Copyright@unsplash

Needs Assessment

January – April 2023

Transformative Climate Action Using Participatory Data Driven Decision Making Platforms- TCAP

Prepared by

The Energy Resources and Institute (TERI)

Supported by:
Federal Ministry for Economic Affairs and Climate Action
on the basis of a decision by the German Bundestag
IKI INTERNATIONAL CLIMATE INITIATIVE

Terms of use

Contents from the publication may be utilized for non-commercial purposes, provided it is attributed to the source. Enquiries concerning reproduction should be sent to the following address:

The Energy and Resources Institute
Darbari Seth Block, India Habitat Centre, Lodhi Road, New Delhi – 110 003, India

Suggested citation

The Energy and Resources Institute (TERI). 2023. Needs Assessment for Transformative Climate Action Using Participatory Data Driven Decision Making Platforms- TCAP. New Delhi: TERI

Developed by

The Energy and Resources Institute

Supported by

United Nations University – Institute for Environment and Human Security (UNU-EHS)

National Institute of Urban Affairs (NIUA)

Published by

The Energy and Resources Institute, 2023

For More Information:

The Energy and Resources Institute (TERI)
Transport and Urban Governance Division
Sustainable Habitat Programme
Darbari Seth Block, IHC Complex, Lodhi Road New Delhi – 110003
India Tel.: +91 11 2468 2100
Fax: +91 11 2468 2144 or 2145
Email: pmc@teri.res.in
Web: https://www.teriin.org/cities

United Nations University – Institute for Environment
and Human Security (UNU-EHS)
Vulnerability Assessment, Risk Management & Adaptive Planning (VARMAP)
UN Campus, Platz der Vereinten Nationen 1, 53111, Bonn, Germany
Tel.: (+49) 0228 815 229
Email: https://ehs.unu.edu/

National Institute of Urban Affairs
Core 4B
Indian Habitat Centre, Lodhi Road
New Delhi – 110003
India Tel.: +91-11-24634971/+91-11-24643576
Email: http://www.niua.org/

Contents

Transformative Climate Action Using Participatory Data Driven Decision Making Platforms- TCAP 1
1. Background 8
1.1 Aims and Objectives 9
1.2 Outcomes and Implications 10
2. Stakeholder Consultation Workshop Findings 13
2.1 Methods and Tools: Foundation for Needs Assessment 14
2.2. Digitization, Concept Mapping and Analysis 15
3. Needs Assessment 18
3.1 Phase one 19
3.2 Focused Group Discussion (FGD) 20
3.3 Stakeholder mapping on Miro board 22
3.4 Phase two 32
3.5 Scenario Exercise 34
4. Final analysis 38
4.1 Operationalization 38
Key Concepts and Indicators: 38
Climate Impacts and Vulnerable Groups 39
4.2 Crisis Response of Visakhapatnam 40
Pre-Disaster Preparedness 40
Effectiveness During Disaster 42
Post Disaster Management 43
4.3 Discussion, Correlations and Key Insights 44
Driving Forces of Crisis Response 45
Restraining Forces of Crisis Response 47
4.4 Capacity Needs Assessment in the City for Climate Action 48
Annexure 51

List of Figures

Figure 1 Detailed Process followed for Needs Assessment 9
Figure 3 Outcomes and Implications: Needs Assessment 10
Figure 4 Word Cloud of the project's understanding based on stakeholder interactions (October 2022) 13
Figure 5 Digitized Data Tabulated on Excel Sheet 15
Figure 6 Analysis on Miro-board 16
Figure 7 Digitized Master Interview Guide 22
Figure 8 Stakeholder Mapping to understand Internal Co-ordination 25
Figure 9 Kumu Network Diagram: Mapping of Stakeholders 26
Figure 10 Kumu Network Diagram: To understand Internal Linkages 27
Figure 11 Kumu Network Diagram: Stakeholder Mapping and Connection 27
Figure 12 Needs Assessment Phase 1 Analysis 28
Figure 13 Actions taken: Disaster Management Cell 29
Figure 14 Challenges and Gaps: Disaster Management Cell 30
Figure 15 Key Areas of Intervention from the Analysis 31
Figure 16 List of Activities Carried out by Urban Community Development Department 31
Figure 17 Interactions with Various Stakeholders 34
Figure 18 Template for Stakeholders from the Scenario Exercise 35
Figure 19 Digitized Data from the Design Thinking Exercise 36
Figure 20 Coded Data Highlighting Frequently Discussed Hazards 39
Figure 21 Atlas.ti Network Diagram: Crisis Response Analysis for Disasters 40
Figure 22 Atlas.ti Network Diagram: Pre-Disaster Actions and Components undertaken by the City 42
Figure 23 Atlas.ti Network Diagram: Activities performed by Stakeholders during Disaster 43
Figure 24 Atlas.ti Network Diagram: Activities performed by Stakeholders Post Disaster 44
Figure 25 Atlas.Diagram: Co-occurrence Analysis 45
Figure 26 Atlas.ti Network Diagram: Driving Forces Analysis 46
Figure 27 Atlas.ti Network Diagram: Restraining Force Analysis 48

Acknowledgments

The study is an outcome of the expert contribution from the Transport and Urban Governance Division of The Energy and Resources Institute (TERI) and supported by United Nations University – Institute for Environment and Human Security (UNU-EHS) and National Institute of Urban Affairs (NIUA). The team is grateful to those who have provided their valuable comments and inputs throughout the study, including the stakeholders from the project city of Visakhapatnam. Additionally, the team would also like to specifically thank the city officials, state executives, policy makers and Civil Society Organisations for their invaluable contribution towards developing this study.

Primary Authors

Contributing Authors

Project Team

United Nations University – Institute for Environment (UNU-EHS) and National Institute of Urban Affairs (NIUA)

Reviewers

Mr Shri Prakash, Distinguished Fellow, Sustainable Habitat Programme, TERI
Mr Sanjay Seth, Director, Sustainable Habitat Programme, TERI
Mr Sharif Qamar, Associate Director, Sustainable Habitat Programme, TERI

Team

Ms Rhea Srivastava, Associate Fellow, Sustainable Habitat Programme, TERI
Ms Shiren Pandita, Area Convenor, Research Associate, Sustainable Habitat Programme, TERI
Ms Anushree Harde, Research Associate, Sustainable Habitat Programme, TERI
Ms Himanshi Sharma, Research Associate, Sustainable Habitat Programme, TERI
Mr Kumar Kunal, Research Associate, Sustainable Habitat Programme, TERI
Ms Harsha Burnwal, Project Consultant, Sustainable Habitat Programme, TERI

01
Background

1. Background

The Needs Assessment conducted between January and April 2023 in the city of Visakhapatnam aimed to comprehensively analyze the existing state of affairs and requirements, with a focus on bridging the gap between current outcomes and desired objectives. The assessment was driven by the purpose of gaining a thorough understanding of institutional capabilities, technical expertise, and deficiencies in implementation and policy execution. The objectives of the needs assessment were multifaceted and revolved around various key aspects.

Inter-Departmental Coordination: The assessment aimed to delve into the coordination and collaboration among different departments falling under the jurisdiction of the Greater Visakhapatnam Municipal Corporation (GVMC). This understanding was crucial to determine how effectively various departments were working together within the scope of the project.

Strengths, Gaps, and Opportunities: The assessment sought to identify the strengths and areas where the city officials and relevant stakeholders excelled. Simultaneously, it aimed to highlight the gaps and challenges that needed to be addressed. Moreover, the assessment aimed to pinpoint opportunities that could be harnessed to enhance the city's efforts in climate action, digitization, and citizen participation.

Stakeholder Perception of Participatory Climate Action: Understanding how stakeholders perceived and engaged with participatory climate action initiatives was a significant objective. This insight was crucial to fine-tune strategies for involving various stakeholders in the decision-making process related to climate action.

Use Cases for Urban Living Lab: The assessment aimed to identify specific scenarios or use cases where the concept of an Urban Living Lab could be applied effectively. This involves creating real-life environments for testing innovative solutions and policies.

Stakeholder Needs for Climate-Informed Decision-Making: Identifying the extent and nature of stakeholders' needs for information and data-driven insights in making climate-related decisions was a pivotal goal. This helped in tailoring strategies and resources to provide the right information at the right time.

Stakeholder Priorities for Data-Driven Governance: Understanding the priorities of stakeholders concerning data-driven governance in the context of climate action was a key aspect. This information was used to align initiatives and strategies with the most critical concerns of stakeholders.

Assessment of Existing Projects and Processes: The assessment aimed to gain a comprehensive understanding of ongoing projects, their processes, and the level of coordination within the GVMC. This helped identify areas of success and those that needed improvement.

1.1 Aims and Objectives

Scope and Methodology: The scope of this needs assessment encompassed a comprehensive analysis of institutional capacities, technical competencies, and the alignment of these factors with the overarching policy framework. The assessment followed a structured methodology that involved data collection, analysis, and interpretation.

Institutional Capacities: This aspect involved a thorough evaluation of the organization's overall capabilities, including its human resources, infrastructure, and financial resources. The goal was to determine whether the current setup is equipped to effectively execute the intended strategies and policy initiatives.

Technical Know-Hows: The assessment delved into the technical expertise within the organization. This included an examination of the organization's proficiency in utilizing relevant technologies, tools, and methodologies required to achieve the desired outcomes. Any gaps in technical knowledge were identified and documented.

Gaps in Implementation and Policy Deliverables: One of the primary objectives was to identify gaps and discrepancies between the organization's current implementation practices and the intended outcomes outlined in policies. This involved a critical review of existing processes, procedures, and mechanisms in place to achieve policy objectives.

