness surveillance under IDSP–NCDC[43]

The surveillance of heat-related illnesses under IDSP–NCDC largely depends on routine reporting from the health department. Currently, the availability of systematic, granular, and city-level data remains limited, which can constrain timely risk assessment and informed decision-making. Enhancing regular, urban-level reporting mechanisms would improve the precision of heatwave impact monitoring.

41 Desai, V., Magotra, R., & Jha, N. (2023). Climate Adaptive and Gender Integrated Heat Wave Action Plan – Surat City, Gujarat. Integrated Research and Action for Development (IRADe). Climate-Adaptive-and-Gender-Integrated-Heat-Wave-Action-Plan-of-Surat-City.pdf

42 National Disaster Management Authority. (2016). Beating the heat: Guidelines for preparation of action plan – prevention and management of heat-wave [PDF]. HeatWave A5 BOOK Final.cdr

43 The point was discussed by experts during Stakeholder Workshop in Surat

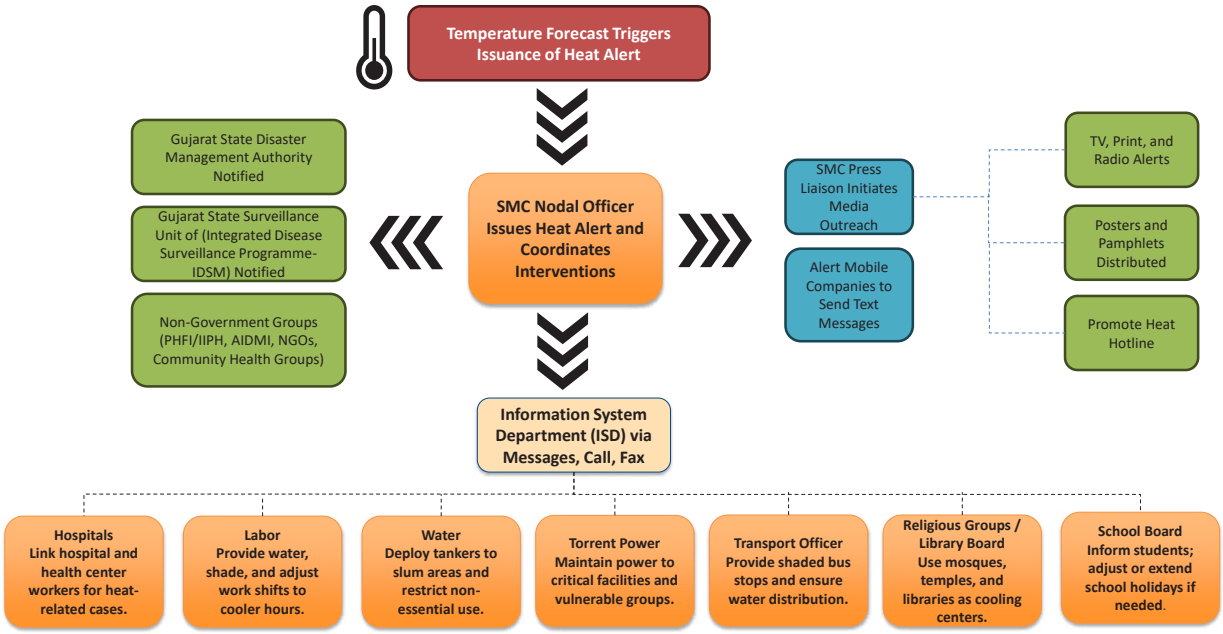


Figure 8: Operational workflow for issuing a heat alert activation and response mechanism in Surat, showing coordination between SMC, state authorities, communication systems, utilities, health services, and community institutions.[44]

2.6 Identifying Gaps and Leveraging Elements in City-Level L&D Assessment

2.6.1 Gaps within existing assessment and reporting methods

Despite the presence of national, state, and district-level disaster management systems, India's current data collection, assessment, and reporting mechanisms present significant limitations when assessed through an L&D lens. These gaps have been categorised broadly into institutional, operational, and capacity-related gaps that constrain the ability to comprehensively document, analyse, and respond to climate-related ELD and NELD , particularly in urban contexts.

Institutional Gaps:

Institutional gaps arise from governance structures, mandates, and accountability arrangements that shape how data is collected, reported, and used.

- **Systematic under-representation of non-economic losses:** Non-economic losses (e.g., impacts on health, education continuity, mental well-being, dignity, and social cohesion) are difficult to document within existing templates and are often excluded from consolidated estimates. Assessment teams may recognise these impacts qualitatively, but lack the tools, indicators, or mandate to record them in a structured way.
- **Event-based focus limits recognition of cumulative and recurrent loss:** PDNAs are typically designed around discrete, major disaster events. In urban contexts characterised by recurrent flooding, prolonged heat stress, or repeated service disruptions, this event-based framing underestimates cumulative losses that accrue over time and across sectors.
- **Weak linkage between assessment outputs and forward-looking decisions:** While NDMA guidelines encourage integrating

44 Desai, V., Magotra, R., & Jha, N. (2023). Climate Adaptive and Gender Integrated Heat Wave Action Plan – Surat City, Gujarat. Integrated Research and Action for Development (IRADe). Climate-Adaptive-and-Gender-Integrated-Heat-Wave-Action-Plan-of-Surat-City.pdf

disaster response and recovery insights into long-term planning, in practice, development and master planning processes often operate independently of disaster recovery frameworks. As a result, insights from damage and loss assessments are rarely carried forward into long-term development decisions, limiting their influence on future risk reduction and resilience.

Operational Gaps:

Operational gaps relate to how data is collected, processed, shared, and used in practice, even when institutions exist.

- **Confusion on the ground on fundamentals of damage, loss, relief, and recovery needs** In practice, local officials and stakeholders often face confusion in distinguishing between damage, loss, relief, and recovery needs, as these terms are relatively new and interpreted differently across departments. This is compounded by the need to report impacts through multiple formats and channels, leading to inconsistent reporting and conflation of immediate relief with longer-term recovery and loss.
- **Sectoral silos constrain capture of cascading impacts:** Although PDNA teams often observe cross-sectoral and cascading impacts in practice (e.g., power outages affecting health services, water supply, and livelihoods simultaneously), existing sector-based templates provide limited space to document or value these interactions for fear of double-counting.

Capacity-related gaps:

Capacity gaps reflect limitations in human resources, technical skills, infrastructure, and incentives at various levels of governance.

- **Urban informal systems do not fit neatly within assessment templates:** Informal livelihoods, informal housing, and small-scale enterprises are often poorly captured due to a lack of baseline data and reliance on proxies. This leads to partial or conservative estimates of livelihood and income loss, particularly for groups most exposed to climate risks.
- **Pressure to converge figures limits reflection of uncertainty:** There is often institutional pressure to converge on single consolidated figures within short timeframes. This can constrain opportunities to document uncertainty, variability, or alternative scenarios, particularly where impacts are unevenly distributed or poorly documented.

2.6.2 Elements in Existing Plans That Can Assist a City-Level L&D Assessment Framework

The preceding review of existing policies and plans shows that a variety of hazard, vulnerability, and operational approaches are already embedded in city governance. They offer institutional channels, data streams and action sequences that can be systematically repurposed to support a structured L&D assessment at the city level.

Hazard and Climate Risk Baselines as Entry Nodes in Impact Chains

DDMP hazard profiles, heat alert thresholds in HAPs, and historical flood documentation provide a standardised starting point for framing impact chains (Ahmedabad DDMA, 2024–25; Surat DDMA, 2024–25; AMC, 2019; SMC, 2018). They identify:

- Which hazards matter most at the city scale (e.g., riverine flooding from Ukai in Surat, compound heat–flood risks in Ahmedabad),
- Typical event characteristics (e.g., return periods, discharge levels, temperature thresholds) and,
- Existing structural/non-structural measures already in place.

For L&D, these baselines can integrate climate projections and intensification trends and help distinguish between:

- Impacts that can still be reduced through additional adaptation (risk reduction), and
- Residual risks that are likely to persist even with strengthened measures, and thus need to be framed as L&D.

In practice, this means that DDMP hazard sections and HAP trigger levels can be used to define which events are included in the L&D assessment, and to locate them on a continuum

from "manageable through DRR" to "increasingly residual under climate change".

Vulnerability and Exposure Information as Social Layer of L&D

HAPs and city plans typically identify vulnerable populations and locations: heat-prone wards, informal settlements, low-income housing, industrial estates, critical facilities (hospitals, STPs, pump stations), and groups such as outdoor workers, the elderly, children, and people with chronic illnesses (AMC, 2019; SMC, 2018).

These elements map directly onto the "exposure and sensitivity" nodes in impact chains:

- They identify who and what is exposed (households, informal workers, small- and medium-sized enterprises, critical infrastructure),
- They provide location-specific insights (wards, talukas, catchment-level hotspots), and
- They highlight pre-existing stressors (poor housing quality, limited access to water, service deficits) that shape how hazards translate into impacts.

For a city-level L&D framework, this information is crucial for:

- Targeting data collection during and after events (e.g., focusing health surveillance or livelihood impact surveys in already identified hotspots)
- Structuring impact chains to capture distributional aspects of L&D (who bears residual risks), and
- Supporting prioritisation of measures in line with full-spectrum risks (economic and high-confidence non-economic losses like health, education disruption, and livelihood impacts).

Early Warning Systems and Operational Protocols as Observation Windows on Residual Risk

Early-warning and response protocols in DDMPs, HAPs, and flood SOPs provide time-bound, action-linked sequences of what happens as a hazard intensifies: alerts issued, communications sent, actions taken, and thresholds at which specific measures are triggered.

For L&D, these protocols create natural observation windows to track where residual risk remains even after planned actions are implemented. For example:

- If HAP protocols instruct departments to adjust work hours, open cooling centres, and ramp up health surveillance during a heatwave, yet morbidity and mortality still rise, this reflects a gap between planned action and residual risk.
- In Surat's flood SOPs, if the Ukai dam releases water and pump operations are managed according to plan, but certain wards still experience prolonged waterlogging and business closures, this residual impact can be systematically documented as L&D.

By aligning L&D monitoring with existing alert levels and SOP steps, cities can:

- Minimise additional reporting burdens on frontline staff,
- Embed data collection at points where residual risk is most visible (e.g., after HAP actions, during peak flood stages), and
- Build a temporal picture of how residual impacts evolve during and after hazard events.

Service-Delivery and ICCC Data as Quantification of Functional Losses

Smart City ICCC platforms in both cities are designed to monitor service performance in real time, including water supply, drainage pump operations, solid waste, mobility, emergency calls, and, in some cases, health alerts. Drainage and engineering departments maintain logs on pump functioning, network blockages, and pre- and post-monsoon works (NITI Aayog, 2020; SMC, 2018).

For L&D, these systems are particularly important for capturing functional losses, which are often under-reported in traditional damage assessments:

- Duration and spatial extent of service disruptions (e.g., hours of water supply interruption, days of drainage pump downtime, and length of road closures),

- Stress on critical services (e.g., spikes in emergency calls, hospital load) during events,
- Recovery timelines (how quickly services return to baseline after an event).

The focus is not only on physical damage but also on how system disruptions lead to downstream economic and non-economic losses (lost work days, missed school days, health deterioration.). Departmental operational records can, therefore, populate the "impact and functional loss" nodes of city-level L&D chains with empirical, time-stamped data, rather than ex post estimates alone.

Damage and Loss Assessment Formats as Instruments for Structured L&D Reporting

Both cities use state-issued rapid, preliminary and detailed damage assessment formats through their DDMPs and Revenue Department procedures. Currently, these formats are designed primarily for relief and compensation processes, with emphasis on:

- Number of affected households;
- Physical damage to housing, infrastructure and assets;
- Immediate needs for relief and reconstruction.

In the L&D framing, these formats can become instruments for systematic, city-level L&D reporting, if they are:

- Augmented with fields that capture high-confidence non-economic losses (e.g., heat-related illness counts, school closure days, temporary displacement);
- Tagged with location codes (wards, drainage basins, slum clusters) for spatial analysis; and
- Linked to hazard intensity information (e.g., discharge levels, temperature bands) to enable attribution and residual-risk analysis.

Because these formats are already embedded in DDMP workflows and familiar to field officials, they offer a low-friction pathway to shift from fragmented, event-specific reporting to routine, L&D-compatible datasets that are consistent with UNFCCC expectations.

Institutional and Review Mechanisms as Governance Infrastructure for L&D

Finally, the institutional arrangements described in DDMPs (DDMC, DEOC, IRS, departmental ESFs) and the annual review mechanisms embedded in HAPs (post-season evaluations, plan revisions, public disclosure) provide a governance backbone for sustaining L&D assessment.

L&D assessment is not a one-off exercise; it is an iterative risk management process where:

- Impact chains are updated as new data emerges,
- Residual risks are re-assessed in the light of new adaptation measures, and
- Priorities for risk reduction, preparedness and compensation are adjusted over time.

The fact that Ahmedabad and Surat already undertake annual HAP reviews, periodic DDMP updates, and regular monsoon preparedness meetings means that:

- There are existing forums where L&D evidence can be tabled, discussed and acted upon,
- Responsibilities for data collation and validation can be anchored in recognised institutions (e.g., DEOC, nodal officers, ICCC teams), and
- L&D findings can feed back into planning cycles (e.g., revisions of HAPs, drainage works, capital investment priorities under AMRUT/ Smart City).

This governance infrastructure is crucial for transforming L&D from a purely technical exercise into a decision-support system that informs planning, budgeting and accountability at the city and state levels.

3.

Learnings from Case Studies

Across the world, cities and communities are experimenting with new ways to understand, manage, and reduce L&D from climate impacts. The following case studies bring together experiences from India and the Global South that illustrate how locally rooted innovations, from community-generated L&D data to anticipatory aid, can reshape disaster governance. Each example highlights how different actors at different scales are responding to gaps in early warning, finance, and institutional capacity. Together, they show that L&D is not only a technical challenge but also a lived, everyday reality shaped by people's exposure to risk and the resources they can draw from. These cases can serve as practical entry points for building people-centred systems for assessing L&D in urban contexts.

3.1 Case Studies within India

3.1.1 Parametric heat insurance by Mahila Housing Trust in Gujarat

Mahila Housing SEWA Trust (MHT) has spent three decades working with women in low-income settlements to secure housing, basic services and climate resilience. In recent years, rising temperatures in Gujarat's industrial cities have turned heat from a seasonal discomfort into a structural risk for informal women workers whose homes double as workplaces and warehouses. Extended heatwaves now mean lost working days, higher electricity bills, and increased health expenses, in contexts where there is no formal social protection or employer liability.

Against this backdrop, MHT has begun piloting a parametric, index-based heat insurance product targeted at women members of two credit cooperatives in Ahmedabad, Vadodara (Baroda) and Surat. The scheme is designed as a climate risk insurance program that complements MHT's broader work on cool roofs, ventilation, and energy-efficient livelihoods, and explicitly recognises heat as both a health and income shock for urban poor women.

From climate burden to financial protection

MHT's earlier work on women-led climate resilience had already documented how heat stress compounds existing gendered burdens: women spend longer hours on unpaid care and domestic work, while also working in home-based manufacturing, street vending or construction. Rising temperatures increase water needs, disrupt sleep, and force women to reduce or reschedule work, with little room to absorb income loss (GRP, 2018)

This experience fed into a conscious move towards Climate and Disaster Risk Finance and Insurance (CDRFI). A 2023 study with the Insu Resilience Centre of Excellence examined poverty- and gender-related barriers that prevent urban poor women from accessing formal insurance: low trust, unfamiliarity with products, irregular incomes, and exclusion from mainstream financial channels (MHT, 2023). The heat index product was designed in part to respond to these insights, by anchoring the insurance in existing women's cooperatives where MHT has deep organising relationships.

Designing an index for excessive urban heat

In 2024, MHT partnered with Global Parametrics, the Natural Disaster Fund (NDF), and private insurers Howden and Go Digit to develop an index-based risk transfer solution for excessive urban heat. The programme provides coverage to around 26,000 women members of two women-led credit cooperatives across

Ahmedabad, Vadodara and Surat. Risk capacity is provided by the NDF, with the cooperatives acting as the direct policyholders and passing on benefits to their members (CelsiusPro, 2024).

The technical core of the product is a heat index linked to extreme heat events, drawing on meteorological data and historical climate patterns. When temperatures in a given city cross pre-defined thresholds over a certain number of days, the policy is triggered and a lump-sum payout is made to the cooperative, which then distributes benefits to insured members. Rather than indemnifying actual individual loss, the product treats extreme heat as a predictable systemic shock, using the index to substitute for costly and time-consuming loss verification.

MHT's role has been to keep this technical design grounded in lived realities. Before finalising the product, the organisation undertook climate risk assessments, over a hundred interviews and focus group discussions with women workers and cooperative staff in the three cities, to understand which heat indicators most closely track felt impacts on health and income. This process ensured that the index design did not drift too far from everyday experience, a common problem with top-down parametric products (CelsiusPro, 2024).

Implementation and early experience

The programme is relatively new, but a few design choices are notable. First, the insurance is embedded within women's financial cooperatives rather than sold to individuals through external agents. This leverages existing trust and collective governance, lowers transaction costs, and allows payouts to be combined with other forms of support, such as rescheduling loan repayments during severe heat events.

Second, MHT has invested heavily in communication and capacity-building around climate risk and insurance literacy. Working with the Bangalore-based organisation Fields of View, the team co-developed games and communication tools to demystify climate indices and triggers, and to help women understand when and why payouts might occur or not. This is critical in a context where previous experiences with insurance (or other financial products) have often been opaque and extractive (CelsiusPro, 2024).

Third, the insurance is not positioned as a stand-alone fix. In parallel, MHT continues to promote low-cost physical measures such as cool roof coatings and building retrofits in dense settlements, which directly reduce indoor temperatures and improve thermal comfort (World Bank, 2024). The intention is that insurance addresses the residual risk that remains even after feasible adaptation measures are taken.

Barriers, limits and questions that remain

The 2023 gender-barriers study flagged affordability, competing financial priorities, and low familiarity as key obstacles for urban poor women (MHT, 2023). Even with subsidies and cooperative-based delivery, there is a risk that only relatively better-off or better-organised women participate, leaving the most marginalised unprotected.

There are also technical limits. Heat indices built on city-wide temperature data may not fully capture neighbourhood-level variation in exposure, especially in dense informal settlements with limited vegetation and high thermal mass. Index design, therefore, always carries a degree of basic risk: women may experience severe heat stress without a trigger being reached, or receive payouts when their own exposure is more moderate.

Finally, parametric insurance can address only a narrow slice of L&D—short-term income loss or emergency expenses. It does not address the longer-term impacts on health, productivity, or intergenerational poverty, nor does it compensate for the historic underinvestment that makes these communities so vulnerable in the first place.

3.1.2 Akshvi by SEEDS: Community-Generated Loss & Damage Data for More Equitable Recovery

SEEDS India developed Akshvi against a familiar backdrop in India's disaster governance: the persistent under-counting of losses experienced by poor and marginalised households. Official

assessments typically record damage to houses or public infrastructure but seldom capture the lived impacts of a disaster such as lost tools and inventory, interruptions in informal work, medical expenses, displacement costs, or the psychological stress of recovery. These gaps are widely documented in SEEDS' own field experience and in national disaster-response reviews. Akshvi was created to address this blind spot by giving households a simple, direct way to record the cost of a hazard on their own terms (SEEDS, 2025).

A household "disaster wallet" for capturing lived impacts

At its core, Akshvi is an e–"disaster wallet" that allows households to log L&D through an IVRS helpline, a WhatsApp chatbot, or with support from community volunteers. These multiple entry points make the tool accessible even to non-literate or low-digital users. Once submitted, entries are fed into a consolidated database that produces a granular picture of disaster impacts at settlement, district, and state scales.

Early pilots revealed the strength of this approach. Following a cyclone in West Bengal, SEEDS found that 98% of self-reported entries matched independent field verification (Jamwal, 2025). This challenged a long-held assumption that bottom-up reporting is prone to exaggeration. More importantly, Akshvi made visible what typically remains invisible: damaged sewing machines, spoiled stock stored under beds, the day's income lost when a woman vendor cannot leave home, or the new debt taken on to cope in the aftermath of a storm.

What the early experience reveals

Although still a pilot, Akshvi has shown how community-generated evidence can reshape understanding of disaster impacts. In several districts, Akshvi data has already helped humanitarian agencies identify which clusters faced the steepest losses—information that would not have emerged from conventional assessments. Households have begun using the recorded entries as a basis to access assistance or negotiate support, creating a rare layer of transparency in relief processes (Jamwal, 2025). For SEEDS, the platform has also become a way to track slow-onset and repeated shocks, revealing how chronic vulnerability accumulates over time rather than in single catastrophic moments.

3.1.3 Surat: Institutionalising Urban Climate and Health Resilience in Cities

Surat's experience with climate risk is long and uneven. The 2006 floods, triggered by sudden dam releases upriver, submerged nearly 75 percent of the city, affecting homes, industries, and basic services. But the event's significance extended beyond physical damage: it revealed deep structural gaps in coordination between dam authorities, municipal departments, industries, and health systems (Resilient Cities Network, 2017). With a fast-growing migrant population, dense low-lying neighbourhoods and a complex hydrological setting along the Tapi River, Surat needed an institutional mechanism capable of anticipating risks rather than responding in silos.

In 2012–13, under the Asian Cities Climate Change Resilience Network (ACCCRN), local government, industry leaders, public-health officials and technical organisations came together to form the Surat Climate Change Trust (SCCT), a city-level institution aimed at mainstreaming climate resilience across departments and anchoring long-term action beyond individual projects or political cycles. SCCT was legally registered under the Bombay Public Trusts Act and positioned deliberately outside the constraints of any single agency, giving it the flexibility to convene diverse stakeholders and sustain climate work over time (SEI, 2017).

The Urban Health & Climate Resilience Centre: linking climate risk to public health

One of SCCT's earliest priorities was addressing the public-health dimensions of climate impacts. The 2006 flood led to significant outbreaks of water-borne and vector-borne diseases, particularly in informal settlements with limited sanitation. Recognising that climate hazards in a city like Surat cascade quickly, floodwater stagnation, contaminated drinking water,

mosquito breeding, heat stress, and respiratory illness, SCCT established the Urban Health and Climate Resilience Centre (UHCRC) in 2013 (Karanth & Archer, 2014).

UHCRC was designed as a technical and institutional bridge between the health department, water supply and sanitation divisions, engineering wings of the municipal corporation, and external research institutions. Its mandate was to build a system that could track disease patterns, environmental indicators, and climate signals in real time, allowing the city to respond before outbreaks escalated. UHCRC moved beyond emergency surveillance to build long-term evidence: mapping vulnerability hotspots, monitoring environmental health trends after monsoon flooding, and linking climate information with public health planning (Resilient Cities Network & URDPFI/Partners, 2017).

How UHCRC changed Surat's approach to climate risk

The creation of UHCRC shifted flood management away from being primarily an engineering problem. Instead of focusing only on drainage capacity and embankments, Surat began integrating environmental health, sanitation, and community awareness into its resilience strategy. UHCRC helped institutionalise early warning systems for floods by working closely with the Irrigation Department to improve the predictability and communication of dam releases. It also strengthened disease surveillance, coordinating vector-control drives in vulnerable neighbourhoods based on risk signals rather than routine schedules.

This approach was put to the test in flood seasons after 2013, when coordinated early warnings, targeted sanitation campaigns, and pre-monsoon health interventions reduced the scale of water-borne disease outbreaks compared with previous years. UHCRC also provided a space for ongoing learning: technical teams refined vulnerability maps, strengthened meteorological linkages, and improved communication channels to low-income settlements through partnerships with community-based organisations (NIUA, 2014).

What the early experience reveals

The early years of SCCT demonstrated the value of a dedicated, city-level resilience institution. Because SCCT operated across sectoral boundaries, it could convene agencies that ordinarily interacted only during crises, such as the health department, water management authorities, industrial associations, researchers, and local civil society. This allowed Surat to see floods not merely as hydrological events, but as systemic shocks with direct consequences for health, labour productivity, and urban services (Ghanekar & Desai, 2019).

UHCRC's continuous surveillance model offered a counterpoint to episodic disaster assessments, avoiding the need to wait for damage to be recorded post-flood and embedding climate-health monitoring into everyday urban governance. The city also began integrating climate risk considerations into planning processes, from infrastructure investments to public-health budgeting (SEI, 2017).

3.1.4 Nagaland's State Disaster Insurance: Building Public Financial Protection Against Climate Losses

Nagaland is a small, largely mountainous state where monsoon rains routinely trigger landslides, flash floods and road collapses, exposing both rural and urban settlements to recurring losses. The 2017 monsoon alone affected nearly a third of the state's population and put enormous pressure on the State Disaster Response Fund, which was already overstretched. Traditional disaster financing mechanisms rely heavily on slow, post-event assessments and ad hoc allocations from the central government, resulting in long delays in compensation. Recognising these systemic gaps, the Nagaland State Disaster Management Authority (NSDMA) began exploring whether parametric insurance could serve as an additional layer of financial protection that would trigger rapid payouts during extreme rainfall events. This approach was developed with early technical support from the InsuResilience Solutions Fund and private insurers, including Tata AIG and Swiss Re (ISF, 2025).

Designing a state-level cover to top up disaster response funds

The initial pilots tested whether rainfall thresholds, recorded through a strengthened network of ground weather stations, could serve as objective triggers for releasing funds to the state. Rather than relying on claims or surveyed losses, the insurance was designed to activate automatically when rainfall crossed critical levels. As the pilots progressed, Nagaland invested in upgraded risk modelling, new weather stations, and a decentralised digital payment system linked to the state's Disaster Management Information System (ISF, 2025). These investments aimed to ensure that, when payouts occurred, funds could flow quickly to districts and affected households identified through rapid field verification and existing disaster beneficiary lists, without the bottlenecks of conventional claims-based systems (NSDMA, 2024).

From pilot to a multi-year disaster insurance programme

Building on the early experience, the state pursued a more robust, multi-year scheme known as the Disaster Risk Transfer Parametric Insurance Solution (DRTPS). In 2024, Nagaland signed an MoU with SBI General Insurance, supported by reinsurers Munich Re and GIC Re, becoming the first Indian state to adopt a comprehensive state-wide disaster insurance system (PTI, 2024). The cover protects Nagaland against extreme rainfall events throughout the monsoon season, and payouts are designed to reach state coffers within roughly two weeks of the trigger. This speed is crucial in a place where landslides and flash floods often isolate communities and damage critical infrastructure (Evans, 2024).

In March 2025, Nagaland received its first payout under the scheme, about ₹1.06 crore, following intense rainfall that met the agreed trigger conditions. Funds were disbursed through the state's digital relief payment system, marking a significant milestone for India's experiment with parametric risk transfer (Sheehan, 2021).

What the early experience reveals

The Nagaland insurance model represents a shift in how Indian states can manage climate risk. Instead of relying solely on relief funds that are chronically insufficient, the state created a predictable financial backstop that can be activated when hazards intensify. The approach also shows that small states, even with limited administrative capacity, can shape the triggers that govern payouts, recalibrating rainfall thresholds to reflect local realities and reduce "basis risk," in which losses occur, but triggers are not met (Tripathi, 2025).

The investment in weather stations, risk models and digital payment systems has strengthened Nagaland's entire disaster-management architecture, not only the insurance scheme itself. The state is also exploring how climate risk insurance could complement livelihood recovery programmes and adaptation planning.

3.2 International Case Studies

3.2.1 Oxfam Loss and Damage Dashboard (Bangladesh): Making Climate Loss Visible Through Community Data

Why the L&D Dashboard was created

Bangladesh is among the world's most climate-vulnerable countries, suffering repeated floods, cyclones, riverbank erosion, heatwaves and slow-onset hazards such as salinity intrusion and sea-level rise. National loss estimates, often based on macroeconomic data, suggest that the country loses roughly USD 3 billion annually to climate-related events, or 1–2 per cent of the GDP. However, these figures typically omit many household-level and non-economic losses that shape people's lived experience and persist long after a disaster's peak (The Business Standard, 2025).

To address this data gap, Oxfam in Bangladesh, with support from Oxfam Australia, Oxfam Novib and the Swedish International Development Cooperation Agency (Sida), developed the Loss and Damage Dashboard, an interactive, participatory digital platform that enables communities themselves to record and visualise climate-related ELD and NELD. It was piloted across 19 districts between June 2023 and

March 2024 and formally launched at an event in Dhaka in early November 2025 (Dhaka Tribune, 2025).