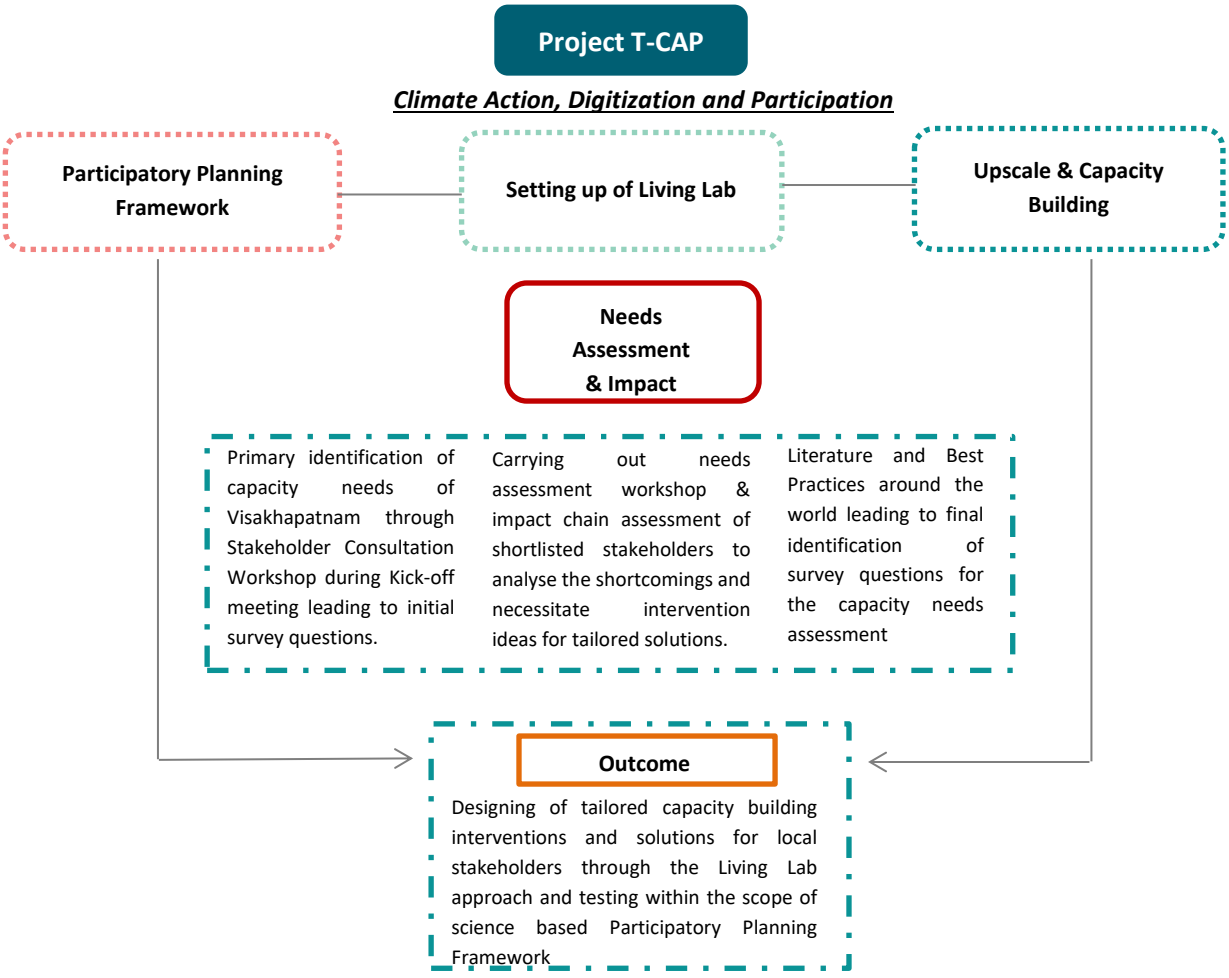


Figure 1 Detailed Process followed for Needs Assessment

1.2 Outcomes and Implications

The anticipated outcomes of the needs assessment were as follows:

Needs Assessment Findings for Impact Chain Assessment: The preceding activity of needs assessment helped in understanding the spectrum of needs, challenges and aspirations with regard to impacts of climate hazards, participatory processes for climate action and use of digital tools and platforms in Vizag. From this exercise several identified recurring impacts were shared by several stakeholders. The Impact Chain assessment was the next step which involved identifying the most recurring impact shared and carrying out a detailed assessment of connected impacts, drivers and root causes of risk including exposure and factors that influence vulnerability (sensitivity and adaptive capacity).

The aim of the assessment with different stakeholder groups was to analyze across the different impact chains and the most suitable points of interventions would then be tested and piloted as use cases within the Vizag Urban Living Lab.

Participatory Planning Framework: The assessment aimed to contribute to the development of a participatory planning framework. This framework would empower local bodies and communities to customize climate-related planning to their unique circumstances, fostering a more inclusive and effective decision-making process.

Intervention Planning for Living Lab: The assessment aimed to provide insights for planning interventions that could be tested and piloted and within the Urban Living Lab approach. This approach involves implementing and evaluating strategies in real-world settings before wider implementation. Further the assessment helped in setting context for the living lab.

Figure 2 Outcomes and Implications: Needs Assessment

The outcome of this needs assessment serves as a foundation for informed decision-making and strategic planning. The identification of gaps and shortcomings in institutional capacities and technical expertise enables stakeholders to prioritize areas for improvement. Moreover, recognizing the misalignments between policy goals and implementation practices, guides the refinement of strategies to ensure a more effective and efficient path towards desired outcomes.

02
Stakeholder Consultation
Workshop Findings

2. Stakeholder Consultation Workshop Findings

The stakeholder consultation workshop, conducted in October 2022, was to introduce the project to stakeholders which played a pivotal role in shaping the subsequent research process for the needs assessment. The qualitative insights gathered during this workshop served as the foundational building blocks for the research efforts, allowing for the establishment of connections, identification of new examples, categorization of related objects into themes, and ultimately the development of comprehensive theories. These theories were then applied to derive practical insights from the study findings for the overall needs assessment. The overarching aim of this needs assessment was to comprehensively evaluate the requirements within the domains of urban development, specifically focusing on climate action, digitalization, and participation.

To delve into the capacity needs assessment process, a multi-faceted approach was adopted. This approach involved a thorough content analysis of various project documents and outputs. These documents encompassed a wide range of materials, including the qualitative findings from the stakeholder consultation workshop, literature reviews, and the outcomes of project deliverables. The holistic analysis of these sources enabled a comprehensive understanding of the existing context and the needs that required attention.

Figure 3 Word Cloud of the project's understanding based on stakeholder interactions (October 2022)

The stakeholder consultation workshop conducted as a part of the needs assessment process played a pivotal role in several critical aspects of the assessment. It served as the cornerstone for the development of interview guides, as well as aiding in the prioritization of stakeholders. The workshop's outcomes were compiled and transformed into digital data, which was subsequently subjected to analysis through two distinct methods: Concept Mapping on Miroboard and the use of ATLAS.ti software.

2.1 Methods and Tools: Foundation for Needs Assessment

1. Collation and Digitization of Responses:

The insights, feedback, and suggestions shared by stakeholders during the workshop were collected, organized, and digitized. This digitization involved converting qualitative input, such as comments, suggestions, and discussions, into a digital format that could be systematically analyzed and processed. This step was crucial for efficiently managing and analyzing a large volume of qualitative data.

2. Prioritization of Stakeholders:

The workshop's outcomes also played a significant role in determining which stakeholders should be prioritized for further engagement and data collection. By analyzing the input received from various stakeholders during the consultation, it became possible to identify key players, influencers, and entities whose perspectives were especially valuable or influential within the context of the urban development objectives. This prioritization process ensured that the assessment efforts were focused on those stakeholders who had the greatest impact or stake in the outcomes.

3. Development of Interview Guide:

The insights and perspectives gathered during the Stakeholder Consultation workshop laid a strong foundation for creating the instruments required for the needs assessment. The qualitative information and feedback provided by the stakeholders during the workshop were instrumental in shaping the structure, content, and focus of the questionnaire/interview guide. This alignment ensured that the assessment tools resonated with the concerns, priorities, and issues identified during the workshop. This process helped guarantee that the data collected through the assessment instruments would be both relevant and comprehensive.

4. Concept Mapping on Miroboard:

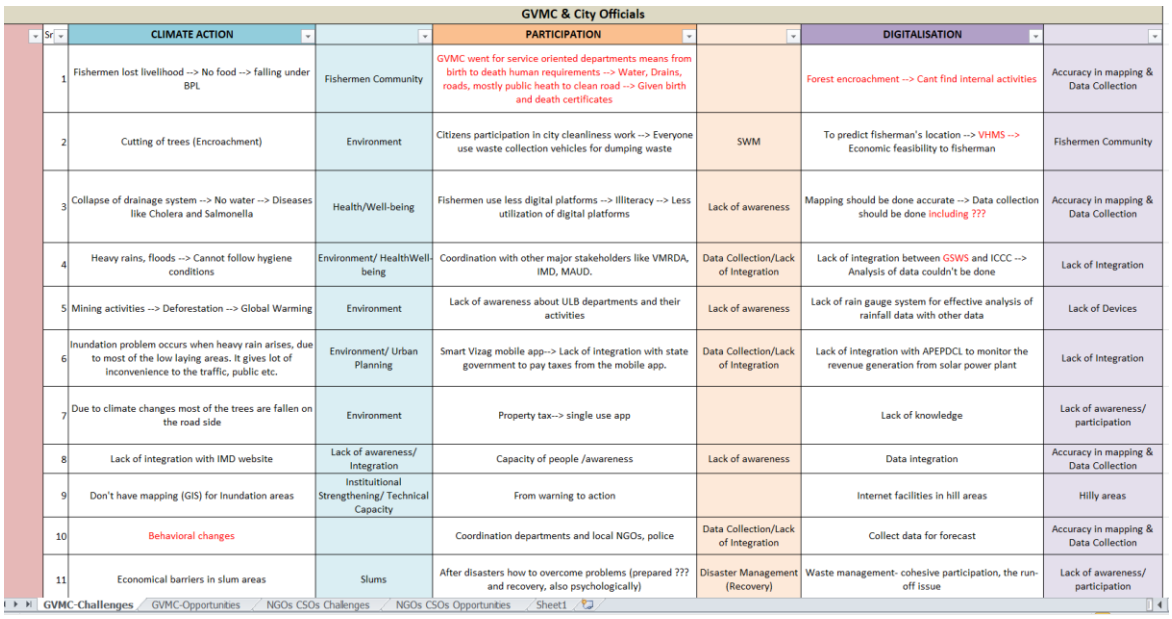
Concept mapping, a visual method used to represent relationships among concepts, was employed to analyze the digitized data. Miroboard, a collaborative online platform, facilitated the creation of visual concept maps that illustrated the connections, associations, and patterns within the data. This approach allowed for a holistic and intuitive understanding of the stakeholders' perspectives, revealing the relationships between different ideas and themes. Concept mapping aided in identifying overarching themes, clusters of ideas, and the interplay between various concepts.

5. Coding of themes using ATLAS.ti Software

ATLAS.ti, a qualitative data analysis software, was another method used to analyze the digitized data. This software provides tools for coding, categorizing, and exploring qualitative data. Through ATLAS.ti, the digitized responses could be systematically coded, categorized, and grouped based on themes and concepts. This approach enabled a deeper exploration of the data, uncovering patterns, trends, and relationships through a systematic and structured process.

2.2. Digitization, Concept Mapping and Analysis

The digitized data was analyzed manually by sorting and grouping relatively similar responses into themes and ultimately connecting them under the pillars of the project i.e., Climate Action, Participation and Digitalization. The data was initially divided stakeholder wise- for GVMC & city officials and NGOs & CSOs. This was further categorized into challenges and opportunities based on the responses received under the three heads of the project.