The dashboard addresses a persistent challenge: official assessments tend to under-count climate impacts, especially slow-onset losses like health impacts, displacement costs and livelihood interruption. By combining local reporting with satellite data and AI-driven validation, Oxfam's tool seeks to lift the invisibility of L&D from the grassroots to the national and global levels (BSS, 2025).

How the Loss and Damage Dashboard works

The platform is designed as a bottom-up, community-driven evidence system that enables individuals and households to report L&D incidents via mobile devices or community intermediaries. These inputs are then validated and cross-referenced with satellite imagery and remote-sensing tools, including the Google Earth Engine, to verify spatial and temporal patterns of damage.

Rather than relying solely on post-disaster government reports or incomplete surveys, the dashboard crowdsources data directly from affected communities. Each loss event, whether damage to housing, crop losses, health impacts, displacement, income loss, or cultural harms, is geo-tagged and time-stamped, creating a real-time evidence base of climate impacts. This is particularly important in Bangladesh, where slow-onset processes such as salinity intrusion and coastal erosion compound episodic disasters but often go uncounted in national statistics (Tran, 2025).

The interactive dashboard allows policymakers, researchers, civil society actors and international negotiators to visualise patterns of loss, aggregate data by district or hazard type, and explore gendered and socio-economic dimensions of impact. It thus serves both as an empirical repository and an advocacy tool (UNB, 2025).

What the Dashboard's data reveals

Between June 2023 and March 2024, the Loss and Damage Dashboard recorded 11,579 L&D cases across the 19 pilot districts, totalling approximately Tk 1.35 billion (about USD 11 million). On average, each affected person reported a loss equivalent to Tk 117,000 (~USD 954), roughly 15 months of income for the average worker (The Business Standard, 2025). This bottom-up evidence highlights losses that are typically absent from macroeconomic estimates. For example, while men often reported higher total financial losses from asset damage or business disruption, women disproportionately experienced health and livelihood losses, including impacts from waterborne diseases, malnutrition and unsafe living conditions. Geospatial analysis of the data identified Cox's Bazar, Kurigram, Satkhira, and Sunamganj among the most severely affected areas, providing a granular view of where L&D is concentrated.

3.2.2 Philippine City Disaster Insurance Pool (PCDIP): A Collective Risk Transfer Innovation for Urban Resilience

The Philippines is one of the most disaster-exposed countries globally, with annual typhoons, earthquakes, floods and storm surges often inflicting severe damage on cities and their populations. Historical events such as Typhoon Haiyan in 2013 underscored how rapidly urban infrastructure, services and livelihoods can be overwhelmed, and how local government units (LGUs) struggle to mobilise timely funds for response and early recovery. Traditional disaster funds at the municipal level are typically tied to post–damage assessments, which are slow and cumbersome, and rely heavily on national allocations that arrive too late to be effective. Against this backdrop, the Philippine City Disaster Insurance Pool (PCDIP) was conceived to address a persistent gap: how can cities access rapid, predictable financing following extreme events to avoid prolonged disruption of services and livelihoods? This question informed the 2015 Disaster Risk Financing and Insurance Strategy developed by the Philippine Department of Finance, which laid the foundation for a parametric pool designed specifically for city governments (ADB, 2024).

Designing a city-focused parametric insurance pool

The PCDIP is structured as a risk-pooling mechanism in which multiple cities collectively purchase parametric insurance. Unlike indemnity insurance, which reimburses assessed losses after extensive surveys, parametric insurance pays out when pre-defined physical triggers, such as earthquake intensity or typhoon wind speeds, are met. This structure aims to provide near-immediate liquidity to municipal governments, enabling early recovery activities, supporting affected population groups, and restoring critical infrastructure without waiting for final damage reports (Olana, 2019).

The Philippine Department of Finance led the pool's design with technical assistance from the Asian Development Bank (ADB) and catastrophe risk modelling from firms such as Risk Management Solutions (RMS). Initial phases of the pool plan to offer typhoon and earthquake covers, with flood cover expected as data and modelling capacity expand. Parametric indices are calibrated for each city, such as wind speed thresholds at multiple monitoring locations, ensuring that local hazard intensity, rather than national averages, drives payouts (MicroSave Consulting & GIZ, 2020). Although the project remains in development and early implementation, Manila and other major cities have expressed interest because of the potential to reduce the financing gap between the emergency resources available to them and the funds actually needed to mobilise early recovery, restore services, and support vulnerable populations in the immediate aftermath of events.

PCDIP in practice: early expectations and structure

Operationally, the PCDIP envisages a board representing participating cities and national government agencies that will oversee the pool. Premiums are contributed collectively by member cities, potentially with support from national co-financing or development finance partners to ensure affordability. The Government Service Insurance System (GSIS), a state-owned insurance institution, is positioned to administer collections and disbursements on behalf of participating municipalities. A reinsurer network underwrites the pooled risk, allowing cities to share risk and benefit from diversification — for instance, a city experiencing a typhoon might trigger a payout while others do not, with the pooled capital cushioning distributions (ADB, 2018).

This pooled approach also helps reduce premium costs compared to standalone policies, as risk aggregation and diversified exposure can lower the overall cost per city. The model, therefore, aims to make parametric protection more accessible for smaller cities with limited budgets — a critical equity dimension given the disproportionate vulnerability of urban poor communities to disaster shocks.

3.2.3 Kaduna, Nigeria: Anticipatory Cash Transfers for Urban Flood Preparedness

Kaduna, a rapidly urbanising Nigerian city divided by the Kaduna River, experiences recurrent flooding that disproportionately affects low-income households in riverbank and informal settlements. Historic floods, including the nationally devastating 2012 and 2018 events, caused significant damage to homes, small enterprises, and urban infrastructure, with Kaduna State among the hardest hit (OCHA, 2018). For residents in low-lying neighbourhoods, even moderate flooding wipes out furniture, work tools, and inventory for informal businesses, while triggering cycles of debt and displacement.

To address these persistent losses, partners including the Nigerian Red Cross Society (NRCS), UNICEF Nigeria, IFRC, and the Red Cross Red Crescent Climate Centre launched a forecast-triggered anticipatory cash programme in 2022 as part of Nigeria's broader shift toward shock-responsive social protection. The initiative focused on communities within and around central Kaduna city, where riverine floods frequently spill over into densely populated neighbourhoods (Sengupta, 2022). The goal was to test whether financial support delivered **before** a flood, rather than after, could help urban households protect assets, reduce exposure

and avoid deeper economic losses.

How the anticipatory system worked

The intervention centred on a local Early Action Protocol (EAP) for Floods, developed using historical flood impact analysis and hydrological modelling of the Kaduna River (IFRC, 2022). Approximately 5,000 vulnerable households were pre-identified through Kaduna State's social protection mechanisms and the Rapid Response Register (RRR), Nigeria's national shock-responsive registry (UNICEF Nigeria, 2023). When river level forecasts indicated a high likelihood of severe flooding in early August 2022, the forecast threshold was reached and early action was activated.

Two streams of assistance followed. First, NRCS delivered forecast-triggered humanitarian cash to pre-registered households, marking one of the first verified cases of anticipatory cash distribution in an African urban context. Second, UNICEF provided anticipatory social protection top-ups, delivering NGN 35,000 (~USD 85) in unconditional payments to 4,970 flood-prone households along the Kaduna River **before** the floodwaters arrived (UNICEF Nigeria, 2023). Because payments used existing registry and delivery systems, cash could be disbursed quickly once the trigger was activated.

These funds enabled families to make choices based on their needs: buying food while markets still operated, reinforcing structures, relocating children or elders, securing work tools and documents, or paying for temporary accommodation and transport.

What the early experience reveals

Early reporting from NRCS, UNICEF and the Climate Centre highlights several important outcomes. Households receiving anticipatory cash were able to take protective measures in the days preceding peak flooding, such as moving belongings to higher ground, purchasing essential supplies, and arranging safer temporary shelter (Sengupta, 2022). Many avoided distress borrowing, a common coping strategy during emergencies in urban Nigeria that often prolongs hardship.

The pilot also demonstrated the effectiveness of linking anticipatory action with social protection systems. By activating cash through the RRR, Kaduna showed that a digital social registry can serve as both a **preparedness** and **response** infrastructure. This represents a shift from humanitarian-led early action toward state-led systems capable of protecting at-risk urban residents before shocks occur.

Finally, the intervention demonstrated that anticipatory action is feasible in rural settings. Urban vulnerabilities, including inadequate drainage, densely built informal settlements, and heavy reliance on daily wage labour, often magnify the benefits of early liquidity. The Kaduna experience showed that acting before residents are overtaken by rising water can meaningfully reduce L&D across city households.

3.3 Lessons from Case Studies to inform the Proposed L&D Assessment Framework

These case studies draw out practical lessons that inform the design of the proposed city-level L&D assessment framework. Taken together, these experiences from India and other Global South contexts illustrate how L&D are currently identified, documented, and addressed in practice, and where existing assessment approaches remain limited in urban settings. The lessons are presented below thematically to clarify how they inform the scope, structure, and institutional positioning of the proposed framework.

3.3.1 What needs to be assessed

Across the case studies, a consistent finding is that L&D in urban areas extends well beyond physical asset damage. The parametric heat insurance initiative implemented by Mahila Housing Trust (MHT) in Gujarat illustrates that for urban informal workers, losses are more commonly experienced as reduced income, increased health expenditure, and diminished work capacity during periods of extreme heat, rather than as direct damage to housing or infrastructure. Similarly, community-generated data platforms such as Akshvi (SEEDS, India) and the Oxfam Loss and Damage Dashboard in Bangladesh document a wide range of losses

related to livelihoods, health, displacement, and household well-being that are rarely captured through official damage assessment processes.

These cases also demonstrate that urban losses are often cumulative and recurrent. Repeated flooding, prolonged heat stress, and frequent service disruptions compound over time and are not adequately reflected in event-based post-disaster assessments. Experiences from Surat, including the work of the Surat Climate Change Trust (SCCT) and the Urban Health and Climate Resilience Centre, further show that climate impacts cascade across systems, simultaneously affecting public health, productivity, and the functioning of urban services. Together, these insights point to the need for a city-level L&D assessment framework that is multi-dimensional, explicitly incorporating economic losses, non-economic losses, service disruptions, health impacts, and livelihood effects, rather than focusing primarily on damaged assets or infrastructure. The proposed multi-institutional framework in Chapter 4 addresses this gap by recommending indicators and financial instruments for both ELD and NELD.

3.3.2 Scale and Granularity of Assessment

A second set of lessons relates to the spatial scale at which L&D are assessed. Several case studies show that aggregation at the city or district level conceals substantial intra-urban variation. Community-based reporting mechanisms, such as Akshvi and the Bangladesh dashboard, reveal that L&D are highly concentrated in specific neighbourhoods, informal settlements, or livelihood clusters, which often remain invisible in aggregated datasets.

Experiences from cities such as Surat similarly indicate that ward-level vulnerabilities, service failures, and local exposure conditions frequently determine the scale and nature of loss, yet these dynamics are poorly reflected in conventional assessment formats aligned to district-level administration. These observations underscore the importance of enabling ward- or neighbourhood-level assessment within a city-level L&D framework, with the ability to disaggregate impacts by location, population group, and livelihood type. Without such granularity, assessment systems risk under-representing urban vulnerability and limiting the effectiveness of recovery and adaptation responses. The proposed framework responds to this need by recommending ward-level risk profiling and preparedness planning as integral components of the city-level L&D assessment process, as detailed in Chapter 4.

3.3.3 Who Generates and Validates L&D data

The case studies also offer important lessons regarding data generation and validation. Initiatives such as Akshvi and the Oxfam Loss and Damage Dashboard demonstrate that households, community organisations, and local institutions are capable of systematically documenting their own losses, including non-economic and informal losses that are difficult to capture through standard surveys. Evidence from these initiatives suggests that community-generated data can be both reliable and consistent when appropriate verification and aggregation processes are in place.

At the same time, the MHT heat insurance experience shows how participatory processes can help align technical indicators with lived experience, ensuring that assessment metrics reflect what affected groups perceive as loss. These cases suggest that a city-level L&D assessment framework should formally recognise community organisations, civil society actors, and local institutions as contributors to assessment processes, working alongside municipal and state agencies. Such an approach can strengthen both the quality of data and the legitimacy of assessment outcomes. This need is addressed in the proposed framework through an inter-agency coordination platform that brings together municipal and state agencies with NGOs, CBOs, academia, and private-sector actors to support collaborative L&D data generation and validation.

3.3.4 Timing and Purpose of Assessment

Several cases highlight that the timing of assessment is critical. Parametric insurance

schemes in Gujarat and Nagaland, the Philippine City Disaster Insurance Pool, and anticipatory cash transfer programmes in Kaduna demonstrate that rapid or anticipatory assessment mechanisms can reduce downstream losses by enabling early action and faster access to resources. These approaches contrast with conventional post-event assessments that are completed only after impacts have fully materialised.

In urban contexts, where delays in assessment can intensify livelihood losses, health impacts, and service disruptions, these experiences suggest that L&D assessment should not be viewed solely as a retrospective accounting exercise. Instead, the proposed framework positions assessment as an operational tool that can support preparedness, early response, and recovery decision-making, while also enabling longer-term tracking of cumulative loss.

3.3.5. Institutional and Governance Arrangements

Institutional arrangements emerge as a key factor shaping how L&D is recognised and addressed. Surat's experience with the SCCT and the Urban Health and Climate Resilience Centre illustrates the value of dedicated, cross-sectoral city-level platforms that can capture impacts spanning health, labour, and urban services. In contrast, where assessment remains fragmented across revenue, relief, or sector-specific departments, cross-cutting losses are often under-reported.

State-level initiatives such as Nagaland's disaster insurance scheme further demonstrate the benefits of linking assessment processes with financing and governance mechanisms, enabling more predictable and timely responses. These cases reinforce the need for a city-level L&D assessment framework that is embedded within existing disaster management and urban governance structures, with clearly defined roles across municipal departments, state agencies, and non-government actors, rather than operating as a parallel or ad hoc process, as illustrated in the multi-tiered leadership and governance structure outlined in Chapter 4.

3.3.6 Link between Assessment, Governance, and Finance

Finally, the case studies underline that L&D assessment is closely linked to governance and finance, and that how loss is defined and measured directly influences eligibility for compensation, access to insurance or risk-transfer mechanisms, and the prioritisation of recovery investments. Partial or incomplete assessments not only undercount losses but can also constrain cities' ability to mobilise timely and adequate resources, particularly for informal workers and marginalised groups.

Experiences with risk-transfer instruments, anticipatory finance, and community data platforms demonstrate that credible and timely assessment is a prerequisite for effective L&D financing. This highlights the importance of designing an assessment framework that produces outputs usable within existing response and recovery systems and emerging L&D financing mechanisms.

Taken together, these lessons indicate that an effective city-level L&D assessment framework must be multi-dimensional, spatially granular, participatory, and action-oriented, and firmly anchored within existing urban governance arrangements. The proposed framework presented in the following sections draws on these lessons to strengthen how cities identify, document, and respond to climate-induced L&D in ways that are equitable, operationally relevant, and institutionally grounded.

4.

Proposed L&D Assessment Framework

The Disaster Management (Amendment) Act 2025, passed by Parliament on March 25, 2025, is an update to India's Disaster Management Act, 2005. It was enacted to address emerging challenges posed by climate change and to improve responsiveness and coordination at the national, state, and city levels. The most significant amendment to city-level disaster management is the statutory provision for establishing UDMA. Section 41A of the amended Act empowers state governments to constitute separate UDMAs for state capitals and all cities with municipal corporations, except for the National Capital Territory of Delhi and the Union Territory of Chandigarh. The Composition of UDMA is:

- Chairperson: Municipal Commissioner
- Vice Chairperson: District Collector
- State-appointed Members: Other members as specified by the state government
- Technical Sub-Committees/Teams
- UDMAs are mandated to prepare and implement Urban Disaster Management Plans (Urban Plans), approved by State Disaster Management Authorities.

This institutional arrangement is particularly suited for L&D assessment in Ahmedabad and Surat for the following reasons:

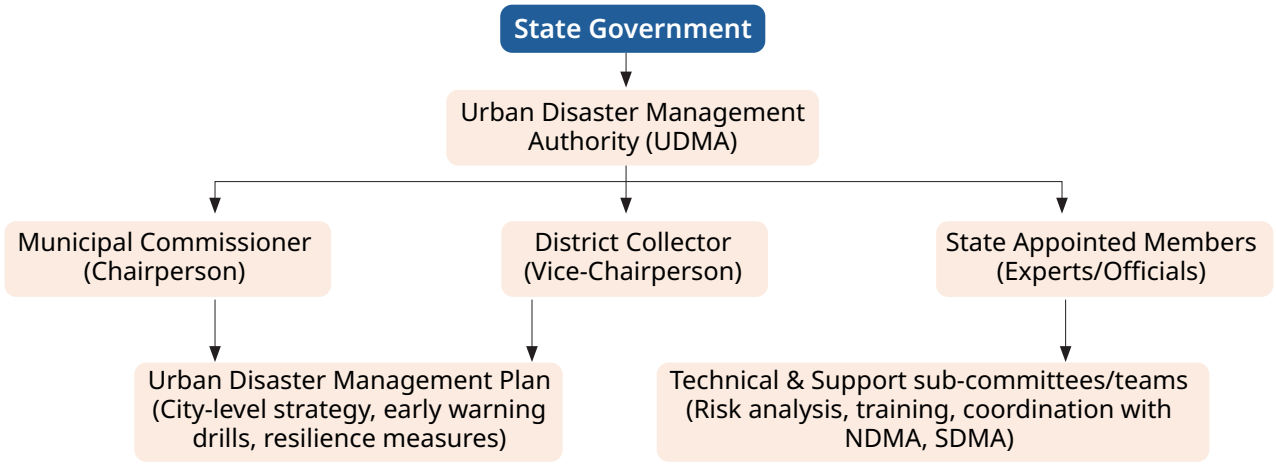


Figure 9: Urban Disaster Management Authority (UDMA) institutional structure, as proposed under the DMA Act (ICLEI South Asia, 2025)

45 Government of India. (2025). Disaster Management (Amendment) Act, 2025 (Act No. 10 of 2025). Ministry of Home Affairs. Retrieved from https://ndma.gov.in/sites/default/files/PDF/DM-Amendment-Act-2025.pdf

46 PRS Legislative Research. (n.d.). The Disaster Management Amendment Bill 2024. https://prsindia.org/billtrack/the-disaster-management-amendment-bill-2024

Table 7: Key provisions of the Disaster Management Amendment Act 2025 and their relevance for strengthening urban Loss & Damage (L&D) assessment and reporting.

Amendment Provision (2025)	Relevance for L&D Assessment
Statutory requirement for establishing and maintaining a comprehensive disaster management database	Legally anchors the role of city governments within UDMA to assess, record, and report L&D in their jurisdictions.
Empowers UDMA to take disciplinary action against officers or functionaries who fail to perform their mandated disaster management duties	Allows accountability for preparing Urban Disaster Management Plans and reporting protocols to be embedded within City Disaster Management Plans (CDMPs).
Power of requisitioning resources, provisions, premises, and services for disaster management by UDMA	Recognition of Urban Local Bodies as first responders enables swift emergency response and minimises both direct and indirect loss and damage, supports vulnerable groups, and ensures more effective L&D management in urban areas.
Section 41A: Constitute and set up a separate UDMA for their state capitals and all cities with a Municipal Corporation	Legally anchors the role of city governments. Formalises urban disaster management plan tailored to the city's risk profile and needs.
Integration of urban disaster risk mapping and vulnerability analysis within city limits and formats for detailed reporting and documentation.	Expands scope beyond physical and economic losses to include non-economic L&D (health, education, heritage, and ecosystem impacts) into the assessment templates.

The key amendments that are relevant to city-level disaster risk assessment are:

- **Urban-Specific Disaster Planning:** UDMAs are tasked with formulating and implementing disaster management plans. These plans could be tailored to the unique challenges of urban areas, such as high population density, complex infrastructure, and rapid urbanisation.
- **Localised Risk Assessment:** Conduct assessments to identify vulnerabilities specific to a specific context and identify the vulnerable communities, including risks from floods, fires, infrastructure failures, and other hazards exacerbated by climate change.

DMA (Amendment) 2025 will provide an enabling institutional framework for embedding systematic L&D assessment at the city level. The establishment of UDMA at the urban level will be instrumental in anchoring ELD and NELD assessment. The amendment has key provisions that explicitly recognise ULBs as operational arms of disaster governance and formalise the inclusion of climate-related slow-onset and compound events, a crucial step for integrating L&D within the state's disaster management framework. Placing the Municipal Commissioner as the chairperson recognises the primary responsibility of ULBs for city infrastructure, service delivery, and system vulnerabilities. These bodies, chaired by Municipal Commissioners, will oversee urban disaster planning and implementation.

4.1 Recommended Composition under UDMA

Building on the statutory provisions of the Disaster Management (Amendment) Act, 2025, this section outlines a framework for establishing and operationalising UDMAs at the city level with a specific focus on roles and responsibilities for L&D assessment.

Understanding the multi-level institutional governance supporting the UDMA is important across planning, operations, and finance mechanisms to develop a city-level framework. Figure 10 maps the key actors and institutions involved across the city, district/state, and state levels. The interconnected roles of government bodies, emergency services, finance mechanisms, research institutions, NGOs, and community organisations demonstrate how these actors collectively enable comprehensive disaster management. The UDMA is the innermost level and operates at the centre of a coordinated network that includes city-level

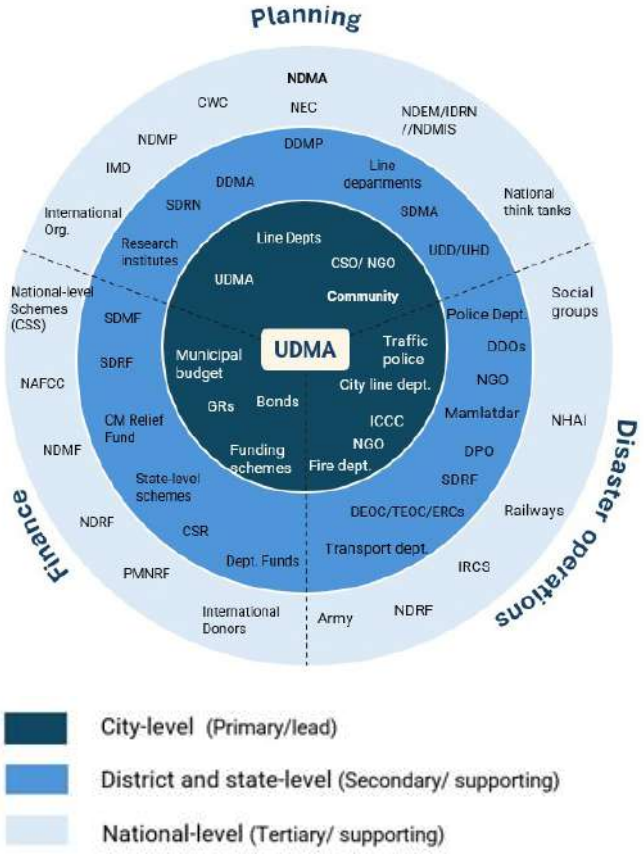


Figure 10: Multi-Level Institutional Coordination Framework supporting UDMA across Planning, Finance, and Disaster Operations

departments as primary leads, district and state agencies providing secondary support, and national-level institutions offering technical, financial, and strategic guidance.

Together, the proposed composition presents a comprehensive multi-level, multi-stakeholder governance architecture designed to support urban disaster preparedness, response, and L&D assessment. The importance of key personnel's roles and responsibilities includes:

- Placing the Municipal Commissioner as chairperson recognises the primary responsibility of ULBs. Leads the UDMA, spearheads urban disaster planning, implementation, coordination, monitoring, and budget oversight. The proposed organisational structure under the Municipal Commissioner, multiple municipal departments, such as health, housing, environment, water supply, sanitation, transport, communications, and emergency services, form the operational backbone for city-level disaster and L&D management.

  District Collector (Vice-Chairperson): Assists the Chair, ensures administrative backing, resource mobilisation, liaison with district administration. The District Collector's role as vice-chairperson bridges the jurisdictional gap between the district administration and municipal corporations, enabling integrated assessment across urban and peri-urban areas. This is crucial because climate impacts often transcend municipal boundaries. The District Collector connects UDMA with district and sub-district departments, including revenue, labour, irrigation, transport, agriculture, power, water resources, and public enterprises, ensuring vertical coordination and alignment with DEOC.

- **Chief Executive Officer (CEO) of Urban Development Authorities:** Facilitates alignment between disaster risk management and urban planning, infrastructure development, and land-use regulations, ensuring that risk reduction and L&D considerations are embedded in long-term urban development processes.
- **Deputy Municipal Commissioner (Health):** Responsible for public health preparedness, disease surveillance, management of heat-related illnesses, implementation of heat action measures, emergency medical response, and continuity of health services during and after disaster events.
- **Deputy Municipal Commissioner (Water Resources):** Oversees water supply, sanitation, drainage, and flood-related preparedness and response measures, playing a key role in managing climate-induced water risks and protecting critical urban services.
- **Chief Fire Officer (CFO):** Leads fire and emergency services, search and rescue operations, and incident command support, and serves as a core operational authority during emergency response.
- **Climate Research Wing (represented through a Nodal Officer):** Ensures structured integration of climate risk analysis,

data-driven insights, and L&D evidence into decision-making processes. The nodal officer represents both the Analytics Unit and the Data & Information Management Unit, enabling a systematic flow of validated data, hazard modelling outputs, and L&D assessments to support preparedness planning, response prioritisation, and recovery strategies.

- **Technical Sub-Committees/Expert group[47]:** It will be represented within UDMA through a designated nodal officer. State-appointed members designated by the state government, together with Technical Sub-Committees or Expert Groups, constitute the core technical and analytical backbone of UDMA. It draws on technical experts, academic institutions, and specialists in urban planning, health, public works, environment, and emergency services. This creates a vertical support mechanism that enables UDMAs in Ahmedabad and Surat to access state and national technical expertise to conduct sophisticated L&D assessments.

This expert group will be convened on an as-needed basis to support multi-hazard and vulnerability assessments, climate-induced risk assessments, and updating urban disaster plans. Its responsibilities include developing indicators and protocols for ELD and NELD, guiding the integration of early warning systems, supporting post-event assessments and After-Action Reviews, and coordinating with SDMA, NDMA, and centralised disaster and climate databases. The expert group also plays a key role in capacity building, training, and ensuring methodological consistency in L&D analysis over time.

The various departments identified under the Municipal Commissioner, District Collector and State Appointed Members have been listed below:

The proposed composition of UDMA, outlining the coordination roles of the Municipal Commissioner (Chairperson), the District Collector (Vice-Chairperson), and other members, along with state-appointed technical experts, highlights the breadth of municipal, district, and sub-district departments involved in urban disaster management. Together, these entities provide the administrative, technical, and

Table 8: Departmental and Expert Representation within the UDMA Framework

Municipal Commissioner	District Collector	State Appointed Members
Health Department Housing/Shelter/PWD Environment/Horticulture/ Biodiversity Education/School Board Heritage /Tourism/Archaeology Water Supply and Sanitation Transport/R&B Communications and IT Electricity Board Emergency Services (Fire/Police) Smart City (SPV) ICCC	Revenue Department Irrigation Department Regional Transport Department Railway/Civil Aviation/Port Forest Department Agriculture Department Regional Development Authority Department of Public Enterprises (DPE) Department of Industries/MSME Power Department Department of Water Resources/ CWC Labour Department	Economists Finance Expert Geologists/Hydrologists Quantity Surveyors/ Estimation Engineers Architect/Development specialist Civil/Structural/Mechanical/Electronic Engineer GIS/Mapping Experts Real Estate specialist Archaeologist Insurance advisor Biodiversity/Ecology Expert Sociologist/Anthropologist Psychologist Epidemiologist

Note: The above list is indicative and not exhaustive; additional departments, agencies, or experts may be included as required based on specific needs, project requirements, and prevailing circumstances.

47 Although the Disaster Management (Amendment) Act, 2025 envisages Technical Sub-Committees primarily as state-appointed bodies, it permits states to determine the composition of such committees. This allows inclusion of district- and city-level technical experts such as local universities, and sector specialists whose contextual knowledge is essential for robust urban Loss and Damage (L&D) assessment and post-disaster analysis.

operational capacity required for comprehensive L&D assessment, planning, and response. The departmental and expert lists shown here are indicative of the Gujarat context and may be adapted or expanded based on state-specific governance structures, local priorities, and evolving institutional arrangements.