GVMC & City Officials

Sr	CLIMATE ACTION		PARTICIPATION		DIGITALISATION	
1	Fishermen lost livelihood --> No food --> falling under BPL	Fishermen Community	GVMC went for service oriented departments means from birth to death human requirements --> Water, Drains, roads, mostly public heath to clean road --> Given birth and death certificates		Forest encroachment --> Cant find internal activities	Accuracy in mapping & Data Collection
2	Cutting of trees (Encroachment)	Environment	Citizens participation in city cleanliness work --> Everyone use waste collection vehicles for dumping waste	SWM	To predict fisherman's location --> VHMS --> Economic feasibility to fisherman	Fishermen Community
3	Collapse of drainage system --> No water --> Diseases like Cholera and Salmonella	Health/Well-being	Fishermen use less digital platforms --> Illiteracy --> Less utilization of digital platforms	Lack of awareness	Mapping should be done accurate --> Data collection should be done including ???	Accuracy in mapping & Data Collection
4	Heavy rains, floods --> Cannot follow hygiene conditions	Environment/ HealthWell-being	Coordination with other major stakeholders like VMRDA, IMD, MAUD.	Data Collection/Lack of Integration	Lack of integration between GSWS and ICCC --> Analysis of data couldn't be done	Lack of Integration
5	Mining activities --> Deforestation --> Global Warming	Environment	Lack of awareness about ULB departments and their activities	Lack of awareness	Lack of rain gauge system for effective analysis of rainfall data with other data	Lack of Devices
6	Inundation problem occurs when heavy rain arises, due to most of the low laying areas. It gives lot of inconvenience to the traffic, public etc.	Environment/ Urban Planning	Smart Vizag mobile app--> Lack of integration with state government to pay taxes from the mobile app.	Data Collection/Lack of Integration	Lack of integration with APEPDCL to monitor the revenue generation from solar power plant	Lack of Integration
7	Due to climate changes most of the trees are fallen on the road side	Environment	Property tax--> single use app		Lack of knowledge	Lack of awareness/ participation
8	Lack of integration with IMD website	Lack of awareness/ Integration	Capacity of people /awareness	Lack of awareness	Data integration	Accuracy in mapping & Data Collection
9	Don't have mapping (GIS) for Inundation areas	Institutional Strengthening/ Technical Capacity	From warning to action		Internet facilities in hill areas	Hilly areas
10	Behavioral changes		Coordination departments and local NGOs, police	Data Collection/Lack of Integration	Collect data for forecast	Accuracy in mapping & Data Collection
11	Economical barriers in slum areas	Slums	After disasters how to overcome problems (prepared ??? and recovery, also psychologically)	Disaster Management (Recovery)	Waste management- cohesive participation, the run-off issue	Lack of awareness/ participation

GVMC-Challenges | GVMC-Opportunities | NGOs CSOs Challenges | NGOs CSOs Opportunities | Sheet1

Figure 4 Digitized Data Tabulated on Excel Sheet

This digitized excel data was then mapped on Miro board (Miro is a digital whiteboard platform for strategic mapping, brainstorming etc.) for analysis. To understand the interrelationship and interconnections between the challenges and opportunities, this sorted data was mapped on Miro board. While mapping the same process was followed, the data was first segregated stakeholder wise and then divided into challenges and opportunities under the three heads. This data was further segregated into various broad heads like environment, institutional strengthening, capacity building, lack of integration and awareness etc. Various challenges were highlighted by GVMC and city officials, for instance gaps such as lack of digital knowledge among the stakeholders, lack of data integration, and lack of coordination between various stakeholders, capacity building and awareness were some of the highlighted challenges. Responses related to lack of data integration, awareness/participation was grouped under one head. The same was done with the other responses, based on their nature.

The responses received from the stakeholders also captured the need for disaster preparedness. Disasters are something which the city of Vizag has been grappling with for a long time; events of heavy rains, floods have often lead to various issues such as collapsing of drainage system, spread of

diseases, followed by unhygienic and deteriorating health conditions. Various such gaps were highlighted during the consultation workshop.

Along with getting an overview of the gaps and challenges the city is facing, the consultation workshop also captured the opportunities the city could leverage to overcome from the issues highlighted. Various stakeholders additionally highlighted certain programs/activities that are already in place or the city is taking up to resolve these challenges. Some of them were need of capacity building programs especially in the digitalization domain.

The mapping exercise helped in understanding the interconnections between the opportunities and challenges and additionally helped in prioritizing the stakeholders.

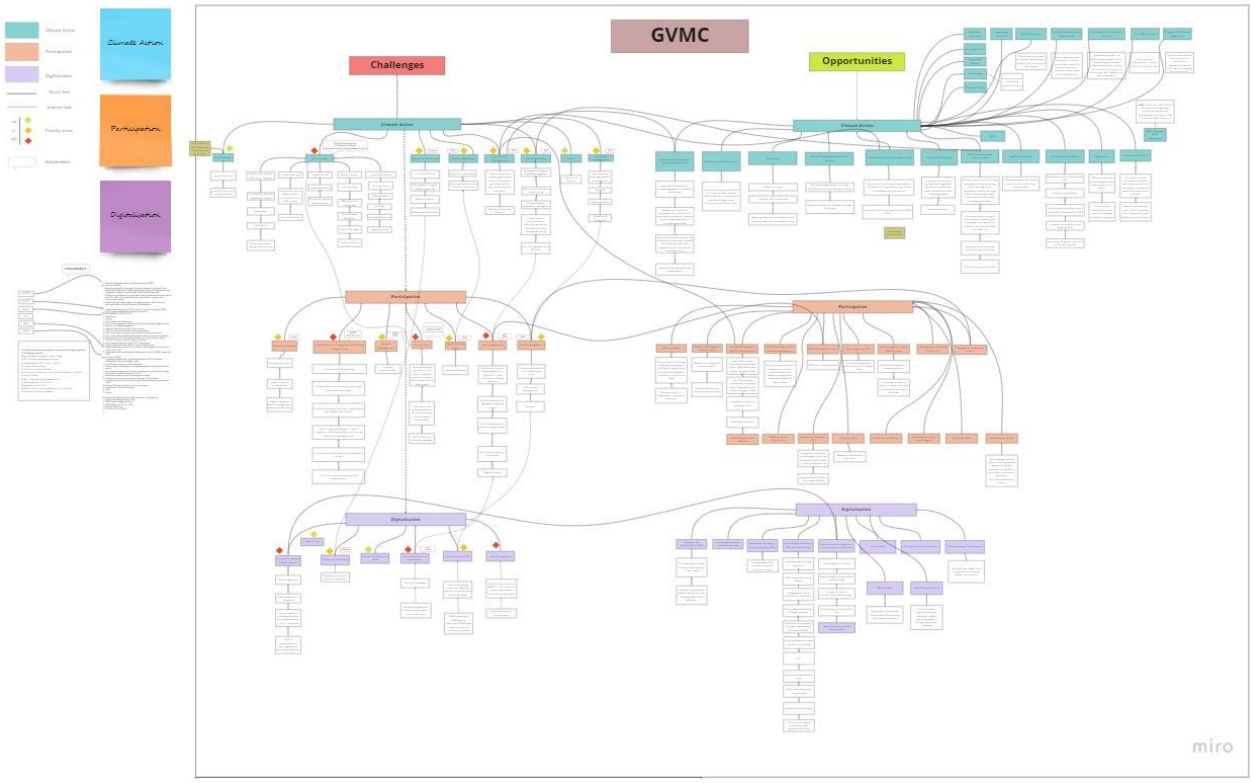
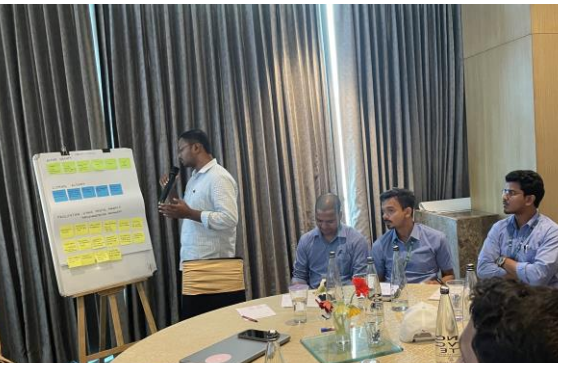
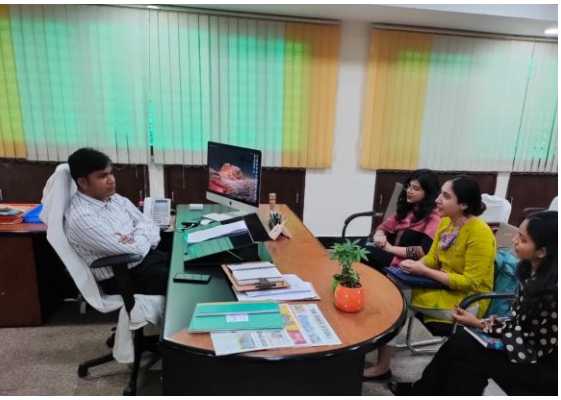


Figure 5 Analysis on Miro-board





03
Needs Assessment

3. Needs Assessment

The needs assessment itself was conducted in two distinct phases, reflecting a systematic and structured approach:

1. **Phase one: Consultation with selected line departments of GVMC along with a focused group discussion. (4th January to 6th January 2023)**

- The stakeholders identified were three departments from GVMC i.e., Education department, Town Planning department, Urban Community Department and 4 cells from the Sustainable Resilience Unit (SRU): Disaster Management Cell, Environment Cell, Climate Cell and the Human Resources Development Cell. Interview guides were prepared for the identified stakeholders which were an outcome from the analysis carried out so far. The questions were formulated categorizing each under the three major heads of the project, i.e., climate action, participation & digitalization. The questions formed focused on understanding the gaps, challenges and perspective of the stakeholders identified under these three pillars.

2. **Phase two: Consultation with other key stakeholders along with a focused group discussion/ Design Thinking exercise with representatives of all the groups (12th April to 15th April 2023)**

- Another round of needs assessment was carried out in April with the rest of stakeholders which were identified by carrying out in-depth analysis and stakeholder mapping from the needs assessment carried out in January. The same methodology and process was followed as during the previous assessment by conducting guided interviews followed by analysis to understand the gaps and challenges. The remaining stakeholders were mapped, this time the list was exhaustive not only it included the stakeholders from government side but the assessment covered NGOs, Slum dwellers, RWAs, Fishermen Community etc., to get a holistic perspective. Building upon the earlier interview guide, questions were prepared for the remaining stakeholders and were tweaked based on the type of stakeholder by prioritizing them from high-low, to the get maximum output from the assessment.

3.1 Phase one

Consultation with Selected Line Departments:

In January (4^{th}-6^{th}) 2023, a targeted consultation process was undertaken involving specific line departments within the Greater Visakhapatnam Municipal Corporation (GVMC). This consultation aimed to gather insights, perspectives, and feedback from these departments, which were directly, involved in the urban development initiatives under examination. A focused group discussion approach was adopted to facilitate open dialogues and comprehensive inputs.

Stakeholders Identified:

The stakeholders chosen for this consultation were carefully selected to represent key areas of expertise and responsibilities within GVMC. The identified stakeholders included three departments: Education Department, Town Planning Department, and Urban Community Department. Additionally, four cells from the Sustainable Resilience Unit (SRU) were also included: Disaster Management Cell, Environment Cell, Climate Cell, and Human Resources Development Cell. This selection ensured a diverse range of perspectives, as each stakeholder brought their specialized insights to the table.

Preparation of Interview Guides:

To guide the consultation process and ensure a structured approach, interview guides were developed for each of the identified stakeholders. These interview guides were a product of the analysis conducted up to that point in the needs assessment process. They were carefully designed to elicit specific information that aligned with the project's objectives and focus areas.

The questions were formulated categorizing each question under the three major heads of the project, i.e., climate action, participation & digitalization. The questions formed focused on understanding the gaps, challenges and understanding of the stakeholders identified under the three pillars of the project. The interview guides were structured such, categorizing each question under the three major thematic areas of the project. This categorization ensured that the questions effectively addressed the core pillars of the urban development initiative. The questions were thoughtfully crafted to explore the viewpoints, challenges, and gaps perceived by the stakeholders in relation to these three domains.

Exploring Gaps, Challenges, and Perspectives:

The questions within the interview guide were tailored to gain a comprehensive understanding of the stakeholders' perspectives. For each of the three major project pillars, stakeholders were prompted to share insights on existing gaps, challenges faced, and potential opportunities. By capturing these insights, the consultation aimed to uncover critical areas that required attention and improvement. The stakeholders' perspectives were invaluable in shaping the subsequent phases of the needs assessment process.