4.1.1 Operational Coordination Mechanisms under UDMA

While the Disaster Management (Amendment) Act, 2025 establishes the statutory authorities and mandates for urban disaster management, effective implementation at the city level requires additional operational coordination mechanisms. Accordingly, the proposed City Crisis Group and Inter-Agency Coordination Unit are not envisaged as new statutory bodies, but as facilitative arrangements constituted by UDMA to facilitate incident command, inter-departmental coordination, and engagement with non-government actors, consistent with the powers and responsibilities conferred under the Act.

The City Crisis Group enables senior leadership to exercise unified command during emergencies, validate impact information, and oversee transitions from response to recovery, while the Inter-Agency Coordination Unit provides a structured interface for information exchange, resource mobilisation, and community-level feedback, including inputs from NGOs, trusts, CBOs, utilities, and private sector actors. Together, these mechanisms ensure that operational response data feeds directly into L&D assessment processes. The composition, roles and responsibilities are detailed in Section 4.3.

4.1.2 Operationalisation of Roles and Task Coordination under UDMA

To assist city officials in translating this institutional framework into routine administration and emergency operations, the proposed structure assigns phase-wise and function-wise task coordinators at the city level under UDMA. These task coordinators are standing roles, embedded within the Municipal Corporation, with defined responsibilities across the preparedness, response, and recovery phases.

During non-disaster periods,, task leaders/ coordinators lead risk assessment, planning, capacity building, data management, inter-departmental coordination, and integration of DRR and L&D considerations into urban development processes. During disaster events, the same officers assume enhanced operational responsibilities, functioning within the Incident Response System (IRS) through the EOC/ICCC for command, coordination, response, damage assessment, and relief operations.

This arrangement mirrors the functioning of the District Disaster Management Authority (DDMA), where designated nodal officers and section leads operate continuously, with roles scaling up during emergencies. The DDMA's practices in incident command, inter-departmental tasking, damage assessment, and relief coordination may serve as a functional template for defining reporting lines, standard operating procedures, and escalation protocols at the urban level.

Each functional unit under the preparedness, response, and recovery divisions shall have a designated Unit Lead/Nodal Officer drawn from the relevant municipal or allied department. These Unit Leads shall function under the overall supervision of the respective Phase Task Leader/Coordinator and shall be responsible for day-to-day implementation, inter-departmental coordination, and reporting as shown in Figure 13. During disaster situations, Unit Leads shall operate within the IRS through the EOC/ICCC, with roles scaling up as per established SOPs.

4.2 Institutional Structure of the Proposed UDMA

A comprehensive institutional framework for Urban Disaster Management (UDMP), integrating leadership structures, operational agencies, and activities across disaster phases is presented in Figure 11. It aims to strengthen coordination between state, district, and city-level actors while embedding expert advisory systems and inter-agency collaboration.

4.2.1 Leadership & Governance Structure

The proposed framework establishes a multi-tiered leadership and governance structure

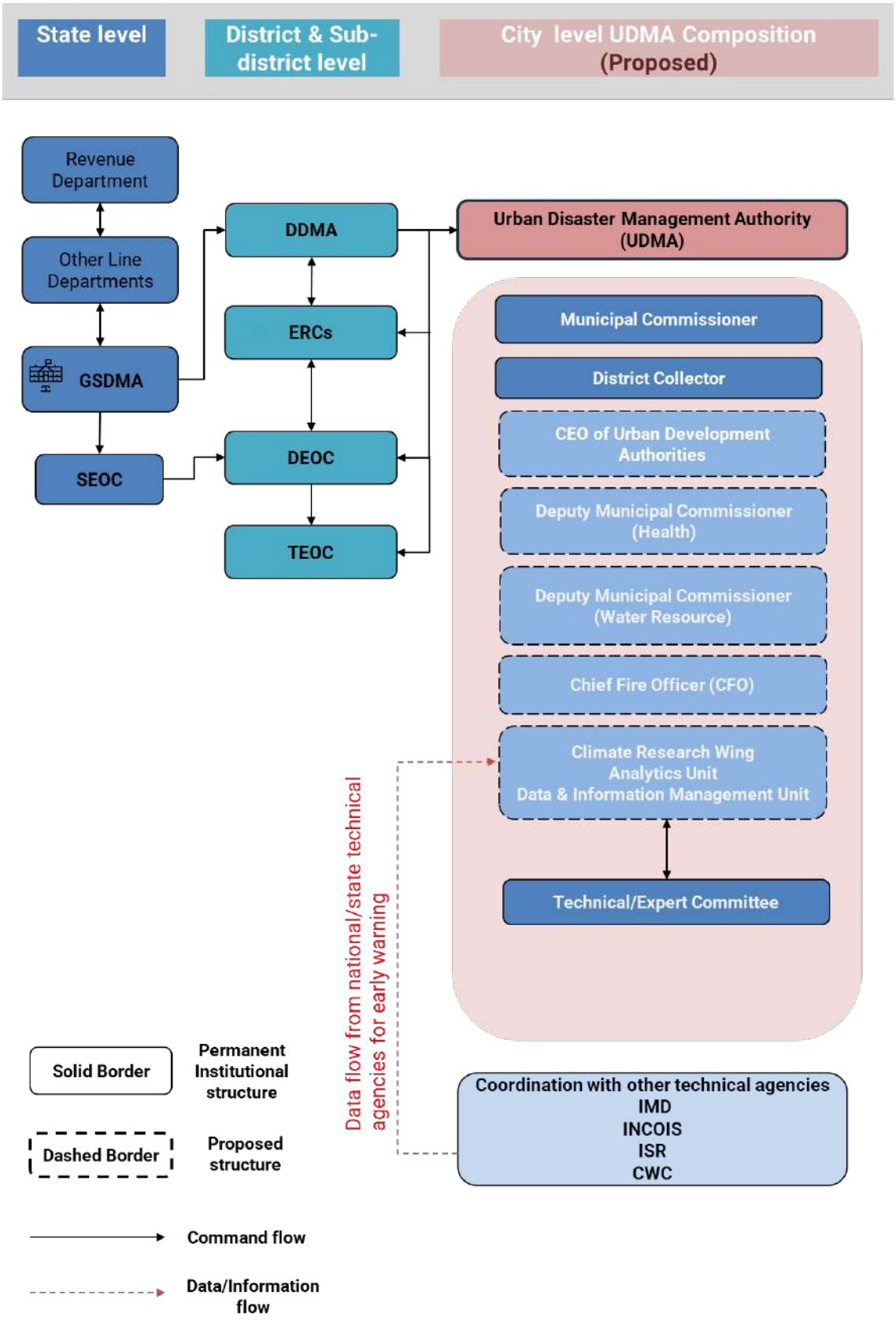


Figure 11: Recommended Structure and Composition of UDMA

that enables strategic oversight, coordinated decision-making, and effective on-ground execution across state, district, and city levels, as illustrated in Figure 12.

- **State Level:**

At the state level, the Gujarat State Disaster Management Authority (GSDMA) provides overarching policy direction, strategic guidance, and institutional coordination for disaster management. GSDMA, supported by the SEOC and relevant legal and policy mechanisms, ensures alignment with state disaster management priorities and facilitates coordination during large-scale or multi-jurisdictional emergencies.

- **District and Sub-district Level:**

At the district level, the District Collector, through the DDMA, leads disaster management functions and acts as the key link between state and city systems. Operational coordination is undertaken through the Emergency Response Centres (ERCs), DEOC, and Taluka Emergency Operations Centres, ensuring escalation, resource mobilisation, and inter-departmental coordination across district and sub-district jurisdictions.

- **City Level:**

At the city level, the Municipal Commissioner serves as the overall authority for urban disaster management and chairs UDMA. UDMA functions as the central decision-making and coordination body for preparedness, response, and recovery activities. It includes senior city and district officials, including the District Collector, Chief Fire Officer, Deputy Municipal Commissioners, and the CEO of Urban Development Authorities. The city-level governance structure is supported by the following key institutional mechanisms:

- Technical/Expert Committee Group, which provides specialised technical, scientific, and analytical guidance and is convened on an as-needed basis to support risk assessment, planning, data management, and recovery-related functions.

  Note: As indicated in Figure 13, the Technical/ Expert Committee is specifically responsible for Recovery functions A, B, E, F, and G, which include:

  a. Damage & Loss Assessment (ELD & NELD)
  b. Finance & Resource Mobilisation Unit
  c. Reconstruction and Risk Reduction
  d. Monitoring, Evaluation and Audit Unit
  e. Institutional Learning and Improvement

These functions are undertaken in an advisory and technical capacity, supporting city departments and execution units.

4.2.2 City-level Coordination and Inter-agency Mechanisms

- **City Crisis Group** is responsible for incident-level coordination, operational decision-making, and alignment across city departments during emergency situations.
- **Inter-agency coordination platform** which facilitates collaboration between city and district departments, state agencies, NGOs, CBOs, private sector entities, academic institutions, professional bodies, and volunteers, ensuring a whole-of-society approach to disaster management.
- **Climate Research Wing (within UDMA):** To strengthen evidence-based planning and L&D assessments, a dedicated Climate Research Wing is proposed within UDMA. The wing will coordinate with national and state technical agencies, including the India Meteorological Department (IMD), Indian National Centre for Ocean Information Services (INCOIS), Institute for Seismological Research (ISR), and other relevant scientific and research institutions, to access early warning information, hazard projections, and specialised technical inputs for preparedness planning, response prioritization, and recovery strategies. The composition, roles and responsibilities are detailed in Section 4.3.

This wing serves as the analytical and knowledge backbone of the city's disaster management framework and comprises the following units:

- **Analytics Unit,** responsible for climate risk modelling, hazard and vulnerability analysis, L&D estimation, and scenario-based planning to inform preparedness, response prioritization, and recovery strategies.
- **Data and Information Management**

Unit, responsible for systematic data collection, integration, validation, storage, and dissemination across departments and agencies, supporting real-time monitoring, reporting, and decision-making.

Both units are operationally supported by the Integrated Command and Control Centre (ICCC) and function in close coordination with the Smart City Special Purpose Vehicle (SPV) and the City Climate Cell. This integrated arrangement enables convergence of urban service data, geospatial information, climate indicators, and disaster-related analytics for comprehensive city-level L&D assessments.

4.2.3 Functional Departments

Two broad sets of line departments feed into this core leadership: These units implement actions across preparedness, response, and recovery.

- Departments under City Administration
- Departments under District and Sub-district Administration

4.2.4 Activities Across Disaster Phases

The central section maps three major phases of disaster management, each coordinated by a Task Coordinator. Each phase links to specific sub-activities, including ward-level actions and integration with city development/master plans, as shown in Figure 13.

Preparedness Activites

Task Leader/Coordinator: City Engineer / Deputy Municipal Commissioner (Disaster

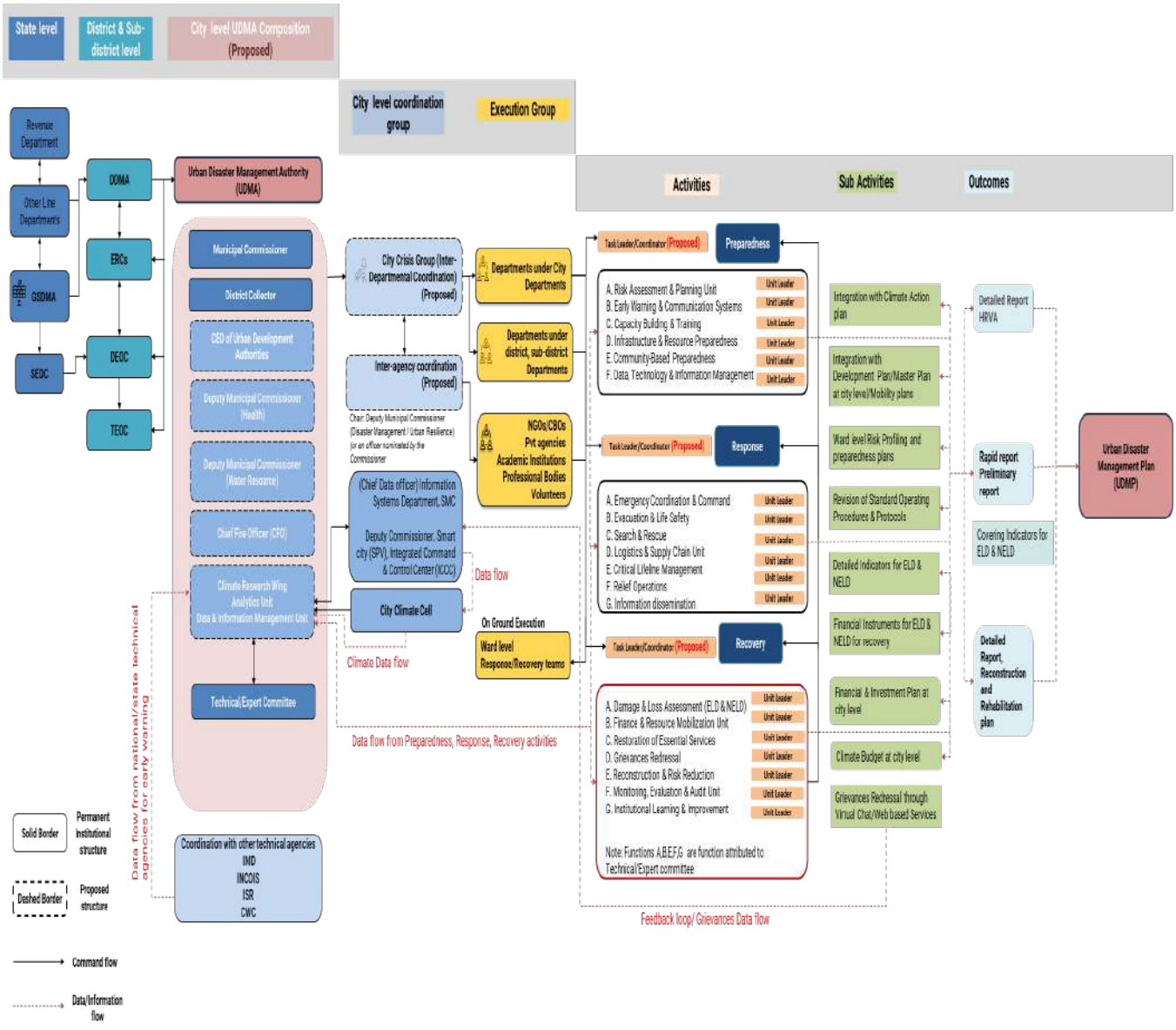


Figure 12: UDMA Structure for Inter-departmental and Inter-agency coordination and Execution

Management) as designated by Municipal Commissioner

Each function (from A to F will have a designated Unit Lead/Nodal Officer reporting to the Task Leader/Coordinator).

A. Risk Assessment and Planning

- Conduct multi-hazard risk assessments (flood, cyclone, heat, industrial, fire, seismic).
- Maintain and annually update the UDMP.
- Develop city-level hazard zonation maps and exposure inventories.
- Integrate risk reduction measures into Master Plan, Development Plan, TP Schemes, and infrastructure planning.

B. Early Warning and Communication Systems

- Establish unified early warning with automated alert dissemination.
- Integrate IMD, CWC, pollution control, local sensors, and smart-city IoT feeds.
- Periodic testing of sirens, public address systems, SMS cell broadcast, and app notifications.
- SOPs for last-mile communication to communities, slums, institutions, and industries.

C. Capacity Building and Training

- Training modules for ULB departments: Fire, Health, Police, Engineering
- Specialised training for task force leaders, public health teams, and first responders.
- Conduct mock drills (city, ward, institutions: schools/hospitals/industrial units).

D. Infrastructure and Resource Preparedness

- Maintain updated resource inventory (boats, pumps, vehicles, generators, shelters).
- Ensure functionality of critical infrastructure: shelters, hospitals, power backup, water supply.

E. Community-Based Preparedness

- Develop ward-level volunteers: Civil Defence, NSS, Aapda Mitra, RWAs, Mohalla Committees.
- Awareness programmes on evacuation, flood safety, heat actions, fire safety, and chemical leak protocol.
- Promote household and institutional preparedness (emergency contacts, shutoff valves).

F. Data, Technology and Monitoring

- Use GIS dashboards, drone surveys, real-time sensors for rainfall, river gauge, air quality, and heat index.
- Maintain urban database on vulnerable populations (elderly, disabled, informal settlements).
- Develop emergency apps for alerts, reporting, and shelter locations.

Response Activities

Task Leader: Chief Fire Officer / Deputy Municipal Commissioner (Disaster Management) as designated by Municipal Commissioner

Each function (from A to F will have a designated Unit Lead/Nodal Officer reporting to the Task Leader/Coordinator).

A. Emergency Coordination and Command

- Activate EOC, ICCC and Incident Command System (ICS).
- Coordinate between ULB, DDMA, police, fire, SDRF, health, transport, PWD, and utilities.
- Deploy Rapid Response Teams (RRTs) and Ward Response Units.

B. Evacuation and Life Safety

- Implement evacuation protocols for flood-prone areas, industrial zones, or unsafe structures.
- Operate emergency shelters, relief centres, and temporary housing.
- Ensure safety of special groups (children, elderly, differently abled, migrants).

C. Search and Rescue

- Deploy Fire and Emergency Services, SDRF, trained volunteers, drones, and rescue equipment.
- Rapid water rescue (boats), high-rise rescue,

confined space rescue, and industrial accident response.

D. Critical Lifeline Management

- Maintain continuity of water supply, electricity, sanitation, public transport, and health services.
- Ensure emergency medical care, ambulance routing, and mass casualty management.
- Protect critical urban infrastructure, pumping stations, substations, bridges, and hospitals.

E. Relief Operations

- Distribution of food, water, medicines, blankets, and hygiene kits.
- Mobile health camps and disease surveillance.
- Emergency waste management and temporary sanitation units.

F. Information Dissemination

- Real-time situation reporting (damage maps, rainfall, river level, casualties, infrastructure status).
- Public communication: advisories, rumours management, press briefings.
- Helplines and grievance redressal for affected populations.

Recovery Activities

Task Leader: City Engineer / Deputy Municipal Commissioner (Disaster Management) as designated by Municipal Commissioner

Each function (from A to G will have a designated Unit Lead/Nodal Officer reporting to the Task Leader/Coordinator).

A. Damage and Loss Assessment

- Conduct rapid and detailed damage assessment (RDA/DDA) using GIS, drones, and mobile apps.
- Assess non-economic losses: lives, health impacts, cultural heritage, environment, social fabric, psychological impacts.
- Prepare consolidated post-disaster assessment reports.

B. Finance and Resource Mobilisation Unit

- Assess financial requirements for short-term restoration and long-term reconstruction.
- Mobilise funds from State Disaster Response Fund, National Disaster Response Fund, State budgets, ULB funds, and CSR.
- Prepare proposals for multilateral financing (ADB, World Bank, GCF, Adaptation Fund). Include funding needs for mental health programs, cultural heritage restoration, eco-restoration, and community revitalisation

C. Restoration of the Essential Services Unit

- Coordinate rapid repair of water supply, electricity, drainage, transport, and telecommunication networks.
- Supervise reopening of hospitals, schools, markets, and public institutions.
- Facilitate temporary service arrangements (water tankers, power backup, mobile health units).
- Work with utilities and departments to reinstate minimum service levels within defined timelines.

D. Grievance Redressal Unit

- Operate a multi-channel helpline (SMS/app/ward office).
- Track complaints related to relief distribution, damage assessment disagreements, and service restoration delays.
- Ensure special protocols for vulnerable groups (elderly, women, slum communities, migrants).
- Maintain time-bound resolution dashboards and report systemic issues to the Recovery Division head.

E. Reconstruction and Risk Reduction Unit

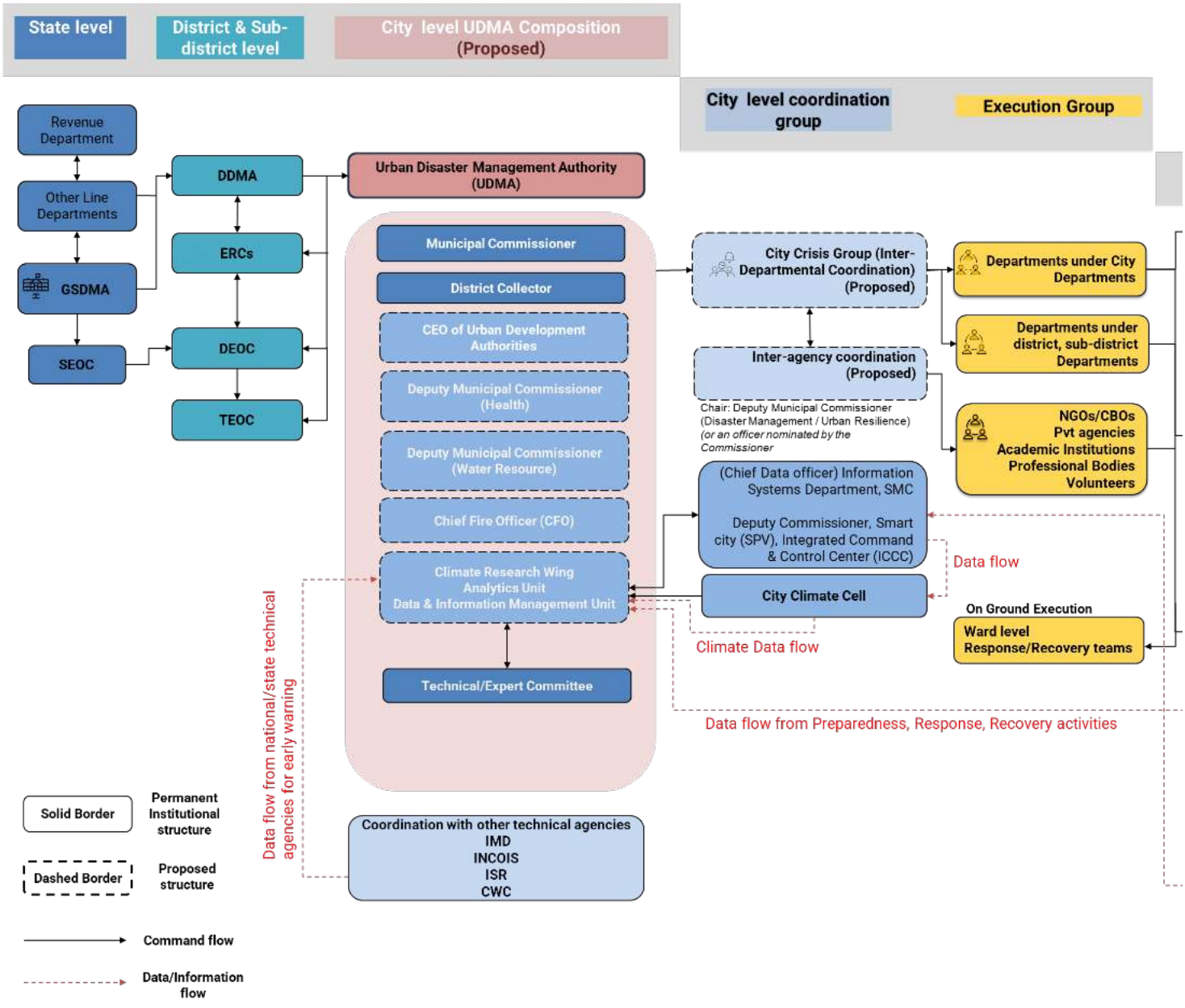
- Implement Build Back Better (BBB) principles in housing and urban infrastructure reconstruction.
- Oversee structural assessments, retrofitting, and resilient design standards.
- Prioritise mitigation work: embankments, stormwater upgrades, slope stabilisation, fire safety infrastructure.

F. Monitoring, Evaluation and Audit Unit

- Track progress of recovery projects through digital dashboards and field verification.
- Undertake third-party audits of reconstruction, financial utilisation, and service restoration quality.
- Conduct social audits involving community organisations and ward committees.
- Provide periodic evaluation reports to the UDMA leadership for transparency and accountability.

G. Institutional Learning and Improvement Unit

- Document lessons learned, best practices, and systemic challenges.
- Update SOPs, contingency plans, and recovery



GSDMA – Gujarat State Disaster Management Authority
SEOC – State Emergency Operations Centre
DEOC – District Emergency Operations Centre
TEOC – Taluka Emergency Operations Centre
IMD – India Meteorological Department
INCOIS – Indian National Centre for Ocean Information Services
ISR – Institute for Seismological Research
CWC – Central Water Commission

Figure 13: Recommended Multi-Level Institutional Framework for Urban Disaster Management

protocols based on findings.

- Lead capacity-building actions for departments based on identified gaps.
- Ensure that learning feeds back into preparedness and mitigation divisions.

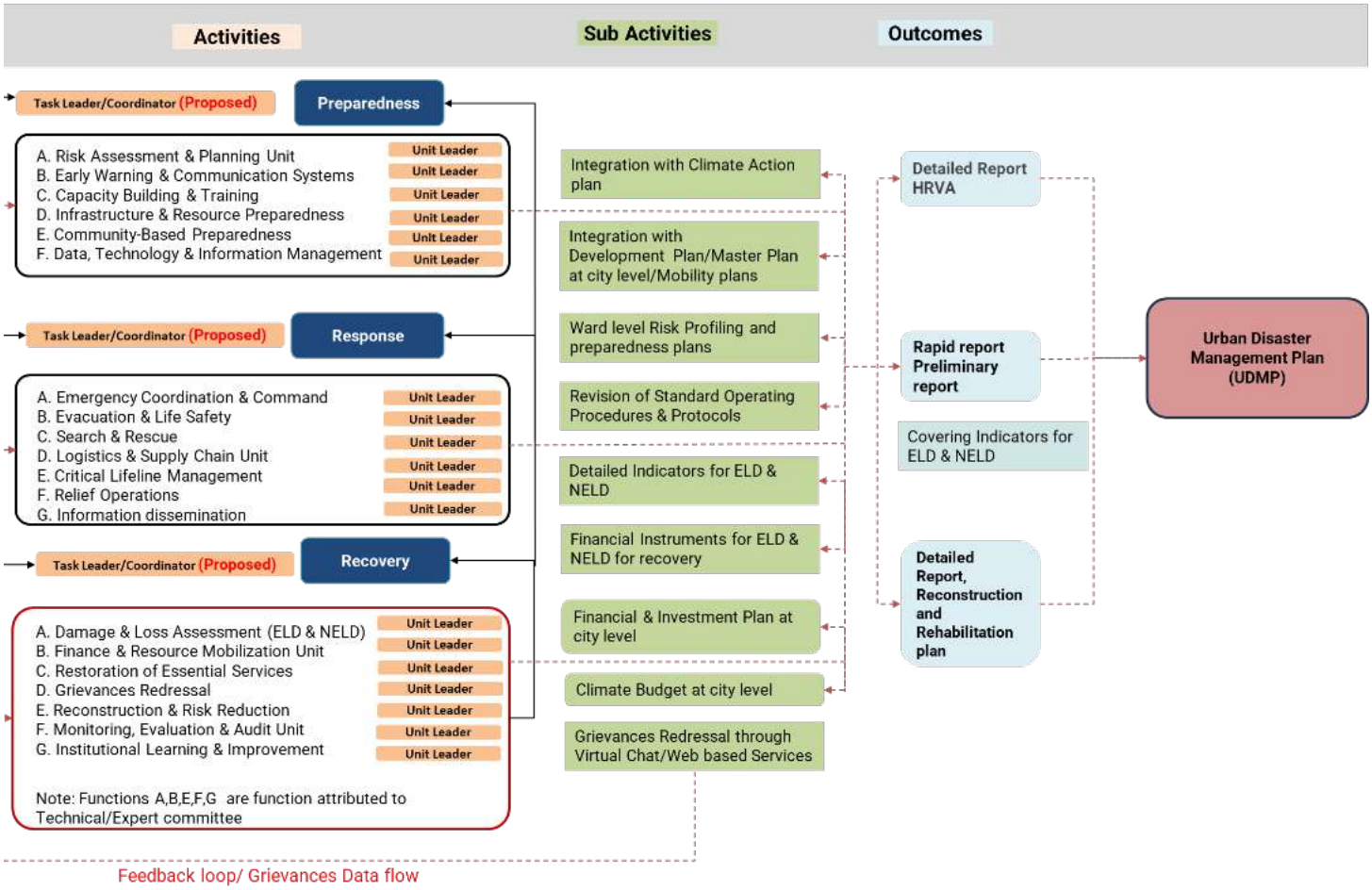
H. Digital Grievance Redressal and Feedback Loop

A digital grievance redressal mechanism, enabled through virtual chat and web-based services, is embedded within the response and recovery phase. This system is operationally supported by the ICCC and the Data and Information Management Unit, enabling transparent intake, tracking, and resolution of grievances related to relief, compensation, and service restoration. Grievance data feeds back into monitoring, audits, and institutional learning processes.

Outputs and Outcomes

Data generated during preparedness, response, and recovery activities flows to the Climate Research Wing for analysis and consolidation. This supports the preparation of:

- Hazard, Risk, and Vulnerability Assessments (HRVA)



- Rapid and preliminary L&D reports
- Detailed L&D, reconstruction, and rehabilitation reports

These outputs collectively inform the preparation and periodic updating of the UDMP, ensuring that disaster risk management and L&D considerations are systematically embedded in urban planning and development processes.

4.3 Roles and Responsibilities of the Key Institutions Proposed

Effective urban disaster management requires a multi-layered institutional system that brings together expertise, leadership, coordination platforms, and legal oversight. The proposed bodies are designed to fill existing operational gaps, improve inter-agency communication, and provide scientific and administrative support across all phases of disaster management. Their composition and roles are detailed in Table 9 to demonstrate how each unit contributes to a resilient and well-coordinated urban governance framework.

4.4 L&D Data Collection Systems

Robust and systematic data collection is central to L&D assessment in urban contexts, where climate impacts manifest unevenly across populations, sectors, and spatial scales. Cities require data systems that not only capture immediate physical damages following hazard events, but also document economic disruptions, service interruptions, and non-economic losses that affect human well-being and long-term impacts.

In India, disaster-related data are generated

Table 9: Roles and Responsibilities of the key Institutions proposed

Institutional Body	Composition	Roles & Responsibilities
Urban Disaster Management Authority (UDMA) **Chairperson: Municipal Commissioner** **Vice-Chairperson: District Collector**	‣ Municipal Commissioner ‣ District Collector ‣ CEO, Urban Development Authority ‣ Deputy Municipal Commissioner (Health) ‣ Deputy Municipal Commissioner (Water Resources) ‣ Chief Fire Officer (CFO) ‣ Designated Nodal Officer, Climate Research Wing (Analytics Unit and Data & Information Management Unit) ‣ Designated Nodal Officer, Technical / Expert Committee (advisory role)	‣ Act as the apex city-level authority for urban disaster management and Loss & Damage (L&D) assessment. ‣ Provide strategic leadership, administrative control, and inter-departmental coordination. ‣ Ensure alignment of disaster risk management with climate action plans, development plans, and master plans ‣ Oversee relief, compensation, grievance redressal, recovery planning, and budgetary allocations.
Technical/ Expert Committee (State–District–City Experts) **Nodal Officer: State-appointed technical representative**	‣ Technical experts from state agencies (IMD, CWC, SDMA technical cells) ‣ District-level specialists (Health, PWD, Irrigation, Revenue) ‣ City technical leads (Climate Cell, ICCC, Urban Planning, Water Supply and Drainage, ‣ Academia, research institutions, and domain experts (hydrology, meteorology, epidemiology, GIS, climate analytics).	‣ Provide scientific and technical advice on urban flooding, heat stress, hydro-meteorological hazards, and multi-hazard risk assessment. ‣ Review Hazard, Risk and Vulnerability Assessments (HRVA), climate projections, and modelling outputs. ‣ Recommend hazard-specific triggers, thresholds, and updates to SOPs. ‣ Guide development of data integration protocols for hazard modelling, impact forecasting, and early-warning systems. ‣ Develop standard methodologies and validate post-disaster damage and loss assessments across sectors. ‣ Provide analytical inputs for recovery prioritisation, funding gap analysis, and evidence-based resource mobilisation. ‣ Advise on risk-informed, climate-resilient reconstruction and “build back better” strategies. ‣ Support development of indicators, technical reviews, and post-event evaluations ‣ Synthesise lessons learned to inform SOP updates, capacity building, and continuous system improvement.

Institutional Body	Composition	Roles & Responsibilities
Climate Research Wing **Nodal Officer: (Senior Municipal Officer) Nominated by UDMA**	‣ Representatives from Climate Cell ‣ Analytics Unit (risk modelling, climate projections, scenario analysis) ‣ Data & Information management Unit ‣ Technical support from Smart City SPV	‣ Serve as the analytical and knowledge backbone for climate-informed urban disaster management. ‣ Generate climate risk analytics, projections, and scenario-based insights to support preparedness, mitigation, and L&D assessment. ‣ Provide evidence-based inputs to the UDMA and Technical / Expert Committee for planning, decision-making, and investment prioritisation. ‣ Coordinate technical data exchange with national and state agencies (IMD, INCOIS, ISR, CWC).
Analytics Unit under the Climate Research wing **Nodal Officer: (Senior Municipal Officer) Nominated by UDMA**		‣ Conduct climate risk modelling, hazard and vulnerability analysis, and scenario-based planning for urban areas. ‣ Support estimation and analysis of Economic and Non-Economic Loss and Damage (ELD and NELD). ‣ Analyse climate projections, hazard trends, and exposure patterns to inform preparedness and response thresholds. ‣ Provide technical inputs to the Technical / Expert Committee for HRVA, SOP updates, and After-Action Reviews.
Data & Information Management Unit under the Climate Research wing **Nodal Officer: (Senior Municipal Officer) Nominated by UDMA**	‣ ICCC analysts and system operators ‣ GIS analysts, data engineers, dashboard operators. ‣ Liaison officers from key departments (Health, Water, Sewerage, Police, Traffic, Environment, Utilities) ‣ Technical System Administrators for sensors, SCADA, and remote-sensing systems	‣ Enable systematic collection, integration, validation, and management of disaster- and climate-related data across departments and agencies. ‣ Support real-time monitoring, reporting, and decision-support by consolidating multi-source datasets through support from ICCC platforms and the city climate cell. ‣ Ensure availability of validated data and analytics to UDMA, City Crisis Group, and Inter-agency Coordination Unit. ‣ Maintain structured data archives to support preparedness planning, post-event assessments, and institutional learning. ‣ Integrate real-time data streams through ICCC systems, including CCTV feeds, IoT sensors, flood gauges, rainfall monitors, mobility data, dashboards, and automated alerts.
City Crisis Group (CCG) (District + ULB + Key Local Agencies) **Chair: Municipal Commissioner**	‣ Heads of municipal departments (Health, Fire, Water Supply, Sewerage, Transport, Electricity, Town Planning, ICT). ‣ Key district departments (Police, Revenue, Roads & Buildings, Irrigation). ‣ Utility service providers (DISCOMs, other agencies) ‣ Representatives from NGOs/ CBOs/Academic Institutions/ Professional bodies on Invitation	‣ Serve as the primary incident leadership and command body during emergencies. Enable unified command and senior-level decision-making during city-level emergencies. ‣ Activate ERCs/EOC and coordinate all departmental response operations. ‣ Validate impact information, situation reports, and damage indicators generated during response operations. ‣ Approve emergency actions, public advisories, evacuation measures, and prioritisation of critical resources. ‣ Prioritise allocation of critical resources, manpower and logistics. ‣ Coordinate with DDMA/SDMA for additional assistance and escalation of major events. ‣ Oversee transition to recovery and ensure restoration of critical services.
Inter-agency Coordination Unit (IACU) (NGOs, CBOs, Private Sector + Govt Interface) **Nodal Officer: (Senior Municipal Officer) Nominated by UDMA**	‣ Senior Representation from City Crisis Group. ‣ Representatives of NGOs, CBOs, volunteers, private sector partners, professional bodies and academic Institutions.	‣ Provide a structured coordination and information-exchange platform linking city and district departments, state agencies, NGOs, CBOs, utilities, private sector actors, academic institutions, professional bodies, and volunteer networks. ‣ Facilitate resource mobilisation, logistics coordination, and deployment of support across agencies. ‣ Enable two-way information flows, including community-level feedback, field observations, and service-delivery updates. ‣ Strengthen whole-of-society engagement in disaster response, recovery, and resilience-building efforts

through multiple reporting mechanisms across preparedness, response, and recovery phases, involving municipal departments, district authorities, and sectoral agencies. While these systems provide a strong foundation for post-disaster assessment, existing reporting formats are primarily oriented toward response and relief, and do not consistently capture the full range of climate-induced losses and damages, particularly at the ward level or across non-economic dimensions.

The Disaster Management (Amendment) Act, 2025, has mandated the establishment and maintenance of a comprehensive disaster management database. This can be leveraged to develop a comprehensive disaster database, data standardisation, and hierarchical reporting, directly enabling L&D data collection and validation at the city level. The DMA 2025 requires the creation of comprehensive disaster databases at the national and state levels. This includes databases that contain information on the Disaster Database:

- Type and severity of disaster risks
- Guidelines for standards of Relief
- Fund allocation details
- Expenditure – Preparedness and Mitigation Plan
- Disaster Management Plans

The amendments to strengthen India's disaster data management system can be leveraged to mandate the collection of L&D data in the disaster database. This section outlines an indicator-based approach to strengthening urban L&D data systems, focusing on three interrelated aspects:

i. Expansion of reporting indicators to reflect priority ELD and NELD categories
ii. Improved spatial resolution through ward-level data generation
iii. Institutional responsibilities for data collection, verification, and consolidation across sectors.

The approach builds on existing disaster management and sectoral information systems, while identifying targeted enhancements required to support comprehensive, timely, and policy-relevant L&D assessments at the city level.

4.4.1 Strengthening Existing Data Collection for L&D Assessment

While existing reporting templates contain several components that can inform a city-level L&D assessment, certain elements can be strengthened or supplemented to reflect the full spectrum of climate-related impacts more comprehensively, which include:

- **Expansion of Reporting Indicators:** The existing Rapid, Preliminary and Detailed reporting formats currently used by district authorities could be supplemented with additional indicators that correspond to high-confidence L&D categories. These additions would align district and city reporting practices, trace impacts across the hazard–exposure–vulnerability chain and capture residual risks.
- **Greater Ward-Level Resolution:** Although DDMP reporting flows through district- and sub-district (including taluka) mechanisms, L&D assessments benefit from spatial granularity that reflects how climate impacts manifest at the neighbourhood scale. Supplementing existing formats with ward-level reporting protocols, particularly within ULBs, can help capture differences in exposure, service disruptions, and early recovery patterns across dense urban settlements, industrial clusters, and vulnerable communities. This improves attribution and enables prioritisation of risk hotspots.
- **Enhanced Documentation of Non-Economic Impacts:** International L&D guidance recognises that non-economic losses include impacts that are not easily measured in monetary terms[48], such as loss of life, health, or mobility (UNFCCC, 2013). In practice, while some impacts may be indirectly visible through sectoral systems e.g.,

48 UNFCCC. (2013). xxxxxxxlosses in the context of the work programme on loss and damage (Technical Paper FCCC/TP/2013/2). United Nations Framework Convention on Climate Change. https://unfccc.int/resource/docs/2013/tp/02.pdf

health surveillance or school closure decisions, they are not consistently documented as L&D-relevant outcomes within routine disaster reporting formats. These can be incorporated into health department, school-level reporting systems and community-level assessments. Supplementing existing formats in this manner would allow cities to capture the broader set of losses described in PDNA/DaLA methodologies and UNFCCC L&D decisions.

A comprehensive assessment requires embedding all baseline information directly into the reporting templates to ensure the L&D assessment is robust, accurate, and collected in a timely manner across sectors. The data collection, reporting, and assessment can be further strengthened at the city level by leveraging the latest DMA Amendment Act 2025. ELD and NELD should be strongly embedded into the disaster database for the reporting system.

Drawing on the previously identified ELD and NELD indicators, gathered from secondary literature, retrospective data analysis, and on-ground consultations with the community, NGOs/CBOs and departmental organisations, the specific data requirements for each sector have been outlined. These data points have been mapped to the corresponding municipal departments and agencies responsible for their collection and verification. This alignment will help to structure the institutional roles and ensure that the L&D assessment framework is grounded and includes both tangible and intangible losses and damages.

4.5 Sectoral Coverage and L&D Dimensions

The sectoral classification for data gathering is adopted from the GIDM reporting and assessment templates, under three broad categories: Social, Productive and Infrastructure Sectors. Within each of these broad categories, a range of ELDs and NELDs have been identified under various city-level departments. By using these sectors as the organising base, the following tables map a range of city-appropriate L&D, ensuring that both visible economic impacts and less tangible but equally significant non-economic losses are captured. This also aligns with community-reported losses captured through CBO consultations, reinforcing lived impacts alongside formal infrastructure and service-level disruptions. This sector-wise disaggregation enables a structured assessment across domains, facilitates data collection from responsible municipal departments, and supports integration with district and state disaster management authorities. The data types are categorised based on whether they are currently collected, whether they are mandated in existing reporting templates, and whether they are gathered at the district or state level. Data collected by third-party entities is also identified separately.

Both cities maintain rich datasets through the ICCCs, health surveillance systems (IDSP), disaster reporting channels, drainage pump logs, emergency calls, and solid waste service records, as mentioned previously. These systems could be better integrated to create multi-sectoral datasets capable of tracking cascading impacts, for example, how a flood event simultaneously affects mobility, health, drainage operations, and water supply[61] (UNDP & WMO, 2023). Such integration aligns with impact-chain methodologies and enables more comprehensive L&D assessments.

Additionally, to support meaningful L&D assessment, the data systems need to integrate:

- **Multi-sectoral:** Integrates data from health, housing, water, sanitation, transport, power, education, environment, livelihoods, and social welfare departments.
- **Multi-level:** Enables reporting from city and ward levels upward to district, state, and national systems.
- **Spatially enabled:** Uses GIS to map hazards, exposure, impacts, and vulnerabilities together.
- **Time-sensitive:** Captures data across pre-event, during-event, and post-event phases.
- **Inclusive:** Incorporates community-reported data and inputs from NGOs, CBOs, and civil society to capture informal and non-economic losses. Uses common indicators and formats while allowing contextual customisation at the city and state levels.

4.5.1 Social Sectors

Table 10: Economic and Non-Economic Losses and Damages in the Health Sector

Health Sector		
Department	**Economic L&D**	**Non-Economic L&D**
Health Department **Family and Welfare Department** **Public Health Centres (PHCs/ CHCs)** **Anganwadis** **Epidemic and Prevention** **ICDS** **Nursing and Maternity Homes** **Immunisation/ Vaccination Wing**	**Losses** ✗ Decline in output/revenue (temporary clinic closures, reduced service delivery) ✗ Temporary clinics, mobile units set up during emergency situations and the cost of setting it up ✓ Expenditure on Emergency medicines and vaccines ✓ Disease surveillance ✗ Overtime staffing, ambulance mobilisation ✗ Increased electricity/water use during heatwaves ✓ Sanitisation, disposal of biomedical waste **Damages** ✓ Damage to health infrastructure: PHCs, CHCs, hospitals, labs ✓ Damage to medical equipment, ambulances, appliances	✓ Loss of life ✓ Vector-borne, water-borne, air-borne diseases ! Heat-related illness ✓ Decline in children's vaccinations ✓ Increased maternal and infant mortality risk ✗ Reduced productivity due to illness ✓ Loss of livelihood/income due to injuries ✗ Increased health burden ✗ Mental health impacts, trauma, psychosocial stress, post-traumatic stress disorder − Malnutrition among children ✗ Mental Fatigue

Table 11: Economic and Non-Economic Losses and Damages in the Education Sector

Education Sector		
Department	**Economic L&D**	**Non-Economic L&D**
Education Department (Primary/Higher Education) **School Board** **Examination Board** **National Cadet Corps** **Samagra Shiksha Office** **PM POSHAN (Pradhan Mantri Poshan Shakti Nirman)**	**Losses** ✗ Temporary schooling cost: tents, containers, mobile classrooms **Damages** ✓ Damage to school buildings, AWCs, libraries ✓ Damage to desks, books, computers, lab equipment ✓ Damage to peripheral structures - washrooms, fences, staff quarters, playgrounds/fields	! Loss of learning time, instructional hours ✗ Postponed/missed exams affecting outcomes ! Dropout rates among children ✗ Increased dropout among girls ✗ Loss of traditional knowledge ✗ Schools used as shelters disrupt education ✗ Loss of learning materials, documents, and marksheets ✗ Increase in screen time and excessive exposure to digital gadgets ✗ Increased absenteeism among adolescent girls due to household disruptions − Digital divide among vulnerable communities49

✓ Data is collected ✗ Data is not collected ! Third parties collect data ! Data is mandated to be collected − Collected at the district or state level

49 Indicators related to digital access are available through NSSO's national surveys, which do not offer city-level or disaster-specific disaggregation

Table 12: Economic and Non-Economic Losses and Damages in the Housing Sector

Housing Sector		
Department	**Economic L&D**	**Non-Economic L&D**
Town Planning/Building Department **Engineering department** **Urban community department** **Urban Housing/Shelter Department** **City planning department** **Smart city division** **TDO Central Office**	**Losses** ✓ Expenditure on temporary shelters ✗ Government overtime/extra staffing in housing departments50 ✓ Cost of debris removal/site clearance post-flooding **Damages** ✓ Buildings/dwellings totally destroyed (by housing-type/ construction material) ✓ Partially destroyed (roof, wall, floor, door/ window) peripheral structures destroyed	✗ Disruption for vulnerable communities ✗ Loss of privacy and dignity in a temporary shelter ! Seasonal or permanent displacement ! Migration51

Table 13: Economic and Non-Economic Losses and Damages in the Environment Sector

Environment Sector		
Department	**Economic L&D**	**Non-Economic L&D**
Environment Department **Forest Department** **Pollution Control Board (PCB)** **Agriculture Department** **Biodiversity Board** **Horticulture Department**	**Losses** ✗ Loss in park-entry fees, permits, ecotourism revenues while sites are closed ✗ Additional cost of Invasive-species control ✓ Emergency fire-control ✗ Overtime for staff and security ✗ Cost of man-made rehabilitation (e.g., slope stabilization to stop erosion, tree plantation drives, urban greening activities, mangrove replanting). **Damages** − Permanent Damage to forests, parks, mangroves[52], ✓ Loss in urban agricultural area, and ✓ Damage/Loss of green cover/Tree cover.[53]	✗ Quantified decline in ecosystem services ✗ Increase in human vulnerability due to poorer air/ water quality, increased disease risk. ✓ Carbon sequestration through Green Initiatives [54] ✓ List of flora, fauna, native species − Loss or degradation of biodiversity, habitats, flora and fauna, endangered-species, wetlands, scenic landscapes.[55] ✗ Recreational deprivation for local communities; loss of aesthetic and educational value. ✗ Reduced regulating and supporting services that are not currently priced: disrupted water-cycle regulation, loss of pollination corridors, weakened coastal storm protection

✓ Data is collected ✗ Data is not collected ! Third parties collect data ! Data is mandated to be collected − Collected at the district or state level

50 Overtime and extra staffing costs are not part of formal disaster assessment templates, but the underlying data can be accessed through HR, departmental deployment orders, and Accounts/Finance expenditure logs

51 The Monsoon loss assistance template shared by Revenue officer shows Migration as one measured indicator

52 State level Forest reports record loss in forest cover data

53 Several initiatives at city level have led to the assessment where city is focussing on % of green cover increased/decreased in past and present and have targets for increasing it. In Surat, the city has done assessment for the year 2020 and 2024 monitoring green cover and tree cover.

54 The city is monitoring several green mitigation measures, including EV deployment, as part of its GHG Inventory efforts. Ahmedabad and Surat have prepared comprehensive GHG Inventories to guide their low-carbon, climate-friendly urban strategies

55 Endangered-species data is maintained by state agencies

4.5.2 Productive Sectors

Table 14: Economic and Non-Economic Losses and Damages in the Trade and Service Sector

Trade and Service Sector		
Department	**Economic L&D**	**Non-Economic L&D**
Estate Department (Markets and Commercial Complexes) **Trade Licensing Cell/Division** **Market Administration** **Labour Department**	**Losses** ✗ Loss in income/sales while shops or service outlets are closed or demand collapses. ✗ Loss of stocks/inventories of goods to sell or inputs for service provision. ✗ Daily wage losses due to missed work[56] ✗ Increase in running costs, water, electricity, raw material procurement ✗ Need for temporary subsidies or soft-credit facilities. ✗ Emergency repairs − Slowdown of City's economic growth − Amplified Debt/ Inflation **Damages** ✓ Destruction of premises/ structures of wholesale, retail, motor vehicle-trade and service enterprises (formal and informal) ✗ Damage to service vehicles (delivery vans, repair trucks, catering vans). ✗ Damage to home-based/small business equipment	✗ Reduced access to raw materials, goods and Services ✗ Employment/income risks for formal sector workers. ! Livelihood disruption ✗ Women and youth in small retail/ services lose earnings and safety nets ✗ Loss of social cohesion in traditional markets that also serve as social spaces. ✗ Physical loss of important local market spaces or community trading hubs that underpin social interaction

Table 15: Economic and Non-Economic Losses and Damages in the Tourism, Heritage and Culture Sector

Tourism, Heritage and Culture Sector		
Department	**Economic L&D**	**Non-Economic L&D**
Heritage Department **Tourism Department** **Archaeology Department**	**Losses** ✗ Revenue loss from culture-site tickets, event bookings ✗ Climate-control for rescued artefacts, archival materials ad-hoc repairs ✗ Foreign-exchange shortfall from reduced international arrivals. ✗ Income impacted due to lay-offs, reduced hours for tour guides, vendors, and taxi drivers. **Damages** − Built heritage & cultural sites- heritage monuments, religious/ pilgrim sites, archaeological sites, museums, archives, galleries, cultural centres, theatres. ✗ Buildings and grounds of all accommodation categories: hotels, heritage hotels, apartment hotels, guest-houses, homestays/ B&Bs, spas, ticket booths, galleries, vehicles. − Moveable collections and inventories: artefacts, manuscripts, paintings, sculptures, furniture and display cases	✗ Loss of culturally or historically significant institutions, buildings, and landscapes. ✗ Livelihood disruption for artisans, performers, and informal microentrepreneurs (e.g., craft sellers) dependent on cultural sites. ✗ Potential social tension or conflict when heritage linked to identity groups is damaged or when access to places of worship is blocked ✗ Destruction of intangible heritage carriers such as sacred spaces, ritual sites, and oral history archives. ✗ Reduced ability to practice or showcase local traditions, including loss of ritual practices, pilgrimages, and festivals. ✗ Loss of heritage or cultural landmarks, traditional marketplaces with cultural significance ✗ Loss of traditional knowledge ✗ Irreversible loss or severe degradation of sites/objects of tourism/historically significant buildings, plazas and landmarks

✓ Data is collected ✗ Data is not collected ! Third parties collect data ! Data is mandated to be collected − Collected at the district or state level

56 PLFS provides periodic state-level estimates of wages and labour indicators, but does not capture event-specific or annual wage losses due to climate or disaster impacts

4.5.3 Infrastructure Sectors

Table 16: Economic and Non-Economic Losses and Damages in the Water Supply and Sanitation Sector

Water Supply and Sanitation Sector		
Department	**Economic L&D**	**Non-Economic L&D**
Water Supply Department **Irrigation Department** **Water works (engineering)** **Drainage and Sewerage Department** **Hydraulic Department** **Stormwater Drainage Department** **Solid Waste Management** **Public Health and Engineering Department (PHED)**	**Losses** ✗ Cost incurred for tanker water, bottled water distribution, ✗ Extra chemicals for water treatment, intensive pumping for groundwater, and ✗ Increase in demand for potable water during a heatwave ✗ Septic Tank clean-up **Damages** ✓ Water-supply structures damaged: pipelines, treatment plants, pumping stations, mains, storage tanks, distribution networks, pumps, tubewells, wells. ✓ Sewerage: collection systems, lift-stations, treatment plants, drainage systems, outfalls. ✓ Solid-waste: transfer stations, trucks, disposal/ composting sites. ✓ Service vehicles of utilities	− Reduction in safe, reliable water-supply and sanitation coverage (% of households with direct connections falls) ✗ Disproportionate burden on vulnerable groups (women) for access to water ✓ Environmental contamination of water resources and disposal sites.

Table 17: Economic and Non-Economic Losses and Damages in the Electrical and Communication Sector

Electrical and Communication Sector		
Department	**Economic L&D**	**Non-Economic L&D**
Electrical & Mechanical Department **IT/Communication Department** **Electricity Board** **Power Department**	**Losses** ✗ Increase in consumer household expenditures ✗ Increased importing cost higher installation cost of renewables ✗ Reduction in hydropower output due to water scarcity. **Damages** ✓ Power generation infrastructure, Transmission system/distribution grid ✓ Damage to power generation units, solar panels, substations, transformers, supply line. ✗ Service vehicles communication assets, equipment	− Reduced household electricity access post-disaster[57] − Loss of access to emergency communications or safety services[58] ✗ Reduced functionality of emergency services and administrative bodies due to outages. ✗ Safety concerns due to poor lighting. ✗ Remote/inaccessible areas are more prone to loss of electricity/ communication Access ✗ Reduction in hydropower output due to water scarcity.

✓ Data is collected ✗ Data is not collected ! Third parties collect data ! Data is mandated to be collected − Collected at the district or state level

57 SAIDI/SAIFI reliability indicators are recorded by DISCOMs annually but not city-level everywhere. It is a standard reliability indicator used by electricity utilities (DISCOMs) to measure how long, on average, a customer experiences power outages in a year.

58 Data on emergency communication network outages is not collected annually. Such information is typically available only through incident-specific logs maintained internally by telecom operators and district/state disaster management authorities

Table 18: Economic and Non-Economic Losses and Damages in the Transport Sector

Transport Sector		
Department	**Economic L&D**	**Non-Economic L&D**
Transport Department **Roads & Building (R&B)** **Bridges and Highway Department** **District Transport Office** **Regional Transport Office (RTO)** **Railway** **Civil Aviation**	**Losses** − Revenue loss from tolls, user fees, airline/ shipping / rail/bus fares not collected.[59] ✗ Government subsidies/tax relief to keep public transport affordable ✗ Increase in fuel, tyre and vehicle maintenance (longer routes, detours, poorer surfaces) ✗ Cleaning & rehabilitation costs for terminals, yards, channels ✗ Cost of transport facilities used as shelters or logistics hubs **Damages** ✓ Damage to metro, BRTS infrastructure or bus stops/ Metro stations ✓ Collapsed / washed-out road segments (expressway, NH, SH) ✓ Destroyed bridges, culverts, by material (steel, concrete, wood) − Rail track, Airport runways and terminals − Transport related buildings, RTO, workshops, depots and control centres ✗ Damage to locomotives, carriages, wagons, Transport vehicles (buses, taxis, trucks) ✗ Damage to Toll Plaza − Airport ground handling equipment and aircraft	✗ Loss of access to essential services and emergency services (police, ambulance, fire) ✗ Added travel time for commuters, especially women, children, elderly, persons with disabilities ✗ Loss of mobility-based livelihoods (drivers, porters, roadside vendors) − Supply chain disruption leading to local scarcity/price spikes in utilities, food and other items[60]. ✗ Loss of connectivity leading to community isolation and safety risks

✓ Data is collected ✗ Data is not collected ! Third parties collect data ! Data is mandated to be collected − Collected at the district or state level

Existing city plans predominantly rely on historical hazard profiles (Ahmedabad DDMA, 2024–25; Surat DDMA, 2024–25). These can be strengthened by integrating forward-looking climate projections, such as temperature rise, humidity trends, changes in rainfall intensity, and river-flow variability and climate modelling. Embedding this information into DDMPs, HAP revisions, and flood SOPs would integrate the emerging residual risks and provide a more robust basis for interpreting future L&D trajectories.

4.6 Engagement with Non-Government Actors

Non-government actors play a critical role in enabling inclusive, credible, and contextually grounded L&D assessment at the city level. In urban settings, a significant share of climate-related losses, particularly those affecting informal livelihoods, health, education, housing security, and access to basic services, remain outside the scope of routine administrative reporting. This is especially true for non-

59 Annual revenue data for tolls, rail, airports and public transport is available, but disaster-specific revenue losses are not recorded and must be estimated through post-disaster assessments or third-party studies.

60 WPI/CPI capture price changes annually. But not tagged to transport disruption

61 United Nations Development Programme & World Meteorological Organization. (2023). Mapping the impact and informing economic resilience. UNDP and WMO. https://www.undp.org/publications/mapping-impact-and-informing-economic-resilience

economic and cumulative losses, which are experienced over time and across systems, but are rarely captured through conventional post-disaster formats. NGOs, community-based organisations (CBOs), research institutions, academia, and private sector actors, therefore, constitute an essential complement to municipal and state authorities in identifying, documenting, and interpreting L&D. Under the proposed framework, engagement with non-government actors is positioned as a structured and continuous element of the L&D assessment process, rather than an ad hoc or consultative add-on.