3.2 Focused Group Discussion (FGD)

The engagement with these stakeholders was further enhanced through a focused group discussion approach. This allowed for an interactive exchange of ideas, experiences, and suggestions among the participants. Focused group discussions encourage collaboration and can unveil insights that might not emerge through individual interviews alone. This approach facilitated a more holistic understanding of the challenges and opportunities within each department and cell.

A focus group discussion (FGD) was organized as part of the culmination of three-day guided interviews. This discussion included all the stakeholders identified in this phase. The idea was to identify the extent of the needs for climate action, digitalization, and participation. The aim of the exercise was to further identify the extent of the needs for climate-informed decision-making and explore priorities related to data driven governance for climate action. The broader objective of the focus group discussion was to explore the opinions and vision of the stakeholders. There were no right or wrong answers; since the objective of the discussion was to capture real-time, unfiltered responses.

The discussion began by understanding the familiarity of the stakeholders with the term 'climate change'. It further progressed by getting an idea on the level of participation various departments have with the community and understanding the ideal level, and if they in the current scenario have the power to be informed, power to talk, power to shape and power to decide. The same was done for the last pillar of the project i.e., digitalization. The discussion further progressed by getting an understanding on the idea of governance and management through digitalization; how do the stakeholders think they can use digital platforms/tools to make their activities efficient for example through better archiving of information, improved access to information, enhanced decision making, more transparency, encouraging a digital culture with better collaboration, future-proof safety.

- Better archiving of information
- Improved access to information
- Enhanced decision-making
- More transparency
- Encouraging a digital culture with better collaboration
- Future-proof safety

The discussion concluded by getting views and opinions of the stakeholders on the aspirations at the overlap of these three aspects and how they see it happening in their respective departments.

During the discussion, a comprehensive understanding was sought by gathering insights and opinions from various stakeholders. The focus revolved around the convergence of three crucial aspects: urban development, environmental sustainability, and departmental roles. Participants were encouraged to share their perspectives on the aspirations lying at the intersection of these dimensions and how they envisioned their departments contributing to these aspirations.

To provide practical context, two hypothetical scenarios were presented, each requiring a coordinated effort across departments:

Situation 1: A cyclone is about to hit Vishakhapatnam. What are the processes you follow – starting from early warning to recovery?

In this scenario, a cyclone threat highlights the importance of disaster preparedness and response. Stakeholders discussed the roles of various departments such as meteorology, disaster management, local administration, and relief services. Early warning systems, community outreach, evacuation plans, and coordination with neighboring regions were identified as critical steps to minimize damage and ensure swift recovery. The discussion underscored the necessity for cross-departmental collaboration, clear communication channels, and a well-defined chain of command to handle the crisis effectively.

Situation 2: Vishakhapatnam is starting a plantation drive to reduce greenhouse gas emissions. How will you be involved in that and what activities will you carry out?

In this context, the focus shifted to sustainable urban development and environmental conservation. Stakeholders explored the roles of urban planning, forestry, environmental agencies, and public engagement departments. The discussions covered aspects like selecting appropriate plant species, identifying suitable locations, engaging the community for participation, and monitoring the progress of the plantation drive. The consensus highlighted the importance of integrating environmental initiatives into urban development plans, utilizing scientific expertise, and encouraging community ownership of such projects.

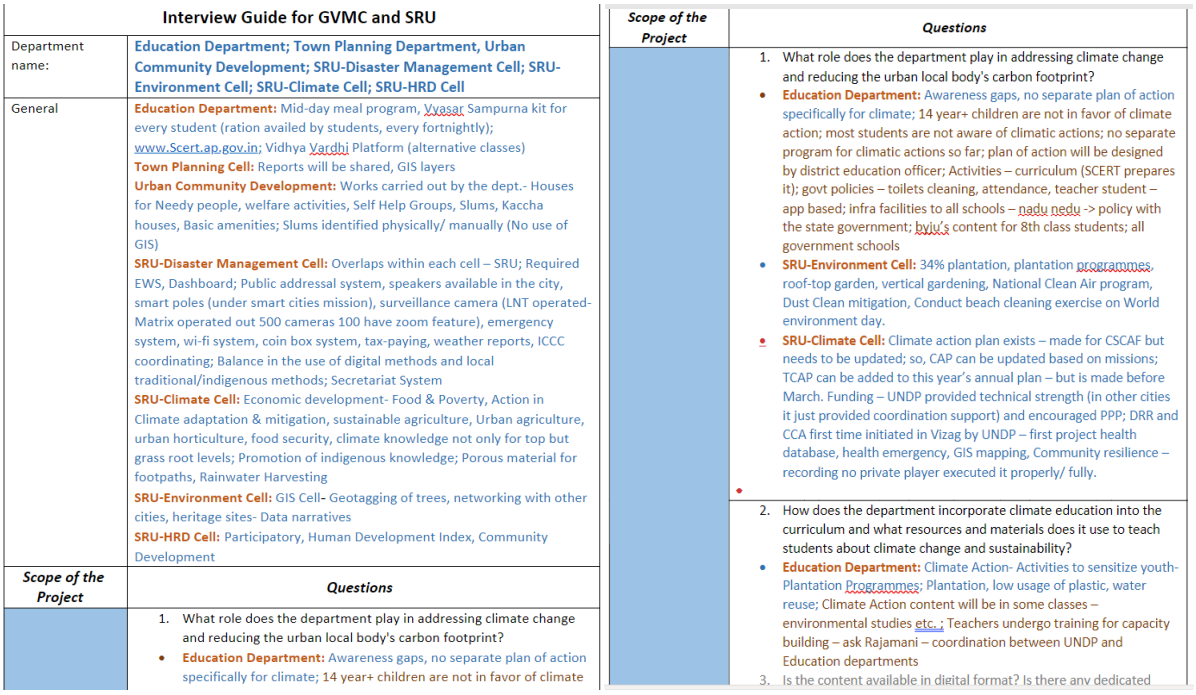
Through these imaginary situations, participants delved into the practical application of their departments' functions in real-world scenarios. This exercise fostered a deeper understanding of interdepartmental dependencies, the need for efficient communication, and the collective responsibility to address challenges at the intersection of urban development and sustainability.

Ultimately, the comprehensive discussions and imaginative scenarios allowed stakeholders to envision a holistic approach where urban development, environmental sustainability, and departmental responsibilities intertwine to create a resilient and thriving city. The process emphasized the significance of proactive planning, cooperation, and adaptability in navigating the complex challenges faced by cities like Vishakhapatnam.

In summary, the consultation with selected line departments of GVMC, combined with a focused group discussion, was a crucial step in the needs assessment process. The consultation process involved preparing interview guides, formulating questionnaires aligned with project themes, and engaging stakeholders to explore gaps, challenges, and perspectives in the areas of Climate Action, Participation, and Digitalization. The insights gathered from this consultation were poised to inform subsequent phases of the assessment and contribute to the overall understanding of urban development dynamics in Visakhapatnam.

Master Interview Guide:

Based on the responses received from the stakeholders during the interviews and the FGD, all of this data was then compiled and digitized in a consolidated document as a 'Master Interview Guide', this captured responses from all the stakeholders identified for this Needs assessment.



Interview Guide for GVMC and SRU	
Department name:	**Education Department; Town Planning Department, Urban Community Development; SRU-Disaster Management Cell; SRU-Environment Cell; SRU-Climate Cell; SRU-HRD Cell**
General	**Education Department:** Mid-day meal program, Vyasar Sampurna kit for every student (ration availed by students, every fortnightly); www.Scert.ap.gov.in; Vidhya Vardhi Platform (alternative classes) **Town Planning Cell:** Reports will be shared, GIS layers **Urban Community Development:** Works carried out by the dept.- Houses for Needy people, welfare activities, Self Help Groups, Slums, Kaccha houses, Basic amenities; Slums identified physically/ manually (No use of GIS) **SRU-Disaster Management Cell:** Overlaps within each cell – SRU; Required EWS, Dashboard; Public addressal system, speakers available in the city, smart poles (under smart cities mission), surveillance camera (LNT operated-Matrix operated out 500 cameras 100 have zoom feature), emergency system, wi-fi system, coin box system, tax-paying, weather reports, ICCC coordinating; Balance in the use of digital methods and local traditional/indigenous methods; Secretariat System **SRU-Climate Cell:** Economic development- Food & Poverty, Action in Climate adaptation & mitigation, sustainable agriculture, Urban agriculture, urban horticulture, food security, climate knowledge not only for top but grass root levels; Promotion of indigenous knowledge; Porous material for footpaths, Rainwater Harvesting **SRU-Environment Cell:** GIS Cell- Geotagging of trees, networking with other cities, heritage sites- Data narratives **SRU-HRD Cell:** Participatory, Human Development Index, Community Development
Scope of the Project	***Questions***
	1. What role does the department play in addressing climate change and reducing the urban local body's carbon footprint? • **Education Department:** Awareness gaps, no separate plan of action specifically for climate; 14 year+ children are not in favor of climate

Scope of the Project	***Questions***
	1. What role does the department play in addressing climate change and reducing the urban local body's carbon footprint? • **Education Department:** Awareness gaps, no separate plan of action specifically for climate; 14 year+ children are not in favor of climate action; most students are not aware of climatic actions; no separate program for climatic actions so far; plan of action will be designed by district education officer; Activities – curriculum (SCERT prepares it); govt policies – toilets cleaning, attendance, teacher student – app based; infra facilities to all schools – nadu nedu -> policy with the state government; byju's content for 8th class students; all government schools • **SRU-Environment Cell:** 34% plantation, plantation programmes, roof-top garden, vertical gardening, National Clean Air program, Dust Clean mitigation, Conduct beach cleaning exercise on World environment day. • **SRU-Climate Cell:** Climate action plan exists – made for CSCAF but needs to be updated; so, CAP can be updated based on missions; TCAP can be added to this year's annual plan – but is made before March. Funding – UNDP provided technical strength (in other cities it just provided coordination support) and encouraged PPP; DRR and CCA first time initiated in Vizag by UNDP – first project health database, health emergency, GIS mapping, Community resilience – recording no private player executed it properly/ fully. •
	2. How does the department incorporate climate education into the curriculum and what resources and materials does it use to teach students about climate change and sustainability? • **Education Department:** Climate Action- Activities to sensitize youth- Plantation Programmes; Plantation, low usage of plastic, water reuse; Climate Action content will be in some classes – environmental studies etc. ; Teachers undergo training for capacity building – ask Rajamani – coordination between UNDP and Education departments
	3. Is the content available in digital format? Is there any dedicated

Figure 6 Digitized Master Interview Guide

The list of stakeholders was shortlisted from the stakeholder consultation workshop data analysis. The identified stakeholders for the first phase of needs assessment were, three departments from GVMC i.e., Education department, Town Planning department, Urban Community Department and 4 cells from the Sustainable Resilience Unit (SRU): Disaster Management Cell, Environment Cell, Climate Cell and the Human Resources Development Cell.