Effective L&D assessment in cities depends on combining multiple forms of knowledge, administrative data, sectoral information, and lived experience. Non-government actors play a central role in bridging these knowledge domains. Their involvement strengthens the ability of cities to capture losses that are otherwise invisible, contextualise quantitative indicators, and understand how climate impacts interact with social, economic, and institutional conditions at the neighbourhood scale.

Cities such as Ahmedabad and Surat are also characterised by relatively rich and diverse institutional ecosystems, which create favourable conditions for such engagement. Ahmedabad hosts a well-established knowledge corridor, nationally and internationally recognised academic and research institutions, public health bodies, urban planning schools, and policy think tanks. These institutions have long-standing engagement with urban governance, climate risk, heat action planning, and public health challenges, and are well placed to support methodological development, indicator design, and analysis of complex dimensions of L&D. In particular, they can help advance approaches to assessing non-economic losses related to health outcomes, educational disruption, livelihood insecurity, and social well-being. These actors bring experience with risk modelling, financial exposure, and operational disruption, which can inform city-level understanding of system-wide losses and recovery pathways when appropriately integrated into public assessment processes.

Surat's institutional context is shaped by a strong private-sector base, most notably the textile and diamond industries, alongside active trade associations, cooperatives, and industry bodies. These actors are directly affected by climate-related disruptions, including heat stress, flooding, labour productivity, and supply chain reliability. Such disruptions translate directly into income loss, production delays, and worker vulnerability, underscoring the relevance of industry actors in documenting and interpreting economic and livelihood-related L&D.

Both cities also host an active network of civic organisations, professional associations, and academic partners engaged in public health, urban services, and climate risk, further strengthening the cities' capacity for collaborative assessment.

4.6.1 Role of NGOs, CBOs, research institutions, academia, and the private sector

NGOs and CBOs are often the first actors to document climate impacts at the community level, particularly among informal workers, migrants, women, and elderly populations, as well as other groups that are underrepresented in official datasets. Their proximity to communities enables the documentation of livelihood losses, health impacts, displacement costs, service disruptions, and non-economic losses that are rarely captured through departmental reporting systems. Under the proposed framework, these actors can support neighbourhood- and ward-level data collection, facilitate participatory validation of loss categories, and contribute qualitative insights on cumulative and slow-onset impacts.

Experiences from organisations working directly at the city and neighbourhood scale illustrate this role clearly. Institutions such as the Urban Health and Climate Resilience Centre of Excellence (UHCRCE) in Surat have generated evidence linking climate stressors to urban health outcomes, productivity losses, and service pressures, highlighting impacts that cut across sectors and departments. Similarly, Mahila Housing Trust (MHT) has documented heat-related income loss, health expenditure, and

reduced work capacity among informal women workers, dimensions of loss that are typically invisible in post-disaster damage assessments. AIDMI's long-standing work on disaster risk management and recovery has further shown how community-based documentation can surface gaps in relief access, compensation coverage, and long-term recovery for urban poor households.

At the same time, these experiences also point to areas that need strengthening. While NGOs and CBOs generate rich, granular data, this information is often not systematically integrated into formal assessment or decision-making processes. Under the proposed framework, their role needs to be formalised not only as data collectors but as partners in defining assessment categories, validating findings, and interpreting cumulative impacts over time.

Research institutions and academia play a complementary role by strengthening methodological rigour and analytical depth. Building on approaches explored in Deliverables 2 and 3, academic partners can support the development and testing of indicators for NELD, advise on sampling and validation approaches, and assist with analysis of cross-sectoral and cascading impacts. Their involvement can also help align city-level assessment practices with state, national, and emerging international L&D reporting frameworks, improving consistency and comparability over time.

The private sector, including utilities, insurers, infrastructure operators, and large employers, contributes a further layer of insight. Operational data on service outages, infrastructure performance, production losses, workforce impacts, and insurance claims can provide valuable evidence of system-level L&D. When combined with community and departmental data, such inputs can strengthen valuation exercises, inform recovery planning, and support the design of financial protection and risk-transfer mechanisms.

At the same time, effective engagement with non-government actors requires clarity on roles, responsibilities, and expectations. Without such clarity, engagement risks becoming fragmented or extractive, with data collected but not meaningfully integrated into assessment outputs or decision-making processes. The proposed framework therefore emphasises structured modes of engagement, including clearly defined points of interaction during data collection, validation, and review stages, as well as transparency regarding how non-governmental inputs are incorporated within formal L&D assessments.

4.6.2 Community awareness and participation in L&D data and reporting

For L&D assessment to meaningfully reflect lived experience, affected communities need to be aware of what constitutes L&D, how such losses can be documented, and how reported information feeds into official assessment and response processes. In the absence of such awareness, losses are often recorded informally or inconsistently, limiting their visibility within institutional systems. This challenge is particularly acute for non-economic and cumulative losses, which are less easily recognised through conventional assessment formats.

Structured community participation is therefore a core element of the proposed framework. Participatory approaches, such as facilitated group discussions, neighbourhood-level reporting formats, and periodic validation and feedback sessions, can support more accurate and inclusive documentation of L&D. Such processes also create opportunities for communities to contextualise quantitative data, surface priority concerns, and reflect on how losses evolve over time.

Experiences from cities such as Ahmedabad and Surat demonstrate the value of sustained community engagement in climate and health governance. Institutions like the Indian Institute of Public Health (IIPH), through its work on heat action planning and climate–health surveillance in Ahmedabad, have shown how community-level awareness and reporting can improve the identification of heat-related health impacts that are otherwise under-reported in routine systems. Similarly, MHT has worked extensively

with women informal workers in both cities to build awareness of heat-related risks and to document income losses, health expenditure, and work disruptions, contributing to a more nuanced understanding of loss beyond physical damage.

In Surat, the Urban Health and Climate Resilience Centre of Excellence (UHCRCE) has played a bridging role between communities, municipal departments, and health systems, supporting participatory data collection and dialogue on climate impacts affecting vulnerable populations. These experiences suggest that community participation is most effective when embedded within ongoing programmes and mediated by trusted local institutions, rather than treated as a one-off data-collection exercise.

Clear communication regarding the purpose of data collection, how information will be used, and how it feeds into decision-making pathways is critical for sustaining participation and trust. Working through established organisations such as IIPH, MHT, UHCRCE, and local CBOs can help bridge gaps between community knowledge and municipal assessment processes. Under the proposed framework, such actors can play a formal role in facilitating community awareness, supporting participatory reporting, and enabling feedback loops that strengthen both the quality and legitimacy of city-level L&D assessments.

4.6.3 Feedback mechanisms and grievance redress systems

Transparent feedback and grievance redress mechanisms are essential to maintaining accountability and credibility in L&D assessment. Affected groups need clarity on whether reported losses have been acknowledged, how assessments have been conducted, and how concerns regarding omissions, inaccuracies, or exclusions can be addressed. Without such mechanisms, confidence in assessment processes is likely to remain limited, particularly among marginalised communities.

The proposed framework, therefore, emphasises the importance of establishing clear feedback loops, whereby communities and non-government actors are informed about how reported data has been aggregated, interpreted, and applied. Grievance redress mechanisms linked to L&D assessment, such as designated nodal officers, defined response timelines, and escalation pathways, can be integrated within existing municipal systems. Over time, these mechanisms can contribute to improved data quality, stronger accountability, and greater trust between communities, non-government actors, and public institutions.

4.7 Capacity Building

Capacity building is a central enabling pillar of the proposed city-level L&D assessment framework. While cities such as Ahmedabad and Surat have accumulated experience in disaster response, sectoral planning, and climate-related initiatives, the shift towards a systematic, multi-dimensional, and forward-looking L&D assessment approach places new demands on institutions. These demands relate not only to technical skills but also to coordination across departments, engagement with non-government actors, and the ability to use assessment outputs for planning, recovery, and financing decisions. Strengthening capacity within ULBs and associated departments is therefore essential to ensure the framework is implemented effectively, sustained over time, and adapted as climate risks and policy priorities evolve.

At present, many elements required for L&D assessment are fragmented across municipal systems. Data is collected regularly, staff have sector-specific expertise, and disaster management protocols are in place. However, these elements are not yet configured to support an integrated understanding of L&D that captures economic and non-economic impacts, cumulative and slow-onset losses, and cross-sectoral effects. Capacity building under the proposed framework is therefore focused on re-orienting existing capabilities, strengthening linkages between functions, and filling critical gaps, rather than creating entirely new systems.

4.7.1 Capacity needs assessment

A first set of capacity gaps relates to the conceptual understanding of L&D. While most ULB officials are familiar with damage and

loss estimation for physical infrastructure and housing, there is more limited familiarity with the broader L&D discourse, particularly non-economic losses, cumulative impacts, and losses associated with slow-onset hazards such as heat stress and water scarcity. This limits departments' ability to identify, classify, and prioritise impacts on health, livelihoods, education, productivity, and social well-being, which are central to urban vulnerability.

A second set of gaps concerns data management and integration. Departments routinely collect sector-specific data for planning, service delivery, and reporting purposes. However, institutional arrangements for integrating this information across departments, validating community-generated data, and maintaining consistent assessment formats over time remain weak. There is limited experience with qualitative and participatory data and with tracking losses longitudinally rather than on an event-by-event basis. As a result, cumulative losses and recurring stresses are often under-recognised in official assessments.

A third area of capacity gaps relates to climate-risk assessment and damage valuation. This includes limited familiarity with urban-scale climate projections, challenges in linking hazard information to sectoral and social impacts, and a lack of standardised approaches for valuing non-economic losses, health impacts, livelihood disruption, and service outages. Without these capabilities, cities face difficulties in translating assessment findings into recovery priorities, budget allocations, or proposals for external financing.

4.7.2 Cross-training between departments

Loss and damage in urban areas cuts across multiple sectors, including health, water, transport, housing, education, livelihoods, and energy. However, municipal departments typically operate within sectoral silos, with distinct mandates, data systems, and reporting cycles. This creates challenges for integrated L&D assessment, particularly in capturing cascading impacts and interdependencies between systems.

Cross-training between departments is therefore a key capacity-building requirement. This includes building a shared understanding of L&D concepts, assessment objectives, and data requirements across departments, as well as familiarising staff with the types of information held by other departments. Joint training programmes, scenario-based exercises, and periodic review workshops can support departments in jointly interpreting assessment findings and identifying cross-sectoral priorities.

In addition to technical training, capacity-building efforts should focus on strengthening coordination mechanisms. This may include clarifying roles and responsibilities during assessment cycles, establishing standard protocols for data sharing, and creating regular forums for inter-departmental dialogue on L&D trends. Over time, such measures can help embed L&D assessment within routine municipal workflows rather than treating it as an exceptional activity triggered only by disasters.

4.7.3 Capacity Building for Engagement with Non-Government and Community Actors

Effective implementation of the L&D assessment framework requires ULBs to work closely with NGOs, CBOs, research institutions, and community representatives. This introduces additional capacity requirements related to participatory methods, data validation, and communication. Many officials have limited prior exposure to working with community-generated data or facilitating participatory assessment processes, particularly for non-economic and sensitive forms of loss.

Capacity building in this area should focus on developing skills in participatory facilitation, ethical data collection, and integration of qualitative inputs into formal assessment outputs. Training can also support officials in communicating assessment findings back to communities and non-government actors, strengthening transparency and trust. At the same time, capacity support for non-government actors may be needed to align documentation practices with municipal requirements and to ensure consistency and reliability of data inputs.

4.7.4 Need for External Technical Assistance

In the initial phases of adopting the proposed framework, external technical assistance is likely to play an important role in supporting cities to build and consolidate capacity. Institutions such as the NIDM, GIDM, state training institutes, universities, and specialised research organisations can provide targeted training on L&D concepts, assessment methodologies, climate-risk analysis, and valuation approaches.

External partners can also support the development of standard operating procedures, guidance materials, and training curricula tailored to city contexts. In addition, partnerships with academic and research institutions can facilitate applied learning through pilot assessments, peer exchange between cities, and periodic review of assessment practices as risks and policy requirements evolve.

Importantly, external support should be designed to strengthen in-house capacity within UDMA and ULBs rather than substitute for it. A phased approach, with an explicit emphasis on knowledge transfer and institutionalisation, can enable cities to progressively replicate and adapt L&D assessment processes independently, while continuing to draw on external expertise for specialised or emerging needs.

5.
Financing for Loss and Damage

India's L&D relief financing framework is anchored in a well-established disaster relief and compensation system under the Disaster Management Act, 2005, supported by national and state-level instruments such as the State Disaster Response Fund, the National Disaster Response Fund, the PMNRF, and Chief Minister's Relief Funds. As discussed in Section 2.4.3, these mechanisms primarily enable rapid response, relief, and short-term recovery following climate-induced disasters, and remain the principal public instruments for addressing economic L&D in the immediate aftermath of extreme events.

However, these relief-focused mechanisms are primarily reactive and event-driven, with limited scope to address residual, long-term, and non-economic losses, or to systematically reduce future risk. Consequently, financing for L&D must extend beyond post-disaster compensation to include planned public expenditures, private sector instruments, and climate finance.

At the global level, the establishment of the Loss and Damage Fund at COP27 in 2022 and its operationalisation at COP28 in 2023 mark a historic turning point in climate justice. The Fund, formally known as the Fund for Responding to Loss and Damage (FRLD)[62] is designed to provide financial assistance to developing countries facing unavoidable climate impacts that occur despite mitigation and adaptation efforts, with an emphasis on rapid and responsive support. Initial allocation priorities focus on climate-vulnerable countries, with at least 50 per cent of early funding intended for Small Island Developing States (SIDS) and Least Developed Countries (LDCs). These are designed to respond to country-specific needs and priorities, with an emphasis on locally driven, context-appropriate solutions that complement existing national response and recovery systems.

5.1 Public Funds for Disaster Management

Public financing remains the primary source of funding for addressing climate-related L&D, particularly in the aftermath of extreme events. Key public financing channels include:

Funds at National Level:

National Disaster Risk Management Funds (NDRMF)[63]:

The National Disaster Risk Management Funds (NDRMF), created on the 15th Finance

62 The Fund for responding to Loss and Damage (FRLD)
63 Gujarat State Disaster Management Authority. (2025). Gujarat State Disaster Management Plan 2025–26: Volume 1. sdmpvol-107142025060338723.pdf

Commission's recommendation, include the National Disaster Response Fund (80%) and the National Disaster Mitigation Fund (NDMF) (20%). The NDRF's share is further divided into response and relief (40%), recovery and reconstruction (30%), and preparedness and capacity building (10%). While funds cannot be shifted between NDRF and NDMF, up to 10% reallocation is allowed within their respective sub-categories.

For disasters requiring central assistance beyond the State Disaster Response Fund, the Ministry of Home Affairs (MHA) evaluates the State Government's request for additional support. Based on this assessment, the Ministry of Finance allocates the necessary budgetary resources for relief operations, strengthening response systems, enhancing disaster management institutions, capacity building, and DRR initiatives[64].

Prime Minister's National Relief Fund (PMNRF)

The Prime Minister's National Relief Fund (PMNRF) was established entirely through public contributions and receives no budgetary support. PMNRF accepts voluntary contributions from individuals, organisations, trusts, companies and institutions. All contributions towards PMNRF are exempt from income tax under section 80(G) of the Income Tax Act, 1961. The resources of the PMNRF are utilised to provide immediate relief to families of those killed in calamities like floods, cyclones, and earthquakes. Assists in defraying the expenses for medical treatment like heart surgery, kidney transplantation, cancer treatment of needy people, and acid attacks.

State Level:

State Disaster Risk Management Funds (SDRMF)

The State Disaster Risk Management Funds (SDRMF), created on the 15th Finance Commission's recommendation, include the State Disaster Response Fund (80%) and the State Disaster Mitigation Fund (20%). The State Disaster Response Fund portion is further divided into response and relief (40%), recovery and reconstruction (30%), and preparedness and capacity building (10%). Although funds cannot be shifted between the State Disaster Response Fund and SDMF, states may reallocate up to 10% within each fund's sub-windows.

The State Disaster Mitigation Fund is intended for community-level, risk-reducing, and environmentally sustainable interventions, while large-scale mitigation projects (e.g., embankments, coastal walls, and drought resilience works) should be financed through regular development schemes instead of the mitigation fund. The Ministry of Home Affairs will issue detailed operational guidelines.

Chief Minister's Relief Fund: This provides immediate support to people affected by disasters, road, air, or railway accidents, communal riots, crop failure, and floods, among others. The funds can also be used for people affected by cancer, heart surgery and other ailments.

State Disaster Response Fund: The State Disaster Response Fund is strictly designated for providing immediate relief to victims of notified disasters. States may incur emergency relief expenditure from State Disaster Response Fund and subsequently adjust a portion of this spending once funds are released from the National Disaster Response Fund. For state-specific disasters that are not part of the nationally notified list, up to 10% of the state's annual State Disaster Response Fund allocation may be utilised. However, the scale and type of relief assistance, whether for notified disasters or local disasters, must strictly adhere to the approved State Disaster Response Fund/ National Disaster Response Fund norms and cannot exceed the prescribed limits.

Activities permissible under the State Disaster Response Fund / National Disaster Response Fund include[65]:

- Gratuitous relief (compensation for loss of life,

64 National Disaster Management Authority. (2019). National Disaster Management Plan (NDMP 2019). Government of India. https://ndma.gov.in/sites/default/files/PDF/ndmp-2019.pdf

65 National Disaster Management Authority. (2019). National Disaster Management Plan (NDMP 2019). Government of India. https://ndma.gov.in/sites/default/files/PDF/ndmp-2019.pdf

injuries, relief for loss/damage to clothing and utensils/household goods, cash doles)

- Search and rescue operations
- General relief measures
- Air-dropping of essential supplies
- Emergency drinking water
- Debris removal and area clearance
- Assistance to agriculture, livestock, fisheries, handicrafts, and artisans
- Immediate repair/restoration of damaged infrastructure
- Capacity development activities

As per the Revenue Department's Circular dated 10/10/2023 (No. CLS/102012/253/S.3), and in accordance with the guidelines issued by the Government of India, specific standards have been prescribed for providing assistance from the State Disaster Response Fund for losses resulting from various natural disasters. These include heavy rainfall and floods, cloud bursts, cyclones, droughts, earthquakes and tsunamis, landslides, avalanches, extreme cold and frost, hailstorms, frost and cold waves, pest attacks, fire incidents, and COVID-19. Detailed Items and Norms for Assistance from the State Disaster Response Fund and National Disaster Response Fund are listed in Annexure 8.6.

Financial sources available for different components of disaster management[66]

Table 19: Funding mechanisms for disaster management activities in India, outlining sources, utilisation scope, financing patterns, and administering agencies.67

Name	Purpose	Finance Arrangements	Activities that can be conducted under scheme	Nodal Agency
National Disaster Response Fund	Relief Assistance	100% Central Govt	Cash and kind relief	Revenue Department
State Disaster Response Fund	Relief Assistance	75% Centre, 25% State	Cash and kind relief	Revenue Department
Planning Commission (14 Finance commission)	Capacity Building	100% Centre	Trainings Awareness Generation IEC material Mock drills	Revenue Department
State Fund	Capacity Building	100% State	Training, Awareness Generation, IEC Material, Mock drills	GSDMA
Line department funds	Preparedness and mitigation	Line department budgetary allocation	Activities falling in purview of departments for DRR, preparedness and mitigation	Line Departments
District Planning Fund	Any public works	MP and MLA aid and grants	Preparedness, Mitigation capacity building, recovery	Local Bodies, Line departments
External Institutional Funding	Projects on DRR, Recovery, Mitigation and Preparedness	Total external or bilateral or multilateral arrangements	Infrastructure upgradation Technological interventions and technical studies DRR projects	Revenue Department
Donor	Any	Total donation in cash and kind	Any	DDMA/ GSDMA
CSR	Corporate	2% of profit	Any	Charity Commissioner and Corporate
Appeal	Immediate relief	Fully or partially external funds	Immediate relief, reconstruction	DDMA/TDMA

66 Ahmedabad District Disaster Management Authority. (2024–2025). Ahmedabad District Disaster Management Plan. Government of Gujarat. https://ndma.gov.in/sites/default/files/PDF/DDMP/Gujarat/ahmedabad-ddmp.pdf

For disaster management, there can be two categories of budget heads-a) line department's own fund through various schemes and programmes, and b) additional budget required particularly for DM activities. Following are the sources available (or to be tapped) for different components of disaster management.

Broader Financing Architecture for Mitigation, Preparedness, and Recovery

While response and relief financing are primarily managed through the State Disaster Response Fund and the National Disaster Response Fund, long-term DRR requires sustained investments that extend beyond immediate post-disaster support. To ensure stronger preparedness, mitigation, capacity building, and resilient reconstruction, dedicated financial mechanisms and development-oriented funding streams are essential. The following section outlines the broader financial architecture through which DRR initiatives are implemented in India, including public-funded schemes, flexi-funds within centrally sponsored schemes, and externally aided projects.

Public Funded Schemes

DRR initiatives in India are primarily financed through centrally and state-funded public schemes. Several nodal ministries lead disaster management efforts for specific hazards, and many ministries and departments operate dedicated programmes focused on prevention, mitigation, preparedness, and capacity building. Examples include the Ministry of Home Affairs' schemes for strengthening fire and emergency services and supporting Administrative Training Institutes, the Ministry of Environment, Forest and Climate Change's Integrated Coastal Zone Management Programme, and the Ministry of Jal Shakti's flood management and forecasting initiatives. The Department of Space runs a Disaster Management Support Programme, while the Ministry of Earth Sciences operates the Tsunami and Storm Surge Warning System.

Many other government schemes such as those under MoEFCC, the National Rural Health Mission, MGNREGS, and urban development missions also embed DRR elements by strengthening community resilience, a critical dimension of disaster risk reduction.

Flexi-Funds under Centrally Sponsored Schemes

Following the Ministry of Finance's instructions and NITI Aayog's 2016 guidelines for centrally sponsored schemes (CSS), the flexi-fund component was revised to 25% of the annual allocation for States and 30% for Union Territories. These flexi-funds allow:

- Flexibility for states to address local priorities within the broader objectives of a scheme
- Piloting innovative approaches to improve programme efficiency
- Undertaking mitigation or restoration activities during natural disasters or in areas affected by internal security issues.

Flexi-funds must be used in line with the overarching objectives of the respective CSS and may be pooled across schemes within the same sector. However, funds cannot be diverted to activities in other sectors**.**

Externally Aided Projects

Beyond public funding, the Central Government also mobilises resources from external agencies to support vulnerability assessments, capacity development, institutional strengthening, and mitigation initiatives through aid from Word Bank and other such external funding agencies.

Although the primary financial instruments for disaster relief (State Disaster Response Fund / National Disaster Response Fund) support immediate response and short-term recovery, long-term risk reduction increasingly depends on climate adaptation financing. Adaptation funds such as NAFCC, SAPCC allocations, and multilateral climate finance, enable states to invest in resilient infrastructure, water security, sustainable agriculture, and ecosystem-based approaches. These mechanisms complement disaster management systems by reducing future losses and building adaptive capacity, rather than providing post-disaster relief.

67 Gujarat State Disaster Management Authority. (n.d.). State Disaster Response Network (SDRN). http://sdrn.gsdma.org/ .Sourced from Data Collection format Taluka level

5.2 Climate Finance

Climate finance in India is primarily structured around mitigation and adaptation objectives, aimed at reducing greenhouse gas emissions and strengthening resilience to climate impacts. Nevertheless, climate finance remains relevant to L&D frameworks because of its role in shaping future risk trajectories. Well-targeted mitigation and adaptation investments can reduce exposure, vulnerability, and the frequency of climate-related shocks, thereby limit the magnitude of future L&D and ease fiscal pressure on disaster relief systems.

International and Multilateral Climate Finance

India also accesses international climate finance through multilateral and bilateral channels. These funds predominantly support:

- Adaptation and resilience-building projects
- Low-carbon infrastructure and energy transitions
- Climate information systems and early warning systems

Key global climate finance mechanisms include:

Green Climate Fund (GCF)[68]: Provides grants, concessional debt, guarantees, and equity instruments for large-scale mitigation and adaptation projects.

Global Environment Facility (GEF)[69]: Through its family of funds, the GEF supports developing countries in addressing interconnected global environmental challenges by providing financing aligned with international environmental agreements and goals.

Climate Investment Funds (CIF)[70]: A major multilateral climate finance partnership that channels concessional resources through six multilateral development banks to support both upstream policy and advisory work and downstream climate investments. CIF operates through two windows: the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF).

Global Infrastructure Facility (GIF)[71]: A G20-endorsed global collaboration platform that supports the preparation and structuring of sustainable, high-quality infrastructure projects, with the aim of mobilising private investment in developing countries and emerging markets.

Cities Climate Finance Leadership Alliance (CCFLA)[72]: A multi-stakeholder coalition that seeks to close the financing gap for urban and sub-national climate projects by facilitating coordination, knowledge exchange, and collaboration among actors involved in urban development, climate action, and finance.

Adaptation Fund[73]: Finances concrete, on-the-ground adaptation projects at national and sub-national levels, particularly in climate-vulnerable regions. The Fund is supported through contributions from governments and private donors, as well as a two per cent share of proceeds from Certified Emission Reductions (CERs) under the Clean Development Mechanism.

Mitigation Action Facility (NAMA Facility)[74]: Established in 2012 as a multi-donor, grant-based programme, the MAF provides technical support and climate finance for mitigation projects.

Most multilateral climate funds are project-based, forward-looking, and designed to reduce future climate risks, rather than to compensate for losses that have already occurred. As a result, they are generally not structured to address residual, or non-economic losses associated with climate change. Nevertheless, these mechanisms can indirectly contribute to loss and damage objectives by financing adaptation measures that reduce the scale and frequency of future impacts, supporting

68 Green Climate Fund. (n.d.). Home [Website]. https://www.greenclimate.fund/
69 Global Environment Facility. (n.d.). Who we are [Webpage]. https://www.thegef.org/who-we-are
70 Climate Investment Funds. (n.d.). Home [Website]. https://www.cif.org/
71 Global Infrastructure Facility. (n.d.). Home [Website]. https://www.globalinfrafacility.org/
72 Cities Climate Finance Leadership Alliance. (n.d.). Home [Website]. https://citiesclimatefinance.org/
73 Adaptation Fund. (n.d.). Home [Website]. https://www.adaptation-fund.org/
74 Mitigation Action Partnership. (n.d.). NAMA Facility [Webpage]. https://mitigation-action.org/about/nama-facility/

climate information and early warning systems, and strengthening institutional and technical capacity for risk management.

National and State-level Climate Finance Instruments

- **National Adaptation Fund for Climate Change (NAFCC):** Administered by the Ministry of Environment, Forest and Climate Change (MoEFCC) and NABARD, providing grant support for adaptation projects that enhance the climate resilience of communities, livelihoods, and ecosystems. At the sub-national level, climate finance is primarily operationalised through State Action Plans on Climate Change (SAPCCs). SAPCCs provide the strategic framework for identifying sectoral priorities, vulnerability hotspots, and climate actions aligned with national commitments and state development goals.

  In Gujarat, as part of its early efforts to operationalise the SAPCC, the Climate Change Department. formally recognised as a Climate Change Budget Scheme, under which a separate budget line was earmarked to support climate-related programmes implemented by various line departments. The scheme aimed to identify, tag, and highlight climate-relevant expenditures across sectors, rather than create a standalone climate fund.

- **Carbon Credit mechanisms:** Carbon market instruments, including Certified Emission Reduction (CER) credits and emerging domestic carbon market mechanisms, have the potential to incentivise greenhouse gas emission reductions and mobilise private sector investment. In India, these mechanisms are primarily oriented towards mitigation outcomes and are still evolving in terms of institutional design and regulatory clarity. As a result, their direct contribution to state-level or sub-national climate finance, including financing linked to SAPCC implementation, remains limited at present.

- **Sectoral Missions and Schemes:** National flagship programmes such as the Smart Cities Mission, AMRUT 2.0, Swachh Bharat Mission (Urban) 2.0, and the PM E-Drive Scheme integrate climate-relevant objectives, including climate-resilient urban services, sustainable mobility, water security, and clean energy transitions. While not explicitly labelled as climate finance, these schemes account for a significant share of climate-relevant public expenditure at the state and city levels.

- **Market and Financial Instruments:** The Perform, Achieve and Trade (PAT) scheme, PRSF/SIDBI Green Fund[75], and SEBI's Green Bond Framework[76] support energy efficiency, green lending, and capital market mobilisation for climate-aligned investments.

Instruments such as NAFCC, SAPCC-linked expenditures, sectoral missions, and market-based mechanisms focus on risk reduction, resilience-building, and low-carbon development, rather than on compensating for economic or non-economic losses after climate-related events. Nonetheless, these instruments play an important indirect role in a L&D framework by reducing exposure and vulnerability over time, strengthening institutional capacity, and embedding climate considerations into mainstream development spending. However, addressing residual and irreversible losses, particularly at the city level, will require complementary, purpose-built financing mechanisms beyond existing national and state climate finance architecture.

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75 Partial Risk Sharing Facility (PRSF), implemented by the Small Industries Development Bank of India (SIDBI), is designed to de-risk lending for green and climate-relevant projects, particularly for micro, small, and medium enterprises (MSMEs)

76 The Green Bond Framework issued by the Securities and Exchange Board of India (SEBI) provides regulatory guidance for the issuance and listing of green bonds in India's capital markets. The framework defines eligible green project categories, disclosure and reporting requirements, and external review standards, thereby enhancing transparency and investor confidence

City-Level and Urban Climate Finance

Urban climate finance is increasingly channelled through project preparation facilities, municipal finance instruments, and public–private partnership models. Key mechanisms include:

- **Green Municipal Bonds:** Green municipal bonds enable creditworthy ULBs to raise debt finance from capital markets for climate-aligned investments such as renewable energy, sustainable urban transport, water and wastewater systems, and resilient urban infrastructure
- **ESCO Models:** Performance-based contracting mechanisms through which urban local bodies partner with Energy Service Companies to finance and implement energy efficiency and low-carbon solutions in municipal infrastructure, with repayments linked to verified energy savings.

While these instruments strengthen urban capacity for climate-resilient investment, they primarily support risk reduction and service efficiency and are not designed to compensate for L&D already incurred, underscoring the need for complementary state and national financing mechanisms.

5.3 Additional Funding Sources That Can be Leveraged for Loss and Damage

In addition to public budgetary allocations and disaster relief funds, a range of supplementary financing instruments can support L&D response and recovery, particularly for large-scale, recurrent, or climate-induced events.

- **Public–Private Partnership (PPP):** Public–private partnership arrangements can be leveraged to co-finance specific L&D–related investments, particularly in resilient infrastructure, critical services, and post-disaster reconstruction. Under such arrangements, funding responsibilities may be shared between the State Government, private sector entities, and, where applicable, the Central Government, enabling risk-sharing and mobilisation of private capital for climate-resilient outcomes.
- **Grants-in-Aid:** The State may access grants-in-aid from the Central Government, local governments, and bilateral or multilateral development partners to support disaster risk reduction, preparedness, and recovery initiatives. While typically targeted at resilience-building and reconstruction, such grants can also help address climate-induced losses when aligned with state and city priorities.
- **Corporate Social Responsibility (CSR) Contributions:** CSR funding from public and private sector enterprises can support targeted recovery, livelihood restoration, and community-based resilience interventions following climate-induced losses
- **Loans:** With prior approval from the State Government, GSDMA can raise loans from the open market to support disaster management functions outlined in the DM Act, 2003.
- Disaster Bonds: The State Government may explore the issuance of disaster or resilience bonds as a long-term financing mechanism to mobilise resources for managing high-impact, low-frequency disaster events. Such instruments can help spread fiscal risk over time and provide upfront capital for recovery and resilience investments.
- Donations: Under Section 33 of the Gujarat State Disaster Management Act, 2003, the Authority may accept donations, grants, and gifts from governments, institutions, or individuals. These voluntary contributions can supplement public funds, particularly for immediate relief, community-level recovery, and targeted support to affected populations.
- **Recovery Measures and Special Taxes:** The State may adopt recovery strategies such as imposing tax surcharges, introducing local taxes, or sharing funding responsibilities with beneficiaries to support post-disaster recovery.
- **Parametric Insurances:** Parametric insurance mechanisms offer a pre-arranged source of finance that triggers rapid payouts based on predefined hazard thresholds, such as extreme heat, rainfall, or wind speed, rather than assessed losses. These instruments are particularly relevant for addressing immediate liquidity needs following climate shocks and can complement public relief systems by enabling faster and more predictable responses to L&D.

6.
Conclusion and Way Forward

This study has examined the current disaster management policies and climate governance landscape at the national, state, and district levels. Through the lens of L&D in Gujarat, focusing on Ahmedabad and Surat, the analysis examines the strengths of existing institutional arrangements and the critical gaps that limit comprehensive assessment of climate-induced losses at the city level. While India and Gujarat possess relatively mature DRR systems, including response mechanisms, early warning systems, and relief frameworks, these systems are oriented towards preparedness, response, and compensation, with limited capacity to systematically capture the full spectrum of economic and non-economic losses associated with climate change.

The review of national, state, district, and urban disaster governance frameworks demonstrates that L&D is not yet institutionally embedded as a distinct analytical or reporting category. Existing data systems, reporting formats, and assessment methodologies focus primarily on immediate physical damages and relief eligibility, resulting in under-representation of indirect losses, long-term impacts, non-economic losses, and residual risks, particularly in urban and informal contexts. The analysis of data systems and reporting mechanisms further reveals fragmentation across sectoral platforms, limited urban granularity, weak integration of hazard, vulnerability, and impact data, and insufficient mechanisms for integrating community-generated data into institutional evidence.

Drawing on national and international case studies, the report underscores that effective L&D assessment requires clarity on what is assessed, at what scale, by whom, and for what purpose. Lessons from India and comparable global contexts highlight the importance of indicator-based frameworks, multi-sectoral coordination, participatory data collection, and strong institutional anchoring to ensure that L&D data informs governance, planning, and financing decisions rather than a retrospective assessment. This will ensure that future climate impacts and the resulting L&D are mitigated.

The recommended framework, anchored within the proposed UDMA, provides a practical pathway for institutionalising L&D assessment in cities. By clearly defining roles and responsibilities across state, district, and municipal authorities; integrating sectoral data systems; and enabling engagement with NGOs, CBOs, academia, and the private sector through the Inter-Agency Coordination Unit (IACU), the framework strengthens the institutional link between risk identification, impact assessment, response coordination, and recovery planning. Within this architecture, the UDMA provides overall governance and accountability, the City Crisis Group (CCG) exercises unified command and decision-making during emergencies, and the IACU enables horizontal coordination,

field-level feedback, and whole-of-society engagement.

Loss and Damage data generated across departments should be institutionally anchored within a common governance framework and operationalised for regular monitoring and analysis through the ICCC. Leveraging the ICCC as a central coordination and data aggregation node can enable real-time consolidation of sectoral impacts, service disruptions, and emerging risks at the city level, with validated information flowing to the City Crisis Group for operational decision-making, to the Technical/ Expert Committee for scientific review and advisory inputs, and to the UDMA for strategic oversight and policy direction.

This structured data flow ensures that information collected from departments, utilities, communities, and external agencies is systematically analysed, validated, and translated into coordinated action, rather than remaining fragmented across institutions.

In parallel, a stronger and more formalised focus on climate modelling and risk projection is required to anticipate future hazards and evolving vulnerability profiles. This must be institutionalised through systematic alignment with the India Meteorological Department and other national climate science agencies, ensuring that long-range climate projections, early warning information, and risk scenarios directly inform L&D assessment, preparedness planning, and adaptive decision-making under the guidance of the UDMA's Climate Research wing and Technical Expert functions. The framework explicitly links L&D findings, validated through technical review, to municipal budgeting, sectoral investment planning, urban development strategies, and recovery programmes under the oversight of the UDMA, strengthening accountability and ensuring that evidence informs both immediate recovery decisions and long-term risk-reduction investments.

Equally important is the institutionalisation of community engagement within L&D assessment processes. Through the IACU, community-based organisations, NGOs, informal worker groups, and affected households can contribute field-level data, validate impact assessments, particularly for non-economic losses and provide feedback during response and recovery phases. This strengthens the inclusiveness, credibility, and social legitimacy of urban L&D assessments.

The alignment of this framework with provisions under the Disaster Management (Amendment) Act, 2025, particularly those related to disaster databases and urban disaster authorities, offers a strong statutory foundation for its implementation.

Looking ahead, operationalising this framework will require **phased and sustained action.** Key priorities include:

i. Developing standardised L&D indicators and reporting templates across sectors;
ii. Aggregating L&D-relevant data from existing national, state, and city platforms into a common, interoperable system;
iii. Strengthening technical and institutional capacities at the city level; and
iv. Ensuring that L&D data is actively used to inform city planning, climate action, recovery investments,
v. Leveraging access to financing mechanisms at the national and state level, including climate finance for L&D compensation in cities.

In conclusion, embedding L&D assessment within urban governance processes and city-level disaster management systems can enable Indian cities not only to respond more effectively to climate impacts but also to anticipate, reduce, and manage unavoidable ELD and NELD in a transparent, equitable, and evidence-driven manner. By institutionalising L&D assessment at the city scale, Gujarat has the potential to demonstrate a scalable and replicable model for other Indian cities, one that combines retrospective documentation with forward-looking climate risk projections to generate robust local evidence. Such an approach can meaningfully inform national disaster management policies and the evolving international L&D discourse, including mechanisms for global assessment, accountability, and compensation.

7.
References

Adaptation Fund. (n.d.). Home [Website]. https://www.adaptation-fund.org/

Adelina, C., Archer, D., Johnson, O., & Opiyo, R. (2020). Governing sustainability in secondary cities of the Global South. Stockholm Environment Institute. https://www.sei.org/wp-content/uploads/2020/07/seij8317-governing-sustainability-secondary-cities-of-global-south.pdf

Ahmedabad District Disaster Management Authority. (2024–2025). Ahmedabad District Disaster Management Plan. Government of Gujarat. https://ndma.gov.in/sites/default/files/PDF/DDMP/Gujarat/ahmedabad-ddmp.pdf

Ahmedabad Municipal Corporation. (2019). Ahmedabad Heat Action Plan. Ahmedabad Municipal Corporation. https://www.nrdc.org/sites/default/files/ahmedabad-heat-action-plan-2018.pdf

Ahmedabad Municipal Corporation. (2023). Climate Resilient City Action Plan (CRCAP) for Ahmedabad. Ahmedabad Municipal Corporation. https://www.ahmedabadcity.gov.in/ViewFile/ViewFile?TYPE=FileRepository,2098

Ahmedabad Municipal Corporation. (n.d.). Drainage Department functions. https://ahmedabadcity.gov.in/StaticPage/drainage

Archer, D. (2014, October 23). Climate-related "loss and damage" in cities: Exploring a new urban frontier. International Institute for Environment & Development. https://www.iied.org/climate-related-loss-damage-cities-exploring-new-urban-frontier

Asian Development Bank. (2018). Philippine City Disaster Insurance Pool: Rationale and design. PreventionWeb. https://www.preventionweb.net/publication/philippine-city-disaster-insurance-pool-rationale-and-design

Asian Development Bank. (2024). Philippine City Disaster Insurance Pool summary. https://www.adb.org/sites/default/files/publication/479966/philippine-city-disaster-insurance-pool-summary.pdf

Bangladesh Sangbad Sangstha. (2025, November 5). Oxfam launches loss and damage dashboard to highlight climate impacts. https://www.bssnews.net/news/328719

CelsiusPro. (2024). Insuring vulnerable people in India against extreme heat events. https://beta.celsiuspro.com/news-archive/index-based-heatwaves-parametric-insurance-extreme-heat-events-insurance-india-mahilahousingtrust-mht-naturaldisasterfund-ndf

Cities Climate Finance Leadership Alliance. (n.d.). Home [Website]. https://citiesclimatefinance.org/

Climate Change Department, Government of Gujarat. (n.d.). Home [Website]. from https://ccd.gujarat.gov.in/

Climate Investment Funds. (n.d.). Home [Website]. https://www.cif.org/

Desai, V., Magotra, R., & Jha, N. (2023). Climate Adaptive and Gender Integrated Heat Wave Action Plan – Surat City, Gujarat. Integrated Research and Action for Development (IRADe). https://www.apn-gcr.org/wp-content/uploads/2023/06/Climate-Adaptive-and-Gender-Integrated-Heat-Wave-Action-Plan-of-Surat-City.pdf

Dhaka Tribune. (2025). Oxfam launches "Loss and Damage Dashboard" to visualize climate impacts. https://www.dhakatribune.com/bangladesh/395720/oxfam-launches-loss-and-damage-dashboard-to-make

Directorate of Relief, Government of Gujarat. (n.d.). Annual Report on Drought and Flood. https://directorateofrelief.gujarat.gov.in/down-loads

Evans, S. (2024). Nagaland renews parametric insurance with SBI General, Munich Re & GIC Re support. Artemis. https://www.artemis.bm/news/nagaland-renews-parametric-insurance-with-sbi-general-munich-re-gic-re-support/

Fund for Responding to Loss and Damage. (n.d.). FRLD. https://www.frld.org/

Ghanekar, A., & Desai, V. K. (2019). Urban health & climate resilience: A case of Surat city, India. Indian Institute for Human Settlements. https://iihs.co.in/knowledge-gateway/urban-health-climate-resilience-a-case-of-surat-city-india/

Global Environment Facility. (n.d.). Who we are. https://www.thegef.org/who-we-are

Global Infrastructure Facility. (n.d.). Home. https://www.globalinfrafacility.org/

Global Resilience Partnership. (2018). Devising local coping mechanisms and adaptation technologies to build climate-resilience capacities of urban poor in South Asia. https://www.globalresiliencepartnership.org/challenge-project/coping-and-adaption-technologies/

Government of Gujarat. (2024). Memorandum: Gujarat Flood 2024 (Y_778). Directorate of Relief & Disaster Management. https://directorateofrelief.gujarat.gov.in/assets/downloads/Y_778_Memorandum_Gujarat_flood_2024.pdf

Government of India. (2005). The Disaster Management Act, 2005 (No. 53 of 2005). Ministry of Home Affairs. https://ndma.gov.in/sites/default/files/PDF/DM_act2005.pdf

Government of India. (2025). Disaster Management (Amendment) Act, 2025 (Act No. 10 of 2025). Ministry of Home Affairs. https://ndma.gov.in/sites/default/files/PDF/DM-Amendment-Act-2025.pdf

Green Climate Fund. (n.d.). Home [Website]. https://www.greenclimate.fund/

Gupta, M. (2023). Akshvi: Digital wallets for climate loss & damage. UNFCCC. https://unfccc.int/sites/default/files/resource/4_230430%20Manu%20Gupta%20Akshvi.pdf

Gujarat State Disaster Management Authority (GSDMA). (n.d.). DDMP. https://www.gsdma.org/Content/ddmp-4246

Gujarat State Disaster Management Authority. (2024). Gujarat State Disaster Management Plan 2024–25. https://www.gsdma.org/uploads/Assets/sdmp/y177volumn210606202402494137.pdf

Gujarat State Disaster Management Authority. (2025). Gujarat State Disaster Management Plan 2025–26: Volume 1. http://www.gsdma.org/uploads/Assets/sdmp/sdmpvol-107142025060338723.pdf

Gujarat Urban Development Mission. (2023). CITIIS-2.0 Gujarat report [PDF]. https://gudm.gujarat.gov.in/writereaddata/Portal/Magazine/Document/1_32_1_CITIIS-2-0_GR.pdf

InsuResilience Solutions Fund. (2025). Development of a natural disaster risk insurance scheme for Nagaland. PreventionWeb. https://www.preventionweb.net/resource/case-study/development-natural-disaster-risk-insurance-scheme-nagaland

InsuResilience Solutions Fund. (2025). Project brief: Development of a sub-sovereign natural disaster risk insurance scheme for Nagaland. https://insuresilience-solutions-fund.org/wp-content/uploads/2025/03/C3.08-Nagaland_Project-Brief.pdf

Jamwal, N. (2025). Akshvi: One-of-its-kind digital wallet for disasters. Down To Earth. https://www.downtoearth.org.in/natural-disasters/akshvi-one-of-its-kind-digital-wallet-for-disasters-allows-communities-to-self-report-their-losses

Karanth, A., & Archer, D. (2014). Institutionalising mechanisms for building urban climate resilience. Development in Practice, 24(4), 514–526. https://doi.org/10.1080/09614524.2014.911246

Mahila Housing Trust. (2023). Gender and poverty-related barriers of the urban poor to access climate and disaster risk finance and insurance: Evidence from India. https://www.mahilahousingtrust.org/knowledgehub/gender-and-poverty-related-barriers-of-the-urban-poor-to-access-climate-and-disaster-risk-finance-and-insurance-evidence-from-the-mahila-housing-trust-in-india/

Mechler, R., et al. (2019). Climate Risk Management Framework for India – Addressing Loss & Damage. MoEFCC/GIZ/IIASA/NIDM. https://nidm.gov.in/PDF/pubs/GIZ_NIDM_Climate%20RiskManagementFramework.pdf

MicroSave Consulting & GIZ. (2020). The landscape of climate and disaster risk insurance (CDRII) in South and Southeast Asia and Oceania. https://www.microsave.net/wp-content/uploads/2020/12/GIZ-Climate-and-Disaster-Risk-Insurance-CDRII-Landscape-Study.pdf

Ministry of Home Affairs, Government of India. (n.d.). National Disaster Management Information System (NDMIS). https://ndmindia.mha.gov.in/ndmi/ndmis

Ministry of Home Affairs, Government of India. (n.d.). Power and functions of National Executive Committee. https://ndmindia.mha.gov.in/ndmi/functions

Nagaland State Disaster Management Authority. (2024). Expression of interest for disaster risk transfer parametric insurance solution – Nagaland. https://nsdma.nagaland.gov.in/sites/default/files/2024-02/NSDMA%20EOI.pdf

National Disaster Management Authority. (2010). Incident Response System (IRS) guidelines. https://ndma.gov.in/sites/default/files/PDF/Guidelines/incidentresponsesystemjuly.pdf

National Disaster Management Authority. (2016). Beating the heat: Guidelines for preparation of action plan. https://ndma.gov.in/sites/default/files/IEC/Booklets/HeatWave%20A5%20BOOK%20Final.pdf

National Disaster Management Authority. (2019). National Disaster Management Plan (NDMP 2019). https://ndma.gov.in/sites/default/files/PDF/ndmp-2019.pdf

National Disaster Management Authority. (n.d.). Urban floods. https://ndma.gov.in/Natural-Hazards/Urban-Floods

National Institute of Disaster Management. (n.d.). India Disaster Resource Network (IDRN). https://idrn.nidm.gov.in/

National Institute of Disaster Management. (n.d.). Standard Operating Procedure – Post Disaster Needs Assessment (PDNA). https://nidm.gov.in/PDF/pubs/sop_pdna.pdf

National Institute of Urban Affairs. (2024). Environmental surveillance and management: Leveraging ICCC for monitoring and action. https://niua.in/sites/default/files/2025-07/2024_S1_Environmental%20Surveillance%20and.pdf

National Institute of Urban Affairs. (2014). **ACCCRN projects in Surat, Indore and Gorakhpur: A brief summary**. https://www.acccrn.net/sites/default/files/publication/attach/acccrn_projects_in_surat_indore_and_gorakhpur-_a_brief_summary.pdf

National Institute of Urban Affairs. (n.d.). **Use case** [Webpage]. ICCC Portal. https://iccc.niua.org/iccc/sector/use-case/28c8edde3d61a0411511d3b1866f0636

National Remote Sensing Centre. (n.d.). **National Database for Emergency Management (NDEM)** [Web portal]. https://ndem.nrsc.gov.in/

NIDM & GIZ. (2019). **Climate risk management framework for India**. National Institute of Disaster Management & Deutsche Gesellschaft für Internationale Zusammenarbeit. https://nidm.gov.in/PDF/pubs/GIZ_NIDM_Climate%20RiskManagementFramework.pdf

Olano, G. (2019). **Philippines to benefit from parametric insurance pool – ADB**. Insurance Business Magazine. https://www.insurancebusinessmag.com/asia/news/breaking-news/philippines-to-benefit-from-parametric-insurance-pool--adb-122547.aspx

Press Information Bureau. (2025, July 22). **Disaster Management (Amendment) Bill, 2024**. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2146781

PRS Legislative Research. (n.d.). **The Disaster Management Amendment Bill, 2024**. https://prsindia.org/billtrack/the-disaster-management-amendment-bill-2024

PTI. (2024). **Nagaland becomes first state in India to sign MoU on disaster risk management**. The Times of India. https://timesofindia.indiatimes.com/city/kohima/nagaland-becomes-first-state-in-india-to-sign-mou-on-disaster-risk-management/articleshow/112236345.cms

Puig, D. (2023). **Assessing climate change-driven losses and damages**. UNEP Copenhagen Climate Centre & ICAT. https://climateactiontransparency.org/resources/assessing-climate-change-driven-losses-and-damages/

Resilient Cities Network. (2017). **Surat City Resilience Strategy**. https://resilientcitiesnetwork.org/downloadable_resources/Network/Surat-Resilience-Strategy-English.pdf

Santiago Network. (n.d.). **Home** [Website]. https://santiago-network.org/

SEEDS India. (2025). Akshvi: Built for India, designed for the world. https://www.seedsindia.org/portfolio/akshvi-built-for-india-designed-for-the-world/

Sengupta, S. (2022). **Anticipatory shock-responsive social protection trialled as part of Nigeria flood response**. Red Cross Red Crescent Climate Centre. https://www.climatecentre.org/9094/anticipatory-shock-responsive-social-protection-trialled-as-part-of-nigeria-flood-response/

Sharma, S., Ormond-Skeaping, T., & Achampong, L. (2024, October 31). **Loss and damage as the third pillar of climate action**. Loss and Damage Collaboration. https://www.lossanddamagecollaboration.org/publication/loss-and-damage-as-the-third-pillar-of-climate-action-delivering-a-loss-and-damage-sub-goal-under-the-ncqg-at-cop29

Sheehan, M. (2021). **Swiss Re backs disaster risk insurance scheme in Nagaland, India**. Reinsurance News. https://www.reinsurancene.ws/nagaland-processes-first-claim-under-parametric-disaster-insurance/

Stockholm Environment Institute. (2017). **Case studies**. weADAPT. https://weadapt.org/?case-study=26471

Surat Municipal Corporation. (2025). **Draft net-zero climate resilient city action plan (CRCAP) for Surat**. Surat Municipal Corporation

Surat District Disaster Management Authority. (2024). **Surat District Disaster Management Plan (2024–2025)**. Government of Gujarat. https://ndma.gov.in/sites/default/files/PDF/DDMP/Gujarat/surat-ddmp.pdf

Surat Municipal Corporation. (2016). **Integrated**

Command and Control Centre (ICCC) documentation. Surat Smart City Development Limited. https://dmeo.gov.in/sites/default/files/2021-08/Package4_UrbanTransformation_CaseStudy14.pdf

Surat Municipal Corporation. (2018). Surat Heat Action Plan. Surat Municipal Corporation. https://resiliencestrata.org/uploads/publication/1D97E6B4-57F2-4371-9DB7-7DF79D93BA21.pdf

Surat Municipal Corporation. (2018). Flood management standard operating procedures. Surat Municipal Corporation.

The Business Standard. (2025). Each affected Bangladeshi lost Tk 1.17 lakh in 10 months to climate impacts: Oxfam. https://www.tbsnews.net/bangladesh/environment/each-affected-bangladeshi-lost-tk117-lakh-10-months-climate-impacts-oxfam

Tran, D. M. (2025). New tool capturing the unseen climate change costs in Bangladesh. Devpolicy. https://devpolicy.org/new-tool-capturing-the-unseen-climate-change-costs-in-bangladesh-20251107/

UNFCCC. (2013). Non-economic losses in the context of the work programme on loss and damage (FCCC/TP/2013/2). https://unfccc.int/resource/docs/2013/tp/02.pdf

UNICEF Nigeria. (2023). Early action protocol – Kaduna State, Nigeria (floods). https://www.unicef.org/nigeria/reports/early-action-protocol-kaduna-state-nigeria-floods

United Nations Framework Convention on Climate Change. (n.d.). Warsaw International Mechanism for Loss and Damage. https://unfccc.int/topics/adaptation-and-resilience/workstreams/loss-and-damage/warsaw-international-mechanism

United Nations Environment Programme – Copenhagen Climate Centre. (2023). Loss and damage at COP28: A historic step forward. https://unepccc.org/wp-content/uploads/2023/12/loss-and-damage-at-cop28-web.pdf

United Nations Environment Programme – Copenhagen Climate Centre. (2024). Assessing and Managing Loss and Damage: Gujarat – Deliverable 1. https://unepccc.org/wp-content/uploads/2025/03/phase-1-deliverable-ld-assessment-gujarat-final-dec12.pdf

United Nations Development Programme & World Meteorological Organization. (2023). Mapping the impact and informing economic resilience. https://www.undp.org/publications/mapping-impact-and-informing-economic-resilience

United Nations Office for the Coordination of Humanitarian Affairs. (2018). Nigeria floods: Situation report no. 6. ReliefWeb. https://reliefweb.int/report/nigeria/nigeria-floods-situation-report-no-6-18-october-2018

United News of Bangladesh. (2025). Oxfam reveals Tk 1.35 billion climate losses in Bangladesh. Daily Sun. https://www.daily-sun.com/post/838114

World Bank. (2024). On urban heat, India offers lessons to the world. https://blogs.worldbank.org/en/sustainablecities/on-urban-heat--india-offers-lessons-to-the-world

8.
Annexure

8.1 Nodal Ministry for Management/ Mitigation of Different Disasters

Nodal Ministry / Department	Disasters Covered
Ministry of Agriculture & Farmers Welfare (MAFW)	Cold Wave, Drought, Frost, Hailstorm, Pest Attack
Ministry of Earth Sciences (MOES)	Cyclone / Tornado, Earthquake, Tsunami
Ministry of Defence (MOD)	Avalanche (BRO), Oil Spills (Indian Coast Guard)
Ministry of Environment, Forest & Climate Change (MEFCC)	Forest Fire, Industrial & Chemical Accidents
Ministry of Health & Family Welfare (MHFW)	Biological Emergencies
Ministry of Civil Aviation (MOCA)	Air Accidents (Civil Aviation)
Ministry of Railways (MOR)	Rail Accidents
Ministry of Road Transport & Highways (MRTH)	Road Accidents
Ministry of Jal Shakti (MOJS)	Flood
Ministry of Housing & Urban Affairs (MHUA)	Urban Floods
Ministry of Mines (MOM)	Landslides
Department of Atomic Energy (DAE)	Nuclear & Radiological Emergencies

8.2 Monsoon Loss Assistance Templates at District and Taluka level

Damage reports due to heavy rain

		Date:-					District Name: Surat			
૧	Human Death (Urban/Rural)									
Sr. no	Taluka Name	Reported Human Deaths	Verified Cases	Pending Verification	Deaths from Other Causes (Rejected Cases	Approved Cases	Assistance paid case	Cases where assistance is pending	Amount paid (in lakhs)	Remarks
૧										
Total	Total									
૨	Injury Assistance (Urban/Rural)									
ક્રમ	Taluka Name	Number of Injured people	Number of cases where injury assistance was paid	Amount Paid (Rs./- in lakhs)	Rejected Cases	Pending Cases	Remarks			
૧	Choryasi									
Total	Total									

૩	Animal Death (Urban/Rural)									
ક્રમ	Taluka Name	Village name	Animal Death		total animal deaths	Assistance provided		Rejected Cases	Pending Cases	Disposed animal carcass
			small	big		Number of cases	Amount paid (in lakhs)			
૧	Choryasi									
Total	Total									

Damage reports due to heavy rain

૪	Cash Doles (Urban/Rural)					
ક્રમ	Taluka Name	Team	Number of people to whom cashdolls are payable	Number of people to whom CashDolls are paid	Amount paid (in lakhs)	Remarks
૧						
કુલ						

Damage reports due to heavy rain

૫	Household (urban/rural)						
ક્રમ	Taluka Name	Taluka	Team	Number of persons liable for household expenses	Number of people who are paid household expenses	Amount paid (in lakhs)	Remarks
૧			0	0	0	0	

૬	Slum Assistance (Urban/Rural)							
ક્રમ	Taluka Name	Total cases surveyed	Among the surveyed cases, the payable cases	cases which are paid	Amount paid (in lakhs)	Rejected Cases	Outstanding cases	Reasons for remaining
૧								