3.3 Stakeholder mapping on Miro board

The responses received during the needs assessment from the identified stakeholders, an internal mapping was done to understand how the departments within GVMC and cells within SRU interact/respond during a disaster. The flow of information during any disaster follows the following sequence; at first the information is received from the Indian Meteorological Department (IMD) to the commissioner. From there, every department within GVMC and SRU is reached out for alerts. The GVMC department consists of various departments working for the development and welfare of the citizens. Based on the mapping and prioritization of stakeholders from the needs assessment exercise, the department which co-ordinate and disseminate information are, Engineering Department, Education Department, Health Department, Town Planning Department and the Urban Community Development Department.

The functions of various departments within GVMC include:

Engineering Department

This department is entrusted with the overall infrastructure development of the Corporation, related to road development, water supply system, sewage system, public amenity buildings, construction and maintenance of government quarters and other public works to name a few.

Education Department

GVMC is actively taking care of educational needs of children from the age of 3 to 5 years till Higher Secondary level by effectively maintaining pre-primary schools under "Balyam" scheme, primary schools, upper primary schools, high schools, school adoption and support program under "Sweekaram", College tracking financial support for underprivileged and meritorious students, and techno – teaching.

Health Department

The objectives of the department include 100% Public Health, Keep the city clean and green under the Swacch Bharat Mission, Hygienic and Healthy livelihood through, Prevention of Food Adulteration, Registration of Births and Deaths, monitoring 100% trade licenses for a healthy environment, Provide Comprehensive health services - preventive, promotive, curative and rehabilitative services.

Town Planning Department

The purpose of Town Planning is to regulate the usage and construction of land. When a plan is drawn up it includes plans of where for example residential areas, workplaces, park and garden areas and traffic will be placed in the city. It is divided into different planning levels. The more general plan directs how the more precise levels can be planned.

Urban Community Department

The main objectives of Visakhapatnam Slum Improvement Programme are two folds i.e., physical improvement and Community development. Under physical development the following components are taken up in the improvement of Slums- Roads, Drainage System, Sanitation, Water Supply, and Improvement of major streams, Construction of community buildings, and Construction of community buildings. Under Community development the following components were tackled with- Social Development, Economic improvement, Improvement of literacy through Education, Improvement of health conditions.

The departments within GVMC work in tandem with the various cells in ‘Sustainability and Resilience Unit (SRU)’. SRU is an autonomous and self-sustained entity under the Commissioner, GVMC and has been under ‘Sustainability and Resilience Programme (SRP)' to carry out the UNDP-GoI (USAID) projects and development activities for long-term.

The main components of 'Sustainability and Resilience Program (SRP)' are Planning, Mainstreaming, Environment Management, Disaster Management, Climate Risk Management, Human Resource Development, Knowledge Management, Research and Innovation, Partnerships, Collaborations and Convergence etc.
Sustainability and Resilience Unit (SRU) works directly or through its special Cells:

- Environment Cell
- Climate Cell
- Disaster Management Cell
- Human Resource Development (HRD) Cell

Environment Cell

- Strengthen urban environment management systems.
- Advocacy for pollution reduction and improvement of environmental quality.
- Implementation support to Water Sanitation and Hygiene (WASH) activities.
- Conservation, protection and restoration of ecosystems.
- Support to the government/administration for the successful implementation of environmental acts, policies, regulations and guidelines etc.

Climate Cell

- Advocacy for climate risk management and resilient development.
- Promote green growth and utilization of renewable/clean energy.
- Promote climate change adaptation practices in the community.

Disaster Management (DM) Cell

- Reduce disaster risk and encourage resilient development of Visakhapatnam city.
- Strengthen institutions in disaster management.
- Improve coordination and collaborations among stakeholders.
- Promote disaster risk governance in the city.

Human Resource Development (HRD) Cell

- Strengthen the city administration and stakeholders through strategic planning and capacity building activities.
- Promote better governance by adopting citizen centric approaches in planning and developmental efforts of the government.
- Up-gradation of standard operating procedures (SOPs) and action plans etc., according to the policies, frameworks and best practices laid out by the local, state and central government.
- Support organizational development (OD) and business continuity management (BCM).

GIS cell has been newly added to the SRU, the cell will be monitoring and closely manage data and digitization of the city activities.

This mapping helped in understanding the internal coordination with various cells and departments and the line of action and level of collaboration and participation during a disaster.

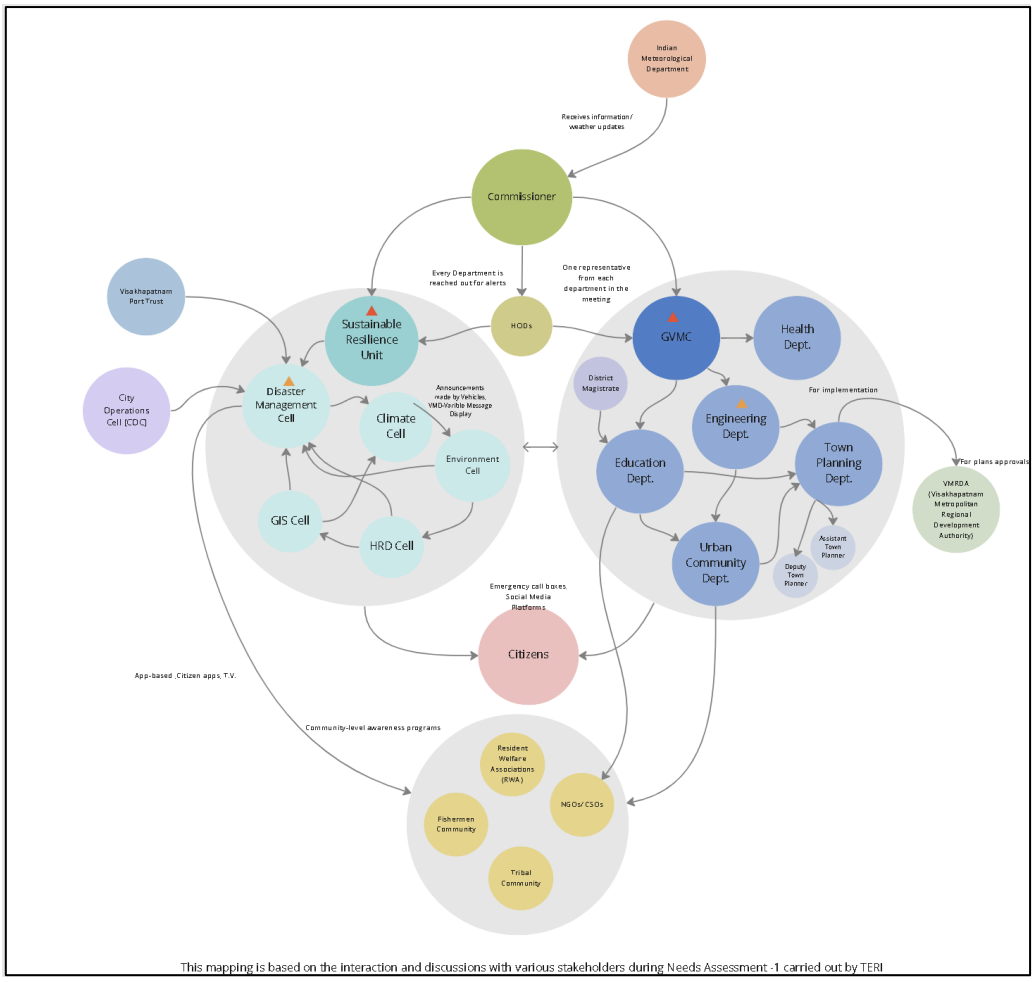


Figure 7 Stakeholder Mapping to understand Internal Co-ordination

To further understand the broad network of stakeholders involved a larger mapping was done on kumu.io. This helped in sorting other stakeholders to be prioritized in the next phase of needs assessment.

Mapping of stakeholders was carried out over KUMU platform to understand the aspect of various stakeholders involved in this process and the roles played by them during various processes. It also formed a visible hierarchy and connections between the stakeholders which helped to understand the interrelated functions according to institutional scale. The figure below shows the hierarchy formed and the stakeholders selected at different levels for analysis (marked by green circles).

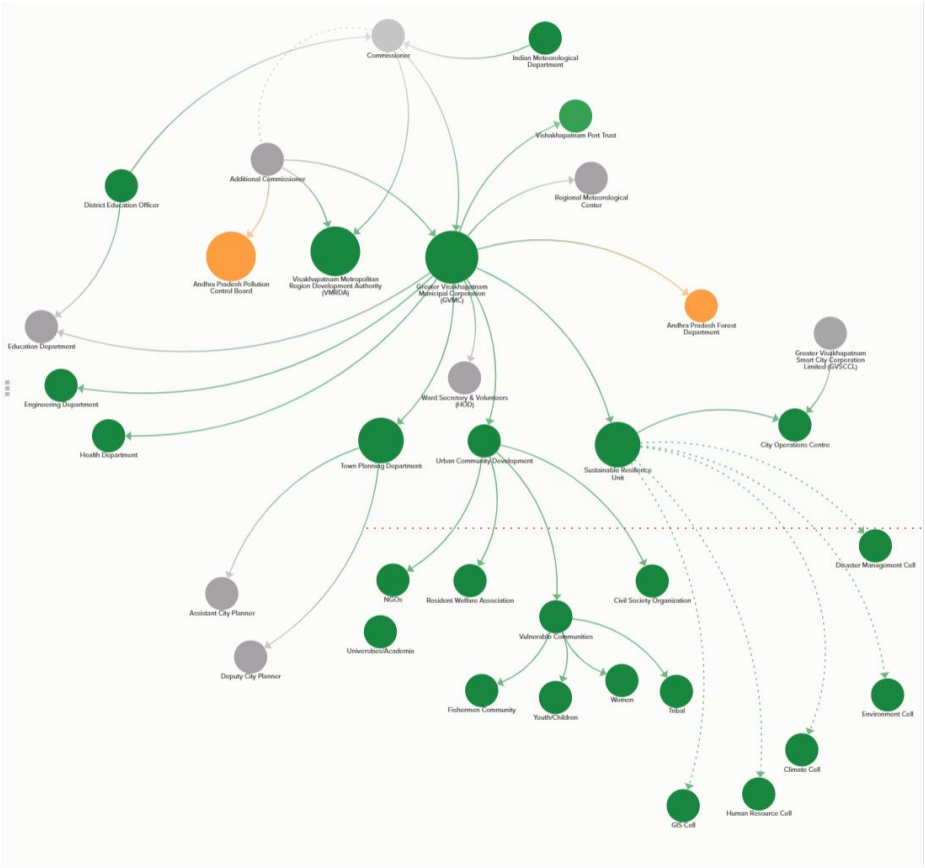


Figure 8 Kumu Network Diagram: Mapping of Stakeholders

Each element in display contains detailed information about the stakeholders elaborating their key functions. The selection of a single stakeholder in the dashboard also highlights the stakeholders directly connected to the selected element which provides with a visual connectivity of all stakeholders.

The KUMU platform's ability to provide with the visual representation of stakeholders involved directly through the key stakeholder is shown in Figure 9. The selection of key stakeholder in the user interface, that is, Greater Visakhapatnam Municipal Corporation (GVMC), has highlighted the other relevant stakeholders which are directly or indirectly involved with GVMC and were also identified as stakeholders for the Needs Assessment exercise. In Figure 9, the stakeholder whose functions are directly related to GVMC is the Commissioner, followed by sub-divisions within the GVMC, namely, Health, Engineering, Education, Urban Community Development departments, and Sustainable Resilience Unit (SRU). GVMC is also connected to several other government departments, such as Visakhapatnam Port Trust, and Town Planning Department. The subsequent departments are further connected to other important departments that are vital to the study, such as the various cells that fall under SRU, Disaster Management, Environment, Climate, Human Resource, & GIS cells and the City Operations Center (COC). Similarly, the Urban Community Development department keeps a record of the public stakeholders such as CSO/NGO, RWAs, and vulnerable communities mapped under the department.