Damage reports due to heavy rain

૭	Housing Assistance (Urban/Rural)							
૭(a)	Completely destroyed mud house (urban/rural)							
ક્રમ	Taluka Name	Total cases surveyed	Among the surveyed cases, the payable cases	cases which are paid	Amount paid (in lakhs)	Rejected Cases	Outstanding cases	Reasons for remaining
૧								
કુલ								

૭(b)	Completely destroyed pucca house (urban/rural)							
ક્રમ	Taluka Name	Total cases surveyed	Among the surveyed cases, the payable cases	cases which are paid	Amount paid (in lakhs)	Rejected Cases	Outstanding cases	Reasons for remaining
૧								
કુલ								

Damage reports due to heavy rain

૭(c)	Partially destroyed mud house (urban/rural)							
ક્રમ	Taluka Name	Total cases surveyed	Among the surveyed cases, the payable cases	cases which are paid	Amount paid (in lakhs)	Rejected Cases	Outstanding cases	Reasons for remaining
૧								
કુલ								

૭(d)	Partially destroyed pucca house (urban/rural)							
ક્રમ	Taluka Name	Total cases surveyed	Among the surveyed cases, the payable cases	cases which are paid	Amount paid (in lakhs)	Rejected Cases	Outstanding cases	Reasons for remaining
૧								
total								-

Damage reports due to heavy rain

૮	Power supply (urban/rural)					
ક્રમ	Taluka Name	Total villages	Affected villages	Reestablished villages	Remaining villages	Number of teams employed
૧						
total						

૮(a)	Power supply (head works)					
ક્રમ	Taluka Name	Total Head works	Affected head works	Restored head works	Remaining head works	Remarks
૧						
total	total					-

Damage reports due to heavy rain

૯	Water supply (urban/rural)				
ક્રમ	Taluka Name	Number of Affected villages	Drinking water system		Remaining villages
			Number of tankers	pipe line	
૧					
total					

૧૦	Road Repairing (Urban/Rural)									
ક્રમ	Taluka Name	Affected roads/bridges			Restored roads			ongoing operations		
		Panchayat	State	NH	Panchayat	State	NH	Panchayat	State	NH
૧										
કુલ										

Damage reports due to heavy rain

૧૧	Cleaning operations (urban/rural)								
ક્રમ	Taluka Name	Number of villages affected	Teams	Number of cleaning tools			Number of workers	Powder Spray (Kg)	REMARKS
				JCB	Tractror	Dumper / chota hathi			
૧									
કુલ									

	Health related activities (urban/rural)						
ક્રમ	Taluka Name	P.H.C./UHC/C.H.C./SDHની સંખ્યા	અવેરત P.H.C./UHC/C.H.C./SDHની સંખ્યા	અવેરત ફરજો	શેરબાગો નોંધાયેલ હોય તેની વિગતો		રીમાર્કસ
					નોંધાયેલ કેસો	સારવારમા જ કેસો	
૧							
કુલ							-

૧૨	ભારે વરસાદને લગતે કરેલ નુકસાનીના પત્રકો Crop Loss / Soil Erosion Survey (Urban / Rural)					
ક્રમ	Taluka Name	number of Damaged	Crop loss crop name	Area(Hectare)	પ્રમેન ધોવાણ (હેક્ટર)	
૧						
કુલ						

૧૩	ભારે વરસાદને લગતે કરેલ નુકસાનીના પત્રકો Migration details (urban/rural)				
ક્રમ	Taluka Name	Number of villages	Number of Migrated people	પુરા પાડેલ ફુડ પેકેટની સંખ્યા	અન્ય સહાયની વિગત રીમાર્કસ
૧					
કુલ					

૧૪	Education				
ક્રમ	Taluka Name	Number of Primary school	Impacted schools	શિક્ષક કર્મચારી ઘરવખરીની સંખ્યા	Remarks
૧					

૧૫	ભારે વરસાદને લગતે કરેલ નુકસાનીના પત્રકો Civil supplies				
ક્રમ	Taluka Name	શેરના અનાજ અની કુલ કુકાનો	Number of FPS impacted	નુકશાન પામેલ પુરવઠાનો જથ્થો (Kg)	અવેરત FPSની સંખ્યા
૧					
કુલ					

૧૬	Communication				
ક્રમ	તાલુકાનું નામ	બારેરસ્તા ગામો	પુર્વવત થયેલ ગામોની સંખ્યા		
૧					
કુલ					

8.3 National and State-Level Digital Dashboards Relevant to Climate and Loss & Damage

Level	Dashboard	Lead Institution	About	Key Coverage / Use	Link
National Disaster Alert Portal	SACHET	National Disaster Management Authority (NDMA)	SACHET is a national disaster alert portal and mobile platform based on the Common Alerting Protocol (CAP) that disseminates real-time, geo-targeted warnings for natural and human-induced hazards through multi-channel notifications, including SMS, mobile applications, and browser alerts, in multiple languages to enhance public preparedness and response.	Real-time alerts and early warning for floods, cyclones, earthquakes, heatwaves, tsunamis and other emergencies; geo-targeted warnings; multi-lingual alerts across web, mobile and RSS feeds to support disaster preparedness	SACHET - National Disaster Alert Portal
National	Monsoon Mission Climate Forecasting System (MMCFS)	Ministry of Earth Sciences and operationalised by IMD	The Monsoon Mission Climate Forecasting System (MMCFS) is India's national coupled climate forecasting system designed to generate sub-seasonal and seasonal climate predictions, particularly for monsoon variability and associated extremes	These systems provide probabilistic forecasts of rainfall and temperature at various spatial and temporal scales, including all-India, regional, and sub-divisional levels[77]	Monsoon Mission
National to City level information	Energy Map of India	ISRO (with NITI Aayog)	Developed through a collaboration between NITI Aayog and the Indian Space Research Organisation (ISRO) under an MoU signed in 2017 to create a comprehensive GIS-based energy mapping platform.	Web-based geospatial visualisation of renewable and non-renewable power plants, oil & gas infrastructure, renewable energy potential, fossil fuel resources, and other energy assets across India.	Energy Map of India
National-level (scenario-based planning)	India Energy Security Scenario (IESS – 2047)	NITI Aayog	IESS is a user-friendly and Interactive Energy Modelling tool that takes into account the Green Policy Initiatives and explores Possible Decarbonization Pathways towards Net-Zero	Scenario modelling platform enabling exploration of alternative energy futures based on demand, supply mix, technology adoption, efficiency, energy security, and emissions pathways up to 2047.	India Energy Security Scenarios, 2047

77 Ministry of Earth Sciences, Government of India. (2024). National Framework for Climate Change Adaptation [PDF]. https://www.moes.gov.in/sites/default/files/PIB2198356.pdf

Level	Dashboard	Lead Institution	About	Key Coverage / Use	Link
National to State level information	India Climate & Energy Dashboard (ICED)	NITI Aayog	Developed by NITI Aayog to provide a unified, open-access platform for climate and energy data to support evidence-based policymaking and inter-state comparisons.	Integrated dashboard providing data on climate indicators, energy production and consumption, emissions, renewable energy potential, power sector performance, and climate vulnerabilities across national and state levels.	Gujarat State Profile: A Comprehensive Overview
State-level (Comparative analysis)	SCETTI (State Clean Electricity Transition Tracker - India)	Independent research consortium	It is a non-profit initiative backed by the Subak Foundation. It is dedicated to transitioning India away from coal-powered electricity. Their mission revolves around the SCETTI dashboard, a platform that combines State-level technical, financial, and policy data about the power sector in India.	It is an open data platform providing integrated, state-level data (technical, financial, policy) on India's electricity sector to help identify opportunities for transitioning from coal to clean energy	Scetti
National to City level	Open Government Data (OGD) Platform India	NIC, MeitY, Government of India	Developed and hosted by the National Informatics Centre to provide public access to government-owned datasets in compliance with India's open data policies.	Open-access datasets from multiple ministries, including energy, climate, infrastructure -related data, usable for analysis.	Open Government Data (OGD) Platform India
National to State level	Akshay Urja Portal	Ministry of New and Renewable Energy (MNRE), Government of India	MNRE is the nodal ministry for renewable energy development in India and maintains the Akshay Urja portal as its primary information interface.	Information on renewable energy schemes, installed capacity, project status, and sectoral progress across states.	RE Portal
National to State level (Real-time monitoring)	Vidyut PRAVAH	Ministry of Power, Government of India	Developed by the Ministry of Power to provide near real-time visibility of electricity demand, supply, and market conditions.	Real-time data on all-India and state-level electricity demand, power shortages, and market prices from power exchanges.	Vidyut PRAVAH | Ministry of Power, India
National to State level information	National Power Portal (NPP)	Ministry of Power, Government of India	A unified national system for data capture and dissemination across the Indian power sector, covering central, state, and private utilities.	Real-time and historical data on installed capacity, electricity generation, demand, supply, outages, and transmission performance.	National Power Portal

Level	Dashboard	Lead Institution	About	Key Coverage / Use	Link
India Water Resources Information System	India-WRIS	Ministry of Jal Shakti in collaboration with CWC, NRSC, and IMD	India-WRIS is a national web-based information system that integrates hydrological data with meteorological inputs from IMD and geospatial datasets to support monitoring, planning, and management of surface and groundwater resources	River basin and sub-basin information; river flows; reservoir storage; rainfall inputs; groundwater status; flood and drought monitoring; decision support for water resources planning and climate risk analysis.	India-WRIS
National to State Level	Forest Fire Alert System and Interactive Geo Portal	Forest Survey of India (FSI)	The Forest Fire Alert System and Interactive Geo Portal is a satellite-based monitoring platform that provides near–real-time detection and spatial visualisation of forest fire incidents across India using remote sensing data.	Near–real-time forest fire alerts; satellite-based fire location; historical fire occurrence analysis; and decision support for forest departments in preparedness, response, and post-fire situational assessment	FSI VAN AGNI 3.0
State (Gujarat) to district level	Gujarat Climate Action Tracker (GCAT)	Department of Climate Change (GoG) and GEDA	GCAT is one stop portal for all information pertaining to district level GHG emissions inventory, climate variability and decarbonisation plans for all the districts of Gujarat	Tracking and visualising climate action indicators; facilitating reporting and transparency; supporting planning and review of climate initiatives in Gujarat.	Gujarat Climate Action Tracker
State (Gujarat)	Hazard Risk and Vulnerability Atlas (HRVA)	GSDMA	GSDMA has prepared a comprehensive Hazard Risk and Vulnerability Atlas (HRVA) for the State covering six major hazards namely Earthquake, Tsunami, Flood, Cyclone, Drought and Chemical and Industrial hazards		Hazard Risk and Vulnerability Assessment (HRVA) | GSDMA Flood | GSDMA BMTPC

8.4 Urban flooding

7.3.1 Understanding Disaster Risk

Urban Flooding					Understanding Disaster Risk
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
1	Mapping/ Zoning, Estimation of Possible Inundation levels, monitoring networks	MHUA*, MOES, MOJS, DOS	**Recurring/ Regular (RR)** Technical support **Short Term (T1)** • Develop guidelines for assessment of potential and actual damages to be done separately • MOES (IMD) to prioritize the establishment in consultation with State Governments • Establish satellite-linked Automatic Rain Gauge Stations, Automatic Weather Stations for 24X7 weather monitoring **Medium Term (T2)** • Maximize real-time hydro-meteorological network to cover all urban centres • MOES (IMD) and MHUA to work out a strategic expansion of DWR network across the country to cover all urban centres **Long Term (T3)** Ward Level Information System to be developed using high resolution satellite images/ aerial photos integrated with socioeconomic data covering natural resources and infrastructure facilities on appropriate scale at community level	DMD$, SDMA, RD, SRSAC, DDMA, PRIs (peri-urban), ULBs	**Recurring/ Regular (RR)** • Develop land use planning based on multi-hazard disaster risk assessment • Place land-use planning maps in public domain • Undertake adequate studies, evaluations, and planning considering land use constraints to prevent flooding • Coordinate with the central agencies and implement recommendations • Undertake HRVCA as part of preparing and periodic revision of DM plans • Ward level assessment • Constitute/ strengthen the mechanisms for consultation with experts and stakeholders

Urban Flooding					Understanding Disaster Risk
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
2	Information Systems, Monitoring, Forecasting, Early Warning	MOES, MOJS	**Recurring/ Regular (RR)** Regular monitoring **Medium Term (T2)** Establishing technical umbrella for urban flood forecasting and warning		**Short Term (T1)** State Urban Flood Disaster Management Information System **Medium Term (T2)** Set up EOCs by the ULBs connected to the ARG network **Long Term (T3)** Develop capacities to make quantitative forecasts and simulate inundation levels under various scenarios
3	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	NDMA, NIDM, MSJE	**Recurring/ Regular (RR)** • Promote studies, documentation and research • Studies on vulnerabilities and capacities covering social, physical, economic, ecological, gender, social inclusion and equity aspects • Provide technical support and guidance for comprehensive HRVCA		
4	Disaster Data Collection and Management	MHA*, MOSPI, all ministries/ depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline	DMD$, SDMA, all depts.	**Recurring/ Regular (RR)** Systematic data management of data on disaster damage and loss assessments **Short Term (T1)** Disaster Damage and Losses 2005-2015 baseline

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.3.2 Inter-Agency Coordination

Urban Flooding					Inter-Agency Coordination
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
1	Overall disaster governance	MHUA	**Recurring/ Regular (RR)** Providing coordination, technical inputs, and support	DMD$, SDMA, RD, DDMA, ULBs, PRIs (peri-urban)	**Recurring/ Regular (RR)** • Preparation and implementation of DM plans and ensure the functioning of agencies with DM tasks • All aspects of disaster risk management and mainstreaming DRR
2	Response	MHUA	**Recurring/ Regular (RR)** Organising and coordinating central assistance	DMD$, SDMA, RD, DDMA, ULBs, PRIs (peri-urban)	**Recurring/ Regular (RR)** • Organising and coordinating the immediate response • Coordinate with central agencies
3	Warnings, Information, Data	MOES* (IMD), MOJS, MOES, NDMA, MEITY	**Recurring/ Regular (RR)** Effective coordination and seamless communication among central and state agencies to ensure quick, clear, effective dissemination of warnings, information and data	DMD$, SDMA, RD, DDMA, ULBs, PRIs (peri-urban)	**Recurring/ Regular (RR)** Coordinating the dissemination of warnings to all, down to the last mile – remote, rural or urban; Regular updates to people in areas at risk
4	Non-structural measures	MHUA, BIS, NDMA	**Recurring/ Regular (RR)** Coordination among central and state agencies for a) revised/ updated rules, norms b) adoption of new/updated standards, c) enact/amend laws, regulations and d) adopt/ review policies	DMD$, SDMA, RD, DDMA, ULBs, PRIs (peri-urban)	**Recurring/ Regular (RR)** Coordination among state agencies for ensuring updated norms/ codes and their implementation, enforcement and monitoring

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.3.3 Investing in DRR – Structural Measures

Urban Flooding					Structural Measures
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
1	Civil Works	MHUA*, MCVA, NBCC, BMTPC, CBRI, SERC, IE(I), CRRI	• City Bridge Design Considerations • City Road Level Design • Technical Support	DMD$, UDD, ULBs, PRIs (peri-urban)	**Short Term (T1)** All road re-levelling works or strengthening/ overlay works to be carried out by milling the existing layers of the road so that the road levels will not be allowed to increase **Medium Term (T2)** • Upgrade the existing drainage and storm water systems • Managing drainage systems • Protection of Water Bodies • Ensure protection of Water Bodies and its restoration/ revival **Long Term (T3)** • Bus and Metro Terminals, Railway stations and Airports to be made flood-proof by providing efficient drainage for a much higher rainfall intensity • All future road and rail bridges in cities crossing drains to be designed such that they do not block the flows resulting in backwater effect • Remove encroachments and take strict action against the encroachers as per the byelaws/ regulations
2	Establishment/ strengthening of Emergency Operation Centres	Relevant Central Ministries, MHA	**Recurring/ Regular (RR)** Ensure round the clock operations of EOCs during the Flood season with adequate manpower/ resources	DMD$, SDMA, ULBs, PRIs (peri-urban)	**Recurring/ Regular (RR)** Ensure round the clock operations of EOCs during the flood season with adequate human resources to respond to urban flood
3	Hazard resistant construction,	NDMA, NBCC, BMTPC, CBRI, SERC, IE(I)	Guidance and implementation	SDMA, DDMA, ULBs, PRIs (peri-urban)	**Medium Term (T2)** Collaboration with technical agencies and implementation

Urban Flooding					Structural Measures
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
	strengthening, and retrofitting of all lifeline structures and critical infrastructure				

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.3.4 Investing in DRR – Non-Structural Measures

Urban Flooding					Non-Structural Measures
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
1	Preparation of comprehensive Urban Storm Drainage Design Manual (USDDM)	MHUA	**Medium Term (T2)** MHUA will consider current international practices, specific locations and rainfall pattern of the cities and future needs for preparing USDDM	DMD$, SDMA, DDMA, UDD	**Recurring/ Regular (RR)** Take initiatives and collaborate with central agencies
2	Preparation of Storm Water Drainage System Inventory	MHUA	**Long Term (T3)** MHUA, in consultation with States/UTs and ULBs promote storm water drainage information system based on best technologies available integrating spatial and non-spatial data	DMD$, SDMA, ULBs, PRIs (peri-urban)	**Long Term (T3)** Coordinate with MHUA in preparing the inventory through ULBs
3	Operation and Maintenance of Drainage Systems	MHUA	**Recurring/ Regular (RR)** Provide guidelines, and carry out monitoring	DMD$, SDMA, ULBs, PRIs (peri-urban)	**Recurring/ Regular (RR)** Adequate budget to be provided to take care of the men, material, equipment and

Urban Flooding					Non-Structural Measures
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
					machinery for O&M of drainage systems on a periodic basis
4	Environmental Impact Assessment	MOEFCC*, MHUA	**Short Term (T1)** Issue guidelines to State/UT for making storm water drainage concerns a part of all EIA norms	DMD$, SDMA, ULBs, EFD, PRIs (peri-urban)	**Short Term (T1)** Ensure strict compliance with the guidelines and land-use planning consistent with sound storm water management **Medium Term (T2)** Minimise loss of ecologically important areas and natural wetlands
5	• Techno-Legal Regime • Land use planning • City/Town Planning	MHUA, MFIN	**Recurring/ Regular (RR)** • Coordinate the efforts of the States for compliance with Techno-Legal Regime by all the ULBs in their respective States • Technical guidance to strengthen land-use planning	DMD$, SDMA, ULBs, PRIs (peri-urban)	**Short Term (T1)** • Ensure strict compliance of Techno-Legal Regime especially of land use through ULBs • Strengthen land-use planning **Medium Term (T2)** • Incorporate water sensitive urban design considerations into land use planning • Incorporate the topography and specific terrain elements such as hilly, coastal, etc. in the land use plan to minimise flooding allowing free flow of storm water along natural contours
6	Constitution of Urban Flooding Cell for Integrated UFDM	MHUA	**Recurring/ Regular (RR)** Lead role in the establishment of the technical umbrella at the national level	DMD$, SDMA, UDD	**Short Term (T1)** Nodal Department to constitute Urban Flooding Cell at State level and a DM Cell to be constituted at the ULB level for managing urban flooding at local level
7	Public Private Partnerships	NDMA, MHUA, MCA*, MCF,	**Long Term (T3)** Guidance and model regulations	UDD, SDMA, DDMA	**Long Term (T3)** Promote private participation in disaster management facilities

Urban Flooding					Non-Structural Measures
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
		MOCI, MPFI, MHIPE, MFIN			
8	Risk Transfer	MFIN*, NDMA, MHA, MAFW	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** Policy Framework	DFIN*, DMD$, SDMA, DAG	**Recurring/ Regular (RR)** Implementation of Risk Transfer Arrangements including multi-hazard insurance for life and property **Short Term (T1)** Policy Framework

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.3.5 Capacity Development

Urban Flooding					Capacity Development
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
1	Education and Training	MHUA*, MHRD, MHFW, NDRF, NIDM, CBSE, MYAS	**Medium Term (T2)** Introduce UFDM modules in school curricula through CBSE Support to training of SDRF, CDEF, community, and volunteers	ULB, PRIs (peri-urban), SDRF	**Recurring/ Regular (RR)** Trainings for urban flood rescue and management for CDEF, community, volunteers and others **Short Term (T1)** • Upgrade equipment and skills of F&ES for UFDM • Enlist professionals for veterinary care and support to disaster-affected animals **Medium Term (T2)** State Governments will encourage their school boards to develop similar content in their school curriculum

Urban Flooding					Capacity Development
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
2	Awareness Generation	MHUA*, NDMA, NDRF, CAPF, NIDM	**Recurring/ Regular (RR)** • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management **Medium Term (T2)** • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM	DMD$, SDMA, RD, DDMA, SDRF, F&ES, CDEF, Police, ULB, PRIs (peri-urban)	**Recurring/ Regular (RR)** • Carry out mass media campaigns • Promote culture of disaster risk prevention, mitigation, and better risk management **Medium Term (T2)** • Promote attitude and behaviour change in the awareness campaigns/ IEC • Promote use of insurance/ risk transfer • Promote Community Radio • Strengthening network of civil society organizations for awareness generation about DRR and DM • Information on care and protection of disaster-affected animals
3	Documentation	NIDM	**Recurring/ Regular (RR)** Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and Risk Management planning	DMD$, SDMA, RD, DDMA, ULB, State ATI	**Recurring/ Regular (RR)** Ensure accurate documentation of all aspects of disaster events for creating good historical records for future research and Risk Management planning
4	Empowering women, marginalised, and persons with disabilities	MWCD*, MSJE, NDMA, NIDM	**Short Term (T1)** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management	DMD$, SDMA, DDMA, RD, SIDM, ATI, and other state-level institutions	**Short Term (T1)** Incorporating gender sensitive and equitable approaches in capacity development covering all aspects of disaster management at the state, district, and local levels
5	Community-Based Disaster Management	MHUA*, MORD*, NDMA, NIDM		DMD$, SDMA, SDRF, RD, DDMA, ULB, SIDM	**Recurring/ Regular (RR)** Promotion, guidance, support, training for CDEF, community, volunteers

Urban Flooding					Capacity Development
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
			Recurring/ Regular (RR) Promotion, Guidance, and Support, Training for CDEF, Community, Volunteers		**Short Term (T1)** Strengthen ability of communities to manage and cope with disasters based on a multi-hazard approach **Medium Term (T2)** Training for RWA, SHG, NCC, NSS, Youth, Ward Committees, local community organizations
6	Mock Drills/ Exercises	MHUA, NDMA, All Govt. Ministries/ Agencies, NDRF, Armed Forces, CAPF	**Recurring/ Regular (RR)** Promoting the planning and execution of emergency drills by all ministries and in all States/UTs	DMD$, SDMA, RD, DDMA, ULB, SDRF, F&ES, CDEF, Police	**Recurring/ Regular (RR)** Joint planning and execution of emergency drills

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

7.3.6 Climate Change Risk Management

Urban Flooding					Climate Change Risk Management
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
1	Research, Forecasting / Early Warning, Data Management, Zoning, Mapping	MOES, MOJS*, MAFW, MOEFCC, DOS, NLRTI	**Recurring/ Regular (RR)** Assessment, Monitoring, and Scientific studies **Short Term (T1)** • Flood vulnerability maps under GACC scenarios	DMD$, IRD, WSD*, EFD, SDMA, AGD, FIHD, DDMA, ULBs, PRIs (peri-urban)	**Recurring/ Regular (RR)** • Support national risk reduction efforts related to GACC • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts

Urban Flooding					Climate Change Risk Management
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
			• Assessing GACC effects on catchments and river basins including trends over past decades • Assess enhanced economic and social risks under GACC scenarios **Medium Term (T2)** • Study GACC-related changes in the rivers flowing from trans-boundary rivers • Develop Database management system relating to climate change impact on floods • Prepare GACC scenario maps for all river systems • Enhanced risks from GACC and on adaptations to change **Long Term (T3)** • Improve the flood forecasting capabilities consistent with the anticipated GACC impacts on flood-prone areas • Coordinate with all neighbouring countries to understand and monitor GACC impacts on major rivers associated with or flowing from neighbouring countries		for GACC mitigation and adaptation **Medium Term (T2)** Document state-specific GACC impacts and coping mechanisms **Long Term (T3)** • Promote state-specific studies on enhanced risks (economic, social, etc.) under different GACC impact scenarios • Promote research studies with State specific contexts on GACC and consequent changes in hazards
2	Hazard Risk Vulnerability and Capacity Assessment (HRVCA)	NIDM, MOJS*, MOST, MOST, CSIR, DOS, NLRTI	**Medium Term (T2)** • Improve the understanding of the enhanced vulnerabilities of communities	DMD$, SDMA, RD, IRD, WRD, SLRTI	**Recurring/ Regular (RR)** • Undertake HRVCA as part of preparing and periodic revision of DM plans

Urban Flooding					Climate Change Risk Management
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
			in flood-prone areas to extreme hydro-climatic events • Provide technical support and guidance for comprehensive HRVCA considering GACC impacts • Assess GACC risks of vulnerable and marginalised sections **Long Term (T3)** Undertake detailed studies on vulnerability and risk under GACC scenarios along the coast		• Develop strategies for structural and non-structural measures based on HRVCA **Medium Term (T2)** Assess GACC risks of vulnerable and marginalised sections
3	Climate Change Adaptation (CCA)	MOES*, MOST, DOS, MOJS, MOEFCC*	**Medium Term (T2)** • Understanding adaptation needs • Study coping mechanisms • Develop GACC adaptation mechanisms **Long Term (T3)** • Implement GACC adaptation programs • Promote appropriate combinations of Green and Blue infrastructure approach • Promote adaptive measures in social protection programmes for the vulnerable groups	DMD$, SDMA, IRD, WSD*, EFD, DRD, DDMA, ULBs, PRIs (peri-urban)	**Recurring/ Regular (RR)** • Sensitisation and awareness creation • Support national CCA efforts • Coordination with central agencies • Sponsor and promote state-specific efforts and local efforts for GACC mitigation and adaptation **Medium Term (T2)** Develop local adaptation strategies and pilot projects **Long Term (T3)** • Sponsor and promote state-specific efforts and local efforts • Implementation of GACC adaptation programs

Urban Flooding					Climate Change Risk Management
	Sub-Thematic Area for DRR	Central/ State Agencies and their Responsibilities			
		Centre#	Responsibility – Centre	State#	Responsibility – State
					• Promote appropriate combinations of Green and Blue infrastructure approach • Integrate adaptive measures in social protection programmes for the vulnerable groups

Notes: (#) Every ministry, department or agency of the government – central and state – not specifically mentioned will also have both direct and indirect supporting role depending on the disaster, location and context. (*) The ministry, department or agency with this symbol has or is deemed to have a nodal or lead role, while others mentioned have a direct or explicit supporting role. ($) DMD—Disaster Management Department: The state government department acting as the nodal department for disaster management, which is not the same in every state/UT.

8.5 Heat Related Illnesses Surveillance Formats (NCDC)

Annexure 3

Heat Related Illnesses Surveillance Formats (NCDC)

FORMAT 1 (B): HEALTH FACILITY FORMAT

Daily line List of **Suspected Heat Stroke DEATHS[#] and Confirmed CVD DEATHS[*]**

(From Medicine, Paediatrics and Casualty/Emergency department)

(To be kept at health facility for record)

Name of health facility:_____ **Date of reporting:** _./_./_./_._

Block:_____ **city:**_____

Type of health facility (Circle the applicable)**:1.** PHC **2.** CHC **3.** Taluka/Rural Hospital/Block Hospital **4.** Sub-district **5.** District Hospital/Civil Hospital **6.** Medical College & Hospital **7.** Private hospitals with emergency facility **8.**Other……

(A). Total no. of all cause deaths in health facility (Casualty/emergency of Medicine and Paediatrics):

Daily line List of **Suspected Heat Stroke DEATHS and Confirmed CVD DEATHS**

S.No	Registration number	Name	Age	Sex (M/F)	Address		Deaths (tick the box)	
					Block	District	Suspected Heat stroke death[##]	Confirmed CVD death

Total

Name of person filling the form:
Name of Facility In-Charge: Designation:
Signature of Facility In-Charge: Signature:

[#]**Suspected Heat stroke:** Altered mental status (including disorientation, delirium, seizure, obtundation) **with elevated core body temperature ≥ 40 ºC/≥104 ºF,** without signs of stroke, history of infection, or signs of medication overdose **OR** Altered mental status (including disorientation, delirium, seizure, obtundation) with hot and dry skin and deranged vitals i.e., tachycardia, tachypnoea and wide pulse pressure without signs of stroke, history of infection, or signs of medication overdose. *(definition is applicable during heat wave season i.e., March to July)*

[##]**Suspected Heat Stroke Death**: Is a death on account of suspected heat stroke patient.