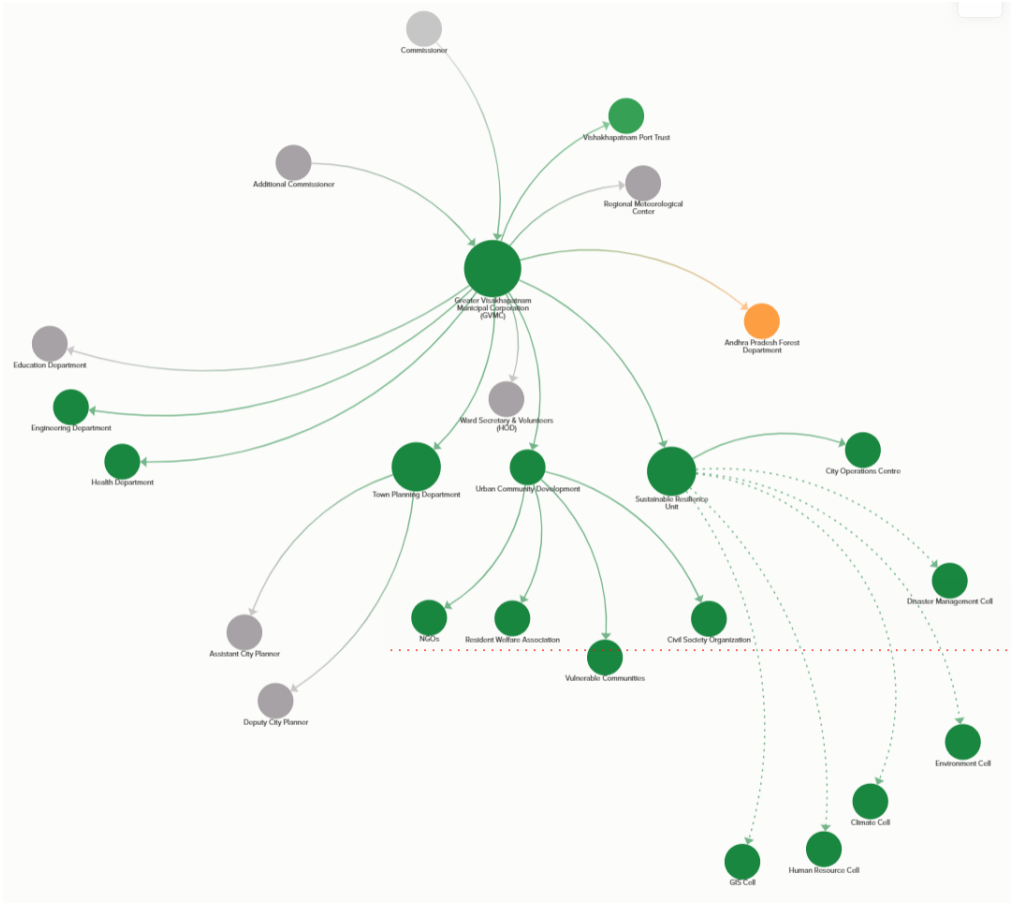


Figure 9 Kumu Network Diagram: To understand Internal Linkages

The detailed information contained within each element consists of actions taken and any gaps & challenges if identified during the Needs Assessment off the selected department in the avenue of the three pillars of T-CAP: digitalization, participation, and climate change. The figure below shows an example of the Town Planning Department existing in the KUMU dashboard.

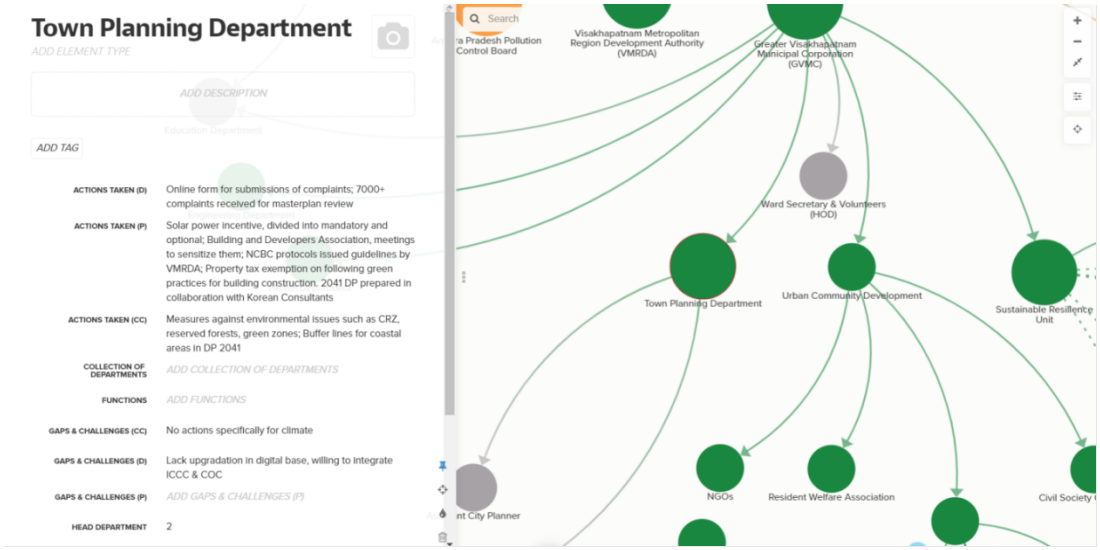


Figure 10 Kumu Network Diagram: Stakeholder Mapping and Connection

Analysis of Needs Assessment: Phase 1

Based on the responses received from the stakeholders in the needs assessment exercise, the same methodology was followed for the analysis. After the responses from all the stakeholders were digitized, this data was filtered out further. The responses were divided into gaps and challenges identified by various departments and the same was done for actions taken by these identified stakeholders. All this was broadly tabulated under the three pillars of the project.

NEEDS ASSESSMENT-1 ANALYSIS

Sr no	Departments	Gaps & Challenges			Actions Taken		
		Climate Action	Participation	Digitization	Climate Action	Participation	Digitization
	GVMC						
1	Education Department	Awareness gaps, no separate plan of action specifically for climate, capacity building, heads should have knowledge; Funding; most students are not aware of climatic actions; no separate program for climatic actions; plan of action will be designed by district education officer; Activities – curriculum prepared by SCERT	No connection with ICCC	Digital means not used up to the mark, stagnant, scope of development;	Climate Action- Activities to sensitize youth- Plantation Programmes; Plantation, low usage of plastic, water reuse. Climate Action content will be in some classes – environmental studies etc. ; Teachers undergo training for capacity building	Digital awareness campaigns in school, GVMC, and ZP schools. Activities to sensitize youth- Plantation Programmes, Interaction with the community through students, their parents which in a way reaches to the public, also reaches to those with less access to digital means through Integrated Tribal Department Agency (ITDA). Use of Vidya Vardhi Platform.	Smart city chrome books, Education apps; 205 digitization of govt schools and 50% for GVMC Schools. Digitalization- Government policies adopted app-based, Teacher-student app, (NADU-NEDU/ Past/Present), BYJU's Content- In all Govt schools, GVMC schools. All government schools are English medium from 1st to 10th - digitalization will be completed up to 20% of all schools – particularly GVMC schools (50%). Mobile, teleconference, and zoom conferences are used to engage citizens on climate change issues.
2	Town planning Department	No actions specifically for climat		Lack upgradation in digital base, willing to integrate ICCC & COC	Measures against environmental issues such as CRZ, reserved forests, green zones; Buffer lines for coastal areas in DP 2041, Solar power incentive, divided into mandatory and optional;	Building and Developers Association, meetings to sensitize them; NCBC protocols issued guidelines by VMRDA; Property tax exemption on following green practices for building construction. 2041 DP prepared in collaboration with Korean Consultants	Online form for submissions of complaints; 7000+ complaints received for masterplan review

NEEDS ASSESSMENT-1 ANALYSIS

Sr no	Departments	Gaps & Challenges			Actions Taken		
		Climate Action	Participation	Digitization	Climate Action	Participation	Digitization
4	Disaster Management Cell	20-30% from publicity, print-out, CSR, and international collaborations; Smart city funds (130 crores). Technology for early warning, funds failed in the past, low-cost stuff;		traditional/indigenous methods. Planning to develop early warning, response, post disaster. When smart cities came, COC came; ICCC; area based messaging, LNT developed but stopped working, now there is no EWS	updated in the years 2014, 2019, updated every year, currently in the process for updating DMP; City level disaster plan in place; Heat wave action plan.	organized; SRU team for capacity building; Case study conducted on how climate change affects tribal, fisherman; 50 FGDs organized so far.	plastic ban aware; Emergency call boxes for citizens, randomly located across the city; Announcement made by vehicle, VMD- Variable Message Display. Receives information from IMD, dissemination of information every one hour, common communication, weather report, broadcasted from ICCC through social media platforms
5	Environment Cell	Environmental ethics, Mindset, Behavioural change, lack of funds.	Civic Engagement is weak, to take learnings from Pune. During hazard, engagement with some departments for and fire service; GVMC also doesn't have a proper environment department that's why we have environment cell.	Dependent on TCAP project for digitalization and participatory approach. Strive to learn from good cases, international case studies, Manual + GIS application, GIS upgradation. Level of information shared with ICCC is as per request, excel based. Face to face interactions and telephone. The cell does not use much of digital means.	Plantation programmes, roof-top gardens, vertical gardening, National Clean Air program, Dust Clean mitigation, Working with industries for awareness, State government-dependent	200+ training programmes for capacity building attended by staff on CC in the past 2 years state, district and city/ward level. Inter-departmental workshops/awareness drives with universities, line departments; World Environment Day and beach clean up involving communities. Regular monitoring execution based.	
6	Climate Cell	Lack of Knowledge, funds (UNDP funds are still being used, 15th FC but slow- Timely release of funds, Topics are not updated, Human mentality, Top level and ground level responsibility & accountability. Seminars are conducted every month but they do not cover	Strive from learning from good use cases, international case studies;Community-level awareness programs	Manual + GIS application, GIS upgradation required	Heatwave action plan, sensitization of community rooftop vertical gardens; biodiversity; CSCAE	Meetings with VMRDA, other departments once every month	Not app-based, monitoring on daily works, 24x7 sanitation with involvement of women. Visual Display – communication – display on the screen; Public relation officer – 2 types of dissemination -officer –

Figure 11 Needs Assessment Phase 1 Analysis

The analysis highlighted actions taken by various stakeholders, and which were further filtered out into gaps and challenges. For instance, the actions taken by the climate cell under climate action included that they have a Heatwave Action Plan for the city in place. They sensitize the community about climate change and encourage the development of roof –top and vertical gardens. Furthermore, initiatives have been taken towards protection of biodiversity and the cell is adapting to the CSCAF to combat climate change. Under the participation head, the cell interacts with VMRDA, and other department via meeting once a month. Under the digitalization head the cell uses Visual Display communication utilized for dissemination of information and Information from Public Relation Officer disseminated through radio media, broadcasting, cable channels, social media and print media. Similar analysis was done for Disaster Management Cell under the head climate change, participation and digitalization, identifying the action taken and challenges and gaps as shown in Figure 12 and 13. The analysis giving an insight about actions taken and challenges and gap identified is being carried out for all the GVMC departments and SRU Cells. This provided with a nuanced understanding of the inter-departmental co-ordination.

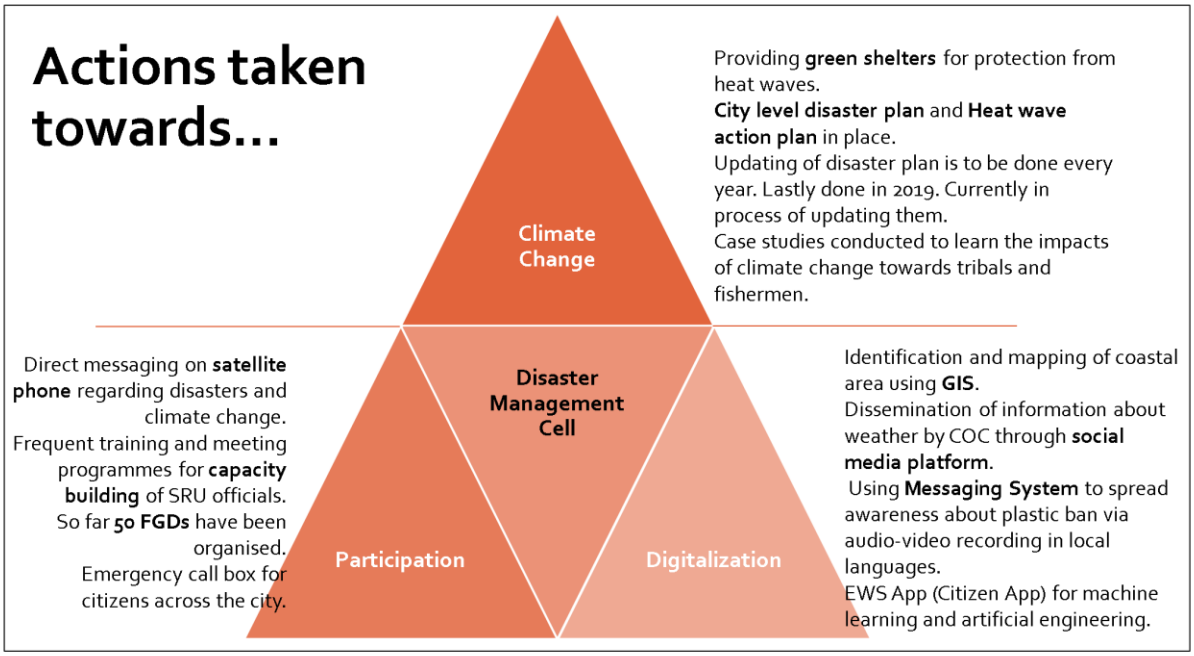


Figure 12 Actions taken: Disaster Management Cell

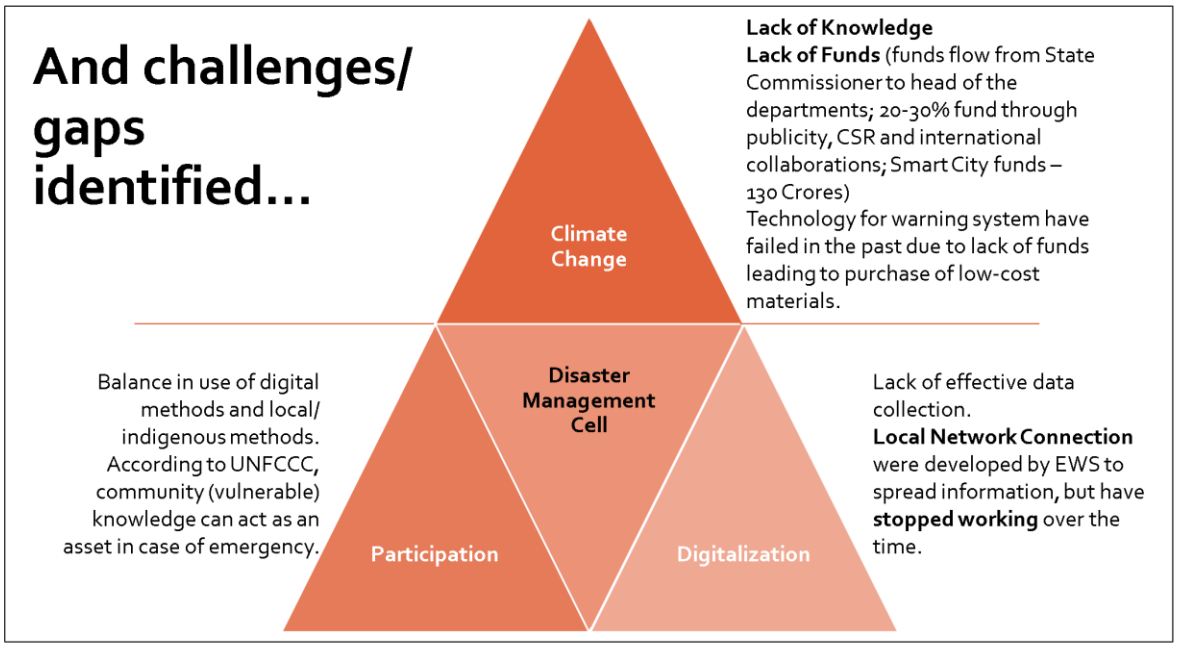


Figure 13 Challenges and Gaps: Disaster Management Cell

The analysis led to five key areas that would be used for further progress of the project. These are as following:

- **Lack of Knowledge –** The stakeholders lack in terms of capacities to make cities climate resilient. There is absence of training and awareness programs to build capacities of GVMC. Also, citizen lack knowledge in terms to using digital technologies.
- **Lack of Funds –** Due to slow process of releasing funds by the central and state authorities, local authorities are not able to put in adequate resources to make cities climate resilient.
- **Integration of Early Warning System –** IMD have an Early Warning System which is being used to disseminate disaster related information to GVMC which further reaches to citizen. This flow of information takes a lot of time which is crucial for the citizens to plan for disastrous events. Therefore, one of the focuses is on formulating an open platform which is accessible to everyone for any information related to disastrous events.
- **Manual Collection of Data –** The government agencies are still collecting the data manually instead of utilizing the modern technologies. Also, citizens are utilizing their indigenous methods to safeguard themselves during the time of disasters. Therefore, one of the key areas for intervention identified is to bring the balance between the indigenous methods as well as the digital methods for making the city of Vishakhapatnam climate resilient.
- **Behavioural Change of the community –** Providing proper knowledge and awareness to citizens on climate change and its impacts. This will create a change in the community's mind-set and will help them adopt positive practises. These positive practises will lead them to a better lifestyle that will make the city resilient.

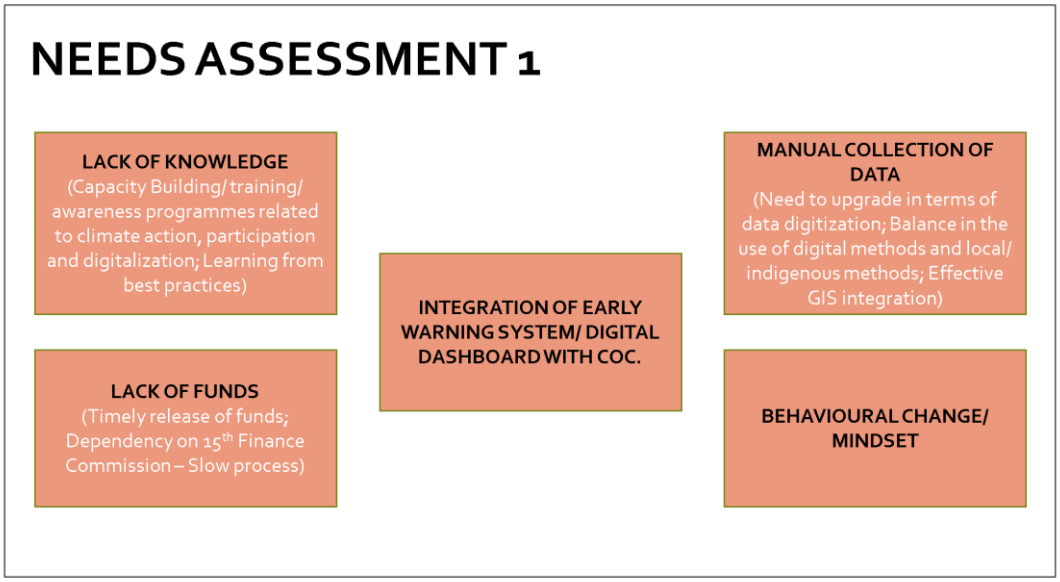


Figure 14 Key Areas of Intervention from the Analysis

Activities and Programs Carried out by Urban Community Development Department

S.No.	Date	Work Done	**Note:** Activities carried out by GVMC from December 2022- 7th February 2023. **Data Source:** Twitter handle- GVMC
1	12/1/2022	Awareness Program on Source Segregation	
2	12/1/2022	Awareness Program on Citizen Outreach Program	
3	12/2/2022	Awareness Program on Segregation of waste and prevention of mosquito borne seasonal diseases	
4	12/3/2022	Awareness Campaign on Citizen Perception Survey	
5	12/5/2022	Town Planning Spandana program	
6	12/5/2022	Awareness Program on Source Segregation	
7	12/5/2022	Meeting with vendors, encouraging them to use biogradable carry bags	
8	12/8/2022	Awareness Campaign on Source Segregation and Single Use Plastic	
9	12/9/2022	Awareness Program on Segregation of waste and prevention of mosquito borne seasonal diseases	
10	12/12/2022	Town Planning Spandana program	
11	12/12/2022	Supporting the "Free Vehicle Zone" Policy	
12	12/12/2022	Awareness Program on Source Segregation	
13	12/13/2022	Awareness Program on Source Segregation	
14	12/14/2022	Town Planning Spandana program	
15	12/14/2022	Awareness Program on Source Segregation	
16	12/14/2022	Awareness Campaign on Citizen Perception Survey	
17	12/15/2022	Awareness Program on Source Segregation and distribution of 3 bins	
18	12/17/2022	Awareness Program on Segregation of waste and prevention of mosquito borne seasonal diseases	
19	12/19/2022	Supporting the "Free Vehicle Zone" Policy	
20	12/19/2022	Awareness Program on Source Segregation	
21	12/19/2022	Awareness Campaign on Citizen Perception Survey	
22	12/20/2022	Awareness among students on Single Use Plastic Bags	
23	12/21/2022	Awareness among students on Single Use Plastic Bags along with NGO	
24	12/21/2022	Awareness Campaign on Citizen Perception Survey	

Figure 15 List of Activities Carried out by Urban Community Development Department

The response received during the interview with Urban Community Development (UCD), included their activities towards climate change such as awareness programs/campaigns/drives carried out by GVMC. To cross verify the activities carried out by UCD and to see if the information of the same is being disseminated to the citizens of Vishkapatnam, an exercise of preparing the list of activities carried out by UCD using GVMC's twitter handle was done. The data was extracted from December 2022- 7th February 2023 to understand the activities carried out, and whether certain training drives/ awareness programs fall in line with climate action, participation or digitalization. The information collected included awareness program to sensitize citizens regarding source segregation and single use plastic bag. These awareness programs are observed to be held every week in different wards

and zones of the city. Most of the programs carried out by GVMC were specifically pertaining to solid waste management domain and most of the drives had certain participation aspects to it.