FORMAT 2: Health facility format for sending to CITIES

Daily numbers of Suspected Heat Stroke CASES[#] and All cause DEATHS[*]

(Compilation of Format 1, A & B)

(To be sent to District Nodal Unit daily)

Name of health facility:

Block: _____ **City:** _____ **Date of reporting:** _./_./_./_._

Type of health facility (Circle the applicable)**:** 1. PHC 2. CHC 3. Taluka/Rural Hospital/Block Hospital 4. Sub-district 5. District Hospital/Civil Hospital 6. Medical College & Hospital 7. Private hospitals with emergency facility 8. Other…….

Department (Circle the applicable)**: 1. Emergency Medicine 2. Emergency Paediatrics 3. Casualty**

Date	Total patients in the department	New Suspected Heat Stroke Cases (A)	Total Suspected Heat Stroke cases since 1st March 2323 (B)	All cause deaths[**]			
				Suspected Heat stroke deaths[##] (a)	Confirmed CVD deaths (b)	Others including unknown (c)	Total deaths (a+b+c)
01-03-23							
02-03-23							

Form filled by (Name):
Designation:
Signature:

Name of Facility In-Charge:
Signature of Facility In-Charge:
Date:

[**]**All cause death:** All of the deaths that occur in casualty/emergency of medicine plus paediatrics, regardless of cause.

[#]**Suspected Heat stroke:** Altered mental status (including disorientation, delirium, seizure, obtundation) **with elevated core body temperature ≥ 40 ºC/≥104 ºF,** without signs of stroke, history of infection, or signs of medication overdose **OR** Altered mental status (including disorientation, delirium, seizure, obtundation) with hot and dry skin and deranged vitals i.e., tachycardia, tachypnoea and wide pulse pressure without signs of stroke, history of infection, or signs of medication overdose. *(definition is applicable during heat wave season i.e., March to July)*

[##]**Suspected Heat Stroke Death**: Is a death on account of suspected heat stroke patient.

[*]**Cardiovascular death** includes death resulting from an acute myocardial infarction (MI) or sudden cardiac arrest or heart failure (HF) or cardiovascular (CV) procedures or CV hemorrhage or death due to other CV causes.

FORMAT 3 (A): FORMAT FOR DAILY COMPILATION

Daily numbers of Suspected Heat stroke CASES[#] and All cause DEATHS[*]

(Compiled from Format 2)
(To be kept at City level for record)

Cases and deaths due to heat related illness (HRI)- *City Name*……..Date of reporting: _._/_._/_._

S.No.	*Name & type of Health Facility*	Total patients of the day (Emergency Medicine + Emergency Paediatrics + Casualty)	**New Suspected Heat Stroke cases (A)**	**Total Suspected Heat Stroke cases since 1st March, 2323 (B)**	**All cause deaths[**]**				**Remarks**
					Suspected Heat stroke deaths[##] (a)	**Confirmed CVD deaths (b)**	**Others including unknown (c)**	**Total deaths (a+b+c)**	
	PHC1								
	PHC2								
	CHC								
	CH/DH								
	PVT1								
	PVT2								
Total for city 1									

Total number of New Confirmed Heat Stroke Deaths[***] in the City on _._/_._/_._: Total number of Confirmed Heat Stroke Deaths in the City since 1st March 23:
[confirmed by committee (heat death committee/three person committee)]

Name of person filling the form:
Designation:
Signature:

Name of nodal officer:
Signature of nodal officer:
Date:

[**]**All cause death:** All of the deaths that occur in casualty/emergency of medicine plus paediatrics, regardless of cause.
[#]**Suspected Heat stroke:** Altered mental status (including disorientation, delirium, seizure, obtundation) **with elevated core body temperature ≥ 40 ºC/≥104 ºF,** without signs of stroke, history of infection, or signs of medication overdose **OR** Altered mental status (including disorientation, delirium, seizure, obtundation) with hot and dry skin and deranged vitals i.e., tachycardia, tachypnoea and wide pulse pressure without signs of stroke, history of infection, or signs of medication overdose. *(definition is applicable during heat wave season i.e., March to July)*
[##]**Suspected Heat Stroke Death**: Is a death on account of suspected heat stroke patient.
[*]**Cardiovascular death** includes death resulting from an acute myocardial infarction (MI) or sudden cardiac arrest or heart failure (HF) or cardiovascular (CV) procedures or CV hemorrhage or death due to other CV causes.
[***]**Confirmed Heat Stroke Death**: A suspected heat stroke death that is confirmed by death committee (heat death committee/three man committee) at city level.

FORMAT 3 (B): FORMAT FOR SENDING TO STATE

Daily numbers of Suspected Heat Stroke CASES[#] and All cause DEATHS[*]

(Compiled from Format 3 A)
(To be sent to State Nodal Unit daily while keeping a copy for record)

Cases and deaths due to heat stroke- *city name* …._ _ **Date of reporting: _._/_._/_._**

Date	Total patients of the day	**New Suspected Heat Stroke**	**Total Suspected Heat Stroke cases since**	**All cause deaths[**]**				**New Confirmed Heat Stroke**	**Total Confirmed Heat Deaths since st**
	(Emergency Medicine + Emergency Paediatrics + Casualty)	**Cases (A)**	**1st March, 23_ _ (B)**	**Suspected Heat stroke deaths[##] (a)**	**Confirmed CVD deaths (b)**	**Others including unknown (c)**	**Total deaths (a+b+c)**	**Deaths[***]**	**1 March 23_ _**
01-05-23…									
02-05-23…									

Name of person filling the form:
Designation:
Signature:

Name of nodal officer:
Signature of nodal officer:
Date:

[**]**All cause death:** All of the deaths that occur in casualty/emergency of medicine plus paediatrics, regardless of cause.
[#]**Suspected Heat stroke:** Altered mental status (including disorientation, delirium, seizure, obtundation) **with elevated core body temperature ≥ 40 ºC/≥104 ºF,** without signs of stroke, history of infection, or signs of medication overdose **OR** Altered mental status (including disorientation, delirium, seizure, obtundation) with hot and dry skin and deranged vitals i.e., tachycardia, tachypnoea and wide pulse pressure without signs of stroke, history of infection, or signs of medication overdose. *(definition is applicable during heat wave season i.e., March to July)*
[##]**Suspected Heat Stroke Death**: Is a death on account of suspected heat stroke patient.
[*]**Cardiovascular death** includes death resulting from an acute myocardial infarction (MI) or sudden cardiac arrest or heart failure (HF) or cardiovascular (CV) procedures or CV hemorrhage or death due to other CV causes.
[***]**Confirmed Heat Stroke Death**: A suspected heat stroke death that is confirmed by death committee (heat death committee/three man committee) at city level.

8.6 List of Items and Norms of Assistance from State Disaster Response Fund (SDRF) and National Disaster Response Fund (NDRF)

REVISED LIST OF ITEMS AND NORMS OF ASSISTANCE FROM STATE DISASTER RESPONSE FUND (SDRF) AND NATIONAL DISASTER RESPONSE FUND (NDRF)

(Period 2022-23 to 2025-26, MHA Letter No. 33-03/2020-NDM-I Dated 10.10.2022)

S.No.	Items	Norms of Assistance
A	**Response & Relief [40% of State Disaster Risk Management Fund (SDRMF) i.e. equal to 50% of SDRF allocation for the year]**	
1	**Gratuitous Relief**	
	a) Ex-Gratia payment to families of deceased persons.	Rs. 4.00 lakh per deceased person, including those involved in the relief operations or associated in preparedness activities, subject to the certification regarding cause of death from the appropriate authority.
	b) Ex-Gratia payment for loss of a limb or eye(s).	Rs. 74,000/- per person, when the disability is between 40% and 60%. Rs. 2.50 lakh per person, when the disability is more than 60%. Subject to certification by a doctor from a hospital or dispensary of Government, regarding the extent and cause of disability.
	c) Grievous injury requiring hospitalization	Rs. 16,000/- per person requiring hospitalization for more than a week. Rs. 5400/- per person requiring hospitalization for less than a week. **Note**: Injured persons getting treatment under the 'Ayushman Bharat' Yojna, will not be eligible for relief under this item.
	d) Clothing and utensils/ house-hold goods for families, whose houses have been washed away/ fully damaged/severely inundated for more than two days due to a natural calamity.	Rs. 2,500/- per family, for the loss of clothing. Rs.2,500/- per family, for loss of utensils/ household goods.
	e) Gratuitous relief for families whose livelihood is seriously affected.	Gratuitous Relief (GR) for families, whose livelihood is seriously affected will be provided to two adults members of the affected family as per actual rate of MNREGA per day or average rate of all States/UTs per day, whichever is lower. For this purpose, notification issued by Ministry of Rural Development from time to time, is to be referred for calculating average rate. The relief amount should be disbursed

		through DBT/cash(In case of exigency of the situation only) or the State Government may provide this relief in kind. State Govt. will certify that identified beneficiaries are not housed in relief camps, during the period GR is provided. Further, the State Government will provide the basis and process for arriving at such beneficiaries, district-wise. Period for providing gratuitous relief will be as per the assessment of the State Executive Committee (SEC) and the Central Team (in case of NDRF). The default period of assistance will be upto 30 days, which may be extended upto 60 days in the first instance, if required, and subsequently upto 90 days in case of drought/ pest attack. Depending on the ground situation, the SEC can extend the time period beyond the prescribed limit. Provided that expenditure on this account, in no case, should exceed 25% of SDRF allocation under this window (Response & Relief) for the year. Further, to ensure transparency, the list of persons to whom Gratuitous Relief is provided, should be uploaded on the website of the State Government. The State Government shall notify the basis and proof for the identification of beneficiaries in a transparent manner.
2.	**Search & Rescue Operations**	
	(a) Cost of search and rescue measures/ evacuation of people affected/ likely to be affected.	As per the actual cost incurred, assessed by SEC and recommended by the Central Team (in case of NDRF). By the time the Central Team visits the affected area, these activities may be already over. Therefore, the SEC and the Central Team can recommend actual/ near-actual costs.
	(b) Hiring of boats and other essential equipments for carrying immediate relief and saving lives.	As per the actual cost incurred, assessed by SEC and recommended by the Central Team (in case of NDRF). The quantum of assistance will be limited to the actual expenditure incurred on hiring boats and other essential equipment required for rescuing stranded people and thereby saving human lives during a notified natural calamity.
3	**Relief Measures**	
	(a) Provision for temporary accommodation, food, clothing, medical care, Gen-set etc. for	As per actual cost incurred, and assessed by SEC and recommended by the Central Team (in case of NDRF), for a period upto 30 days. The

	people affected/ evacuated and sheltered in relief camps.	SEC would need to specify the number of camps, their duration and the number of persons in camps. In case of continuation of a calamity like drought, or widespread devastation caused by earthquake or flood etc., this period may be extended to 60 days. Depending on the ground situation, the SEC can extend the time period beyond the prescribed limit. Provided that expenditure on this account, in no case, should exceed 25% of SDRF allocation under this window (Response & Relief) for the year. Medical care to be provided from National Health Mission (NHM).
	(b) Air dropping of essential supplies and rescue by Air Force	As per actual cost incurred, assessed by SEC and recommended by the Central Team (in case of NDRF). The quantum of assistance will be limited to actual amount raised in the bills by the Ministry of Defence for airdropping of essential supplies and rescue operations only.
	(c) Provision of emergency supply of drinking water.	As per actual cost, based on the assessment of need by SEC and recommended by the Central Team (in case of NDRF), up to 30 days, which may be extended upto 90 days in case of drought. Depending on the ground situation, the SEC can extend the time period beyond the prescribed limit. Provided that expenditure on this account, in no case, should exceed 25% of SDRF allocation under this window (Response & Relief) for the year.
4.	**Clearance Of Affected Areas**	
	a) Clearance of debris in public areas.	As per actual cost, for a period upto 30 days from the date of start of the work, based on assessment of need by SEC for the assistance to be provided under SDRF and as per the assessment of the Central team for assistance to be provided under NDRF.
	b) Draining off flood water in affected areas[i]	As per the actual cost within 30 days from the date of start of the work based on assessment of need by SEC for the assistance to be provided under SDRF and as per assessment of the Central team(in case of NDRF).
	c) Disposal of dead bodies/ Carcasses[i]	As per the actual cost, based on assessment of need by SEC and recommendation of the Central Team (in case of NDRF).
5	**Agriculture**	
(i)	**Assistance to small & marginal farmers having landholding upto 2 ha**	

(A)	**Assistance for land and other loss**	
	a) De-silting of agricultural land (where thickness of sand/ silt deposit is more than 3", to be certified by the competent authority of the State Government.)	Rs 18,000/- per hectare for each item. Above is subject to a minimum assistance of not less than Rs. 2,200/- per farmer. (Subject to the condition that no other assistance/ subsidy has been availed of by/ is eligible to the beneficiary under any other Government Scheme)
	b) Removal of debris on agricultural land in hilly areas	
	c) De-silting/ Restoration/ Repair of fish farms	
	d) Loss of substantial portion of land caused by landslide, avalanche, change of course of rivers.	Rs 47,000/- per hectare to only those small and marginal farmers whose ownership of the land is legitimate as per the revenue records. Above is subject to a minimum assistance of not less than Rs. 5,000/- per farmer
(B)	**Input subsidy (where crop loss is 33% and above)**	
	a) For agriculture crops, horticulture crops and annual plantation crops	Rs. 8,500/- per ha. in rainfed areas. Above is subject to a minimum assistance of not less than Rs.1,000/- per farmer and restricted to sown areas. Rs. 17,000/- per ha. in assured irrigated areas. Above is subject to a minimum assistance of not less than Rs.2,000/- per farmer and restricted to sown areas.
	b) Perennial crops/Agro forestry (Plantation in own farmland)	Rs. 22,500/- ha. for all types of perennial crops/ Agro forestry (Plantation in own farmland), subject to a minimum assistance of not less than Rs. 2,500/- per farmer and restricted to sown areas.
	c) Sericulture	Rs. 6,000/- per ha. for Eri, Mulberry, Tussar Rs. 7,500/- per ha. for Muga. Above is subject to a minimum assistance of not less than Rs.1000/- per farmer and restricted to sown areas.
(ii)	**Input subsidy to farmers having more than 2 Ha of landholding**	Rs. 8,500/- per hectare in rainfed areas and restricted to sown areas. Rs. 17,000/- per hectare for areas under assured irrigation and restricted to sown areas. Rs. 22,500/- per hectare for all types of perennial crops/ trees including agro forestry (Plantation in own farmland) and restricted to sown areas.

		Assistance may be provided where crop loss is 33% and above, subject to a ceiling of 2 ha. per farmer.
	Note: Assistance for input subsidy under item No. 5(i)(B) and 5(ii) will be adjusted to the extent of insurance claim received under the Prime Minister Fasal Bima Yojna (PMFBY), for the instant calamity.	
6.	**Animal Husbandry - Assistance To Small And Marginal Farmers And Landless Livestock Owners**	
	i) Assistance for the loss of milch animals, draught animals or animals used for haulage.	Milch Animals- Rs. 37,500/- Buffalo/ cow/camel/ yak/ Mithun etc. Rs. 4,000/- Sheep/ Goat/ Pig Draught animals - Rs. 32,000/- Camel/ horse/ bullock etc. Rs. 20,000/- Calf/Donkey/ Pony/ Mule/ Heifers The assistance may be restricted for the actual loss of economically productive animals due to notified natural calamity and will be subject to a ceiling of 3 large milch animals and /or 30 small milch animals or 3 large draught animals and/or 6 small draught animals per household irrespective of whether a household has lost a larger number of animals. (Claim for loss of animals will be considered only if number and type of animals owned by Small and Marginal Farmers/Landless Livestock Owners are registered with local/designated authorities.) Poultry:- Poultry @ 100/- per bird subject to a ceiling of an assistance of Rs 10,000/- per beneficiary household. The death of the poultry birds should be on account of a natural calamity. **Note: -** Relief under these norms is not eligible if the assistance is available from any other Government Scheme, e.g. loss of birds due to Avian Influenza or any other diseases for which the Department of Animal Husbandry has a separate scheme for compensating the poultry owners.
	ii) Provision of fodder / feed concentrate including water supply and medicines in cattle camps.	Large animal - Rs. 80/- per day. Small animal - Rs. 45/- per day.

	Explanation: It will also include existing Gaushalas, if authorized by the State Government by Notification or Government Order, to act as a cattle camp subject to the following conditions:- (i) During the period of calamity, District Administration will assess the requirement of cattle shelter and number of gaushala required to be notified as cattle shelter in the District/Tehsil. After obtaining the base-line information on the cattle already sheltered and the number of more cattle it can accommodate, Gaushala may be notified as cattle shelter. (ii) The notified gaushala shall maintain a separate account of the additional cattle belonging to SMF and landless labourers for the notified drought period. The consolidated list of SMF and landless beneficiaries with number and types of animals will be displayed on the notice board of Gram Panchayat, Block, Tehsil and in the office of Sub-Divisional Magistrate and District Magistrate as well as State/ District web-site for the purpose of verification and social audit. (iii) SDRF funds will only be released to such notified gaushala on reimbursement basis and will be limited to list of individual beneficiaries notified as in Sl.No. (ii) above.	Period for providing relief will be as per the assessment of the SEC and the Central Team (in case of NDRF). The default period for assistance will be for the period of calamity upto 30 days, which may be extended upto 60 days in the first instance and in case of severe drought up to 90 days. Depending on the ground situation, the SEC can extend the time period beyond the prescribed limit. Provided that expenditure on this account, in no case, should exceed 25% of SDRF allocation under this window (Response & Relief) for the year. Based on assessment of need by SEC and recommendation of the Central Team, (in case of NDRF) consistent with estimates of cattle as per Livestock Census and subject to the certificate by the competent authority about the requirement of medicine and vaccine being calamity related.
	iii) Transport of fodder to cattle outside cattle camp	As per actual cost of transport during notified calamity, based on assessment of need by SEC and the recommendation of the Central Team (in case of NDRF), consistent with estimates of cattle as per Livestock Census.
7	**Fishery**	
	i) Assistance to Fisherman for repair / replacement of non-mechanized boats and damaged/ lost nets. (This assistance will not be provided if the beneficiary is eligible or has availed of any subsidy/	Rs. 6,000/- for repair of partially damaged boats only Rs. 3,000/- for repair of partially damaged net Rs.15,000/- for replacement of fully damaged boats

	assistance, for the instant calamity, under any other Government Scheme.)	Rs. 4,000/- for replacement of fully damaged net (Assistance under this item will be adjusted to the extent of insurance claim, if any, received by the fisherman, under any insurance scheme, for the instant calamity).
	ii) Input subsidy for fish seed farm to Small and Marginal Farmers	Rs. 10,000/- per hectare. This assistance will not be provided if the beneficiary is eligible or has availed of any subsidy/ assistance, for the instant calamity, under any other Government Scheme, except the one time subsidy provided under the Scheme of Ministry of Fisheries, Animal Husbandry & Dairying.
8	**Handicrafts/Handloom – Assistance To Artisans**	
	i) For replacement of damaged main functional tools/ equipments	Rs. 5,000/- per artisan for equipments. Subject to certification by the competent authority designated by the Government about damage and its replacement.
	ii) For loss of raw material/ goods in process/ finished goods	Rs. 5,000/- per artisan for raw material. Subject to certification by Competent Authority designated by the State Government about loss and its replacement.
9	**Locust Control**	
	Hiring of vehicles, tractors, with spray equipments for spraying of plant protection chemicals for pest control, hiring of water tankers and purchase of plant protection chemicals for locust control.	As per the actual cost, based on the assessment of need by the SEC and recommended by the Central Team (in case of NDRF). The quantum of assistance will be limited to the actual expenditure incurred on hiring vehicles, tractors with spray equipments for spraying of plant protection chemicals for locust control during locust attack. However, expenditure on this account, in no case, should exceed 25% of SDRF allocation under this window (Response & Relief) for the year.
B.	**Recovery & Reconstruction: (30% Of SDRMF i.e. equal to 37.50% of SDRF allocation for the year)**	
10	**Housing**	
	a) **Fully damaged/ destroyed houses and severely damaged houses**	

	i) Pucca house ii) Kutcha House	Rs. 1,20,000/- per house, in plain areas., Rs. 1,30,000/- per house, in hilly areas.
	b) **Partially Damaged Houses (Other than huts) where the damage is at least 15%** i) Pucca house ii) Kutcha House	 Rs. 65,00/- per house Rs. 4,000/- per house,
	c) **Damaged/ destroyed huts:**	Rs. 8,000/- per hut, (Hut means temporary, make shift unit, inferior to Kutcha house, made of thatch, mud, plastic sheets etc. traditionally recognized as hut by the State/ District authorities.) Note: The damaged house/hut should be an authorized construction, duly certified by the Competent Authority of the State Government.
	e) Cattle shed attached with house	Rs. 3,000/- per shed,
11	**Infrastructure** [Repair/restoration(of immediate nature) of damaged infrastructure]	
	(1) Roads & bridges, which may include the following activities: i) Filling up of breaches and potholes, use of pipe for creating waterways, repair and stone pitching of embankments. ii) Repair of breached culverts. iii) Providing diversions to damaged/washed out portions of bridges to restore immediate connectivity. iv) Temporary repair of approaches to bridges/embankments of bridges, repair of damaged railing bridges, repair of causeways to restore immediate connectivity, granular sub base, over damaged stretch of roads to restore traffic.	Assessment of requirements: Based on the assessment of need, as per States' notified schedule of rates for repairs, by SEC and recommendation of the Central Team (in case of NDRF). In case of repair of roads, assistance will be given based on the notified Ordinary Repair (OR) and Periodical Renewal (PR) of the State. In case OR & PR is not available, then assistance will be provided as per rate prescribed in this item. However, in any case, the assistance will be provided at the rate whichever is lower. Prescribed rate are as under:- ➢ Repairs of State Highways /Major District Roads(MDR) - in normal areas -- @ Rs. 1.0 lakh /km ; - in hilly areas -- @ Rs. 1.25 lakh /km ; ➢ Repairs of Rural/village Roads with culverts - in normal areas -- @ Rs. 60,000/- km ; - in hilly areas -- @ Rs. 75,000 / km ; ➢ Repairs of RCC Culvert/Bridge - in normal areas -- @ Rs 60,000 per culvert; - in hilly areas -- @ Rs 75,000/- per culvert.

	(2) Drinking Water Supply Schemes, which may include the following activities:- i) Repair of damaged platforms of hand pumps/ring wells/spring-tapped chambers/public stand posts, cisterns. ii) Restoration of damaged stand posts including replacement of damaged pipe lengths with new pipe lengths, cleaning of clear water reservoir (to make it leak proof). iii) Repair of damaged pumping machines, leaking overhead reservoirs and water pumps including damaged intake-outtake structure, approach gantries/jetties.	-Damaged drinking water supply schemes will be eligible for assistance as per actual, subject to a ceiling of Rs 2.00 lakh per damaged scheme. -Cleaning of Community drinking water wells as per actual, subject to a ceiling of Rs 10,000/ per well
	(3) Minor Irrigation Schemes, which may include the following activities: i) Immediate repair of damaged canal structures and earthen/ masonry works of tanks and small reservoirs with the use of cement, sand bags and stones. ii) Repair of weak areas such as piping or rat holes in dam walls/ embankments. iii) Removal of vegetative material/building material/debris from canal and drainage system. iv) Repair of embankments of minor irrigation projects.	In case of repairs of minor Irrigation works, assistance will be given as per the schedule of rates (SOR) for repairs notified by the concerned State. In case SOR is not available, assistance for irrigation scheme/ canal will be provided as per actuals, subject to the ceiling of Rs 2.00 lakh per damaged minor scheme. **Note:-** However, in any case, the assistance will be provided at the rate whichever is lower. Assistance for restoration of damaged embankment of minor irrigation projects will be at par with the case of similar rural roads, subject to the stipulation that no duplication would be done with any ongoing schemes.
	(4) Power (only limited to immediate restoration of electricity supply in the affected areas): Damaged Poles/conductors and transformers upto 11 kv.	Regarding repair of damaged power sector, assistance will be given for the damaged conductors, poles and transformers upto the level of 11 KV and LT lines with bare conductor, as per details hereunder: ➢ The rate of assistance will be: - Rs.5000/pole; - Rs. 0.50 lakh per km for repairing of damaged LT lines; - Rs.1.00 lakh for replacement of one damaged distribution transformer.

		(Note:-The above assistance will not be applicable for those items which can be re-used).
	(5) Schools Repair of damaged schools building	As per actual, subject to a ceiling of Rs 2.00 lakh per school.
	(6) Primary/Community Health Centres Repair of Primary/Community Health Centres	As per actual, subject to a ceiling of Rs 2.00 lakh per unit.
	(7) Community Assets Owned by Panchayat Temporary repair of Mahila Mandal, Yuva Kendra, Panchayat Ghar, Community Hall, Anganwadi, etc.	As per actual subject to a ceiling of Rs 2.50 lakh per unit.
C.	**Preparedness & Capacity Building (10% Of SDRMF i.e equal to 12.50% of SDRF allocation for the year)**	
12.	Procurement of essential search, rescue and evacuation equipments including communication equipments, etc for response to disaster.	Expenditure from the preparedness and capacity building window will be governed by the Guidelines issued separately by the Ministry of Home Affairs for the Preparedness & Capacity Building window of SDRF/ NDRF.
13	Capacity Building	
D.	**State Specific Disasters**	
	State specific disasters within the local context in the State, which are not included in the notified list of disasters eligible for assistance from SDRF/ NDRF, can be met from SDRF within the limit of 10% of the annual funds allocation of respective window of the SDRF.	Expenditure is to be incurred from SDRF only (and not from NDRF), as assessed by the SEC. The norm for various items will be the same as applicable to other notified natural disasters, as listed above; or In these cases, the scale of relief assistance against each item for 'local disaster' shall not exceed the norms of SDRF. The flexibility is to be applicable only after the State has formally listed the disasters for inclusion and has notified transparent norms and guidelines, with a clear procedure for identification of the beneficiaries for disaster relief for such local disasters', with the approval of SEC.
E	**Items Not Covered under SDRF/NDRF**	
	a) Colleges and other educational institutions buildings b) Major/medium Irrigation Schemes c) Flood control and anti Erosion Protection work	

	d) Hydro Power Project/HT Distribution systems/Transformers and sub stations e) High Tension Lines (above 11 kv) f) State Govt Buildings viz. departmental/office building, departmental/residential quarters, religions structures, patwarkhana, Court premises, play ground, forest bungalow property and animal/bird sanctuary etc. g) Long term/permanent restoration work h) Procurement of equipments/ machineries under NDRF i) National Highways j) Sectors such as Telecommunication and Power (except immediate restoration of power supply), which generate their own revenues, and also undertake immediate repair/restoration works form their own funds/resources, are excluded.

Note:-

(i) For assistance under NDRF for items at S. Nos. 2 (a), (b). 3 (a), (b), (c), 4 (a), (b), (c), 6 (ii), (iii), and 9, while actual expenditure is allowed, the State Government will provide the item-wise details of expenditure to the Inter-Ministerial Central Team (IMCT)/ Central Government.

(ii) Ex-Gratia payment of Rs 50,000/- per deceased person, to next of kin of the deceased person, including those involved in the relief operations or associated in the preparedness activities, subject to the cause of death being certified as COVID-19, as per the guidelines jointly issued by the Ministry of Health and Family Welfare and the Indian Council of Medical Research on 3rd September, 2021, will be given as per guidelines on minimum relief issued by the National Disaster Management Authority (NDMA) dated 11.09.2021.

This ex-gratia assistance will be applicable from the date of first COVID-19 case reported in the country and will continue till de-notification of COVID-19 as a disaster or till further orders, whichever is earlier, to next of kin of the deceased due to COVID-19.

(iii) There will be a Mid-Term review of the norms after 2 years, based on price level index.

(iv) The State Governments are to take utmost care and ensure that all individual beneficiary-oriented assistance is necessarily/ mandatorily disbursed through Direct Benefit Transfer in the bank account of the beneficiary.

(v) The scale of relief assistance against each item for all notified disasters including 'local disaster' should not exceed the norms of SDRF/ NDRF. Any amount spent by the State for such disasters over and above the ceiling, would be borne out of the resources of the State Government and not from SDRF.

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