3.4 Phase two

After the initial needs assessment conducted in January, the subsequent step was the April assessments i.e. phase two, which involved a wider range of stakeholders identified through in-depth analysis and stakeholder mapping. The purpose was to gather a comprehensive and inclusive perspective on the identified needs and challenges. This process aimed to ensure that all relevant voices were heard and that the decision-making process was well-informed and representative.

The methodology followed for phase two assessment mirrored that of the previous one to maintain consistency and comparability. The same steps and processes were adhered to, but this time the focus was on engaging the remaining stakeholders who hadn't participated earlier. The list of stakeholders was exhaustive, encompassing not only governmental bodies but also a diverse array of actors such as non-governmental organizations (NGOs), slum dwellers, Resident Welfare Associations (RWAs), and the fishermen community. This holistic approach aimed to capture varied perspectives and tap into the collective wisdom of these different groups.

Building upon the interview guide used previously, a questionnaire was prepared for the additional stakeholders. The questions were tailored to suit the specific context and needs of each type of stakeholder. The question prioritization was also adjusted, with high-priority questions given precedence to extract maximum valuable insights within the available time frame. This strategic approach ensured that the assessment process remained efficient while still addressing the key concerns of each stakeholder group.

The goal of this approach was to create a comprehensive mosaic of viewpoints, insights, and suggestions. By involving a diverse set of stakeholders and tailoring the questions to their contexts, the assessment aimed to uncover a wide range of needs, priorities, and potential solutions. This approach not only ensured a more accurate and nuanced understanding of the challenges faced but also laid the foundation for a more collaborative and holistic strategy moving forward.

In essence, the phase 2 needs assessment marked a crucial step in the process by expanding the scope of engagement, considering a wide array of stakeholders, and modifying the approach as needed. By doing so, it aimed to foster a more inclusive and effective decision-making process that could lead to well-rounded solutions for the challenges at hand.

Stakeholders identified to be interviewed for this round of Needs assessment were:

- NGOs- (Vasavya Mahila Mandali, Nature's Alliance, Laya)
- Fishermen Community
- Visakhapatnam Metropolitan Regional Development Authority (VMRDA)
- Health Department
- Engineering Department
- Visakhapatnam Port Trust
- Integrated Command and Communication Centre (ICCC)
- Universities/ Academia (Andhra University)
- District Education Officer
- RWAs
- Slum Dwellers

Figure 16 Interactions with Various Stakeholders

From Left to right:

1. Interaction with Fishermen Community at Bheemli
2. Interaction with the locals in hill areas
3. Meeting with professors from Andhra University
4. Prof Sunita from department of Meteorology and Oceanography
5. Interaction with GVMC Department
6. Interaction with Visakhapatnam Metropolitan Region Development Authority (VMRDA)
7. Interaction with Nature's Alliance
8. Interaction with Vasavya Mahila Mandali
9. Interaction with Mr Thiddu Prasanna, President, Fishermen Community
10. Interaction with Professor from Engineering Department

3.5 Scenario Exercise

The design thinking exercise served as an impactful way to engage stakeholders in a collaborative problem-solving process by providing them with real-life scenarios related to disasters, environmental challenges, and public health crises. The exercise aimed to encourage creative thinking, foster empathy, and generate innovative solutions by involving diverse perspectives.

The exercise consisted of four distinct situations, each focused on a specific challenge:

Cyclone Preparedness:

- A cyclone is about to hit Visakhapatnam what are the processes you follow? (Your Involvement starting from pre, during and post disaster/recovery)

Stakeholders were tasked with envisioning their involvement in handling a cyclone about to hit Visakhapatnam. This encompassed the entire timeline, from pre-disaster preparation to post-disaster recovery. Participants were divided into groups representing various stakeholders, including government bodies, disaster management agencies, NGOs, local communities, and others. Each group was further segmented into roles for different phases, such as early warning, evacuation, relief distribution, and rehabilitation. The exercise encouraged participants to identify challenges, allocate responsibilities, and propose ways to enhance coordination, communication, and response efficiency.

Plantation Drive:

- Visakhapatnam is starting a plantation drive, how are you involved in that and what activities do you carry out?

Participants were presented with the context of Visakhapatnam launching a plantation drive to reduce greenhouse gas emissions. Stakeholders from urban planning, environmental agencies, NGOs, and community representatives formed teams. These teams brainstormed their respective roles, such as species selection, site identification, community engagement, and monitoring. The exercise aimed to foster cross-sector collaboration and generate innovative ideas for maximizing the impact of the plantation drive.

Beach Pollution Cleanup:

- The city is dealing with beach pollution (Plastic). A beach clean-up is being organised, how are you involved in the process and what activities do you carry out?

Stakeholders tackled the issue of beach pollution, specifically plastic pollution, and the organization of a clean-up. Different groups representing waste management agencies, environmental NGOs, local businesses, and residents collaborated to outline their contributions. They discussed logistics, waste disposal, awareness campaigns, and long-term solutions to prevent future pollution. This scenario aimed to explore how different actors could work together to address a pressing environmental concern.

COVID Crisis Management:

- How were you involved in dealing with COVID crisis?

Participants reflected on their involvement during the COVID-19 crisis. This scenario encouraged stakeholders from the health sector, local government, community organizations, and communication agencies to share their experiences and lessons learned. Teams discussed their roles in public health communication, resource allocation, community support, and coordination efforts. This part of the exercise aimed to highlight successful strategies, challenges faced, and improvements for future crisis management.

	Government	NGOs	Academia	Others
Current Situation				
How can we make it better				

Figure 17 Template for Stakeholders from the Scenario Exercise

The responses from the exercise were then digitized, for each situation and stakeholders. By presenting stakeholders with these diverse scenarios, the design thinking exercise encouraged a multi-dimensional approach to problem-solving. It facilitated a better understanding of the challenges, the roles each stakeholder could play, and the collaborative efforts needed to address complex issues. The exercise ultimately aimed to spark creative solutions, build stronger collaborations, and enhance the overall resilience of Visakhapatnam in the face of various challenges.

Situations		Government	NGOs	Academia	Others
A cyclone is about to hit Vishakhapatnam. What are the processes you follow? (Your involvement starting from pre, during and post disaster/ recovery).		Disaster Management - Incident Management team; We make an announcement on cyclone; We observe surviillence cameras and providing information to disaster management team	Conduct awareness program in cyclone hitting area.	Discharging the responsibility assigned; Role of academia is now limited in their participation in local DM governance, except probably provide HR like NCC, NSS etc.	
		Post Disaster: We provide information to sanitory inspector and gvmc cleaning section to clean those areas; where cyclone has been hitting; Need Assessment; Damage Assessment; Rehabilitation	Conduct NGOs and Volunteers meeting for after cyclone rehabilitation activity.	Post Disaster: Assessment of the scenario post disasters; Conducting studies and assisting the local urban body in their research programmes through technical issues.	Post Disaster: Rapid assessment - not proper listedaffected community/ family; Safety place - shift community; Rapid assessment of affected community.
		After the cyclone we have provided rehabilitation centre to people; From our side we have provided the data to the concern department to work on this; From our side we need to make the other NGOs and other departments to help the cyclone affected area.	Shelters, Homes, Drainages, Biodoversity to be followed; Canals to be made for water flow; Garbage clearance	Encourage the students to take research project on cyclones; Promote more plantation by the students.	
			Awareness about cyclones; after cyclone - calculating damage and reports send to the government; children prospects to the child friendly resource centres; Immediately need for the water, food and essential items.		
		Involve NSS; NGOs; Youths to be increased for the tra	Delievery of medicines; Services for the migrants; Collaboration with health centres; Rehabilitation Centres for establishment		
		the overall improvement. It may by software and hardware.			
		Before Cyclone cultural activities and other programming activities will give annoucement to stop them.			
		To provide capacity building, knowledge management practices in the citizen to effective response from public to reduce the impact (NGOs + Other community organizations)			
		and restoring the emergency services in 12 to 24 years			
		Government should provide daily essentials for fisherman and should give money. They are advised not to go for fishing untill the situation is controlled.			
		coastal ecosystem management by protecting mangrove vegetation and existing general vegetation to prevent/ control magnitute of calamity. This needs collaboration with Academia and Scientists.			
		Relief operation to government interim of shifting the bodies. First aid services, restoration services, distribution of food giving basic first aid food distribution.			

Figure 18 Digitized Data from the Design Thinking Exercise

04
Final Analysis

4. Final analysis

4.1 Operationalization

The qualitative analysis software Atlas.ti was used to organize the data into codes, and analysis was guided by the thematic approach. An initial coding structure was developed based on the transcribed data from the three phases of the Needs Assessment workshops. Throughout the analysis process, codes were deleted, trimmed, renamed, and elevated into themes that corresponded to categories of the project.

Key Concepts and Indicators:

Concept	Variable	Indicator	Sub-Indicator
Crisis Response of the City	Climate Impacts	Key Climate Impacts	
		Key Vulnerable Groups	
	Disaster Risk Reduction	Preparedness (Pre-disaster)	Role of stakeholders
			Availability of action plan; emergency disaster management plans and protocols
			Early Warning Systems
			Level of resilience of Infrastructure
			Resource Inventory
			Public Awareness
			Training and mock drills
			Budget Allocation
			Collaboration
		Effectiveness During Disaster	Role of stakeholders
			Resource mobilization
			Evacuation and shelter assistance
			Emergency service response
			Communication and information dissemination
			Coordination and Collaboration
		Post-Disaster Management	Role of stakeholders
			Existence of recovery plans
			Mechanisms for monitoring and evaluation
			Capacity building
			Public education
Capacity of the City	Institutional Capacity	Goals and Vision	
		Programs and Projects	
		Knowledge Management	Information systems
		Capacity Building	

		Integration	Vertical integration of climate policies and strategies
			Horizontal integration within departments
		Collaboration	Partnerships
		Participation	Engagement
		Leadership	
	Technical Capacity	Technical Expertise	
	Financial Capacity	Climate funding Commitment	

Climate Impacts and Vulnerable Groups

Visakhapatnam is subject to a multitude of climate impacts due to its geographical location and climatic patterns. These include hazards like heatwaves, cyclones, heavy rainfall, flooding, and drought. Among these, analysis from the stakeholder consultations consistently highlight the most substantial and frequently discussed hazard as the occurrence of cyclones.

Word	Length	Count	%
cyclone	7	58	36.709
cyclones	8	26	16.456
drought	7	5	3.165
flood	5	5	3.165
flooding	8	3	1.899
floods	6	6	3.797
heat	4	19	12.025
heatwave	8	3	1.899
rain	4	3	1.899
rainfall	8	17	10.759
rains	5	4	2.532
security	8	9	5.696

Figure 19 Coded Data Highlighting Frequently Discussed Hazards

Due to its proximity to the Bay of Bengal, Visakhapatnam is vulnerable to the destructive impacts of cyclonic events, such as disruptions in critical infrastructure, economic losses, and a decline in the overall quality of life. In the past eight years alone, from 2014 to 2023, the city has experienced five severe cyclones. Cyclone Hud Hud in 2014 stands out as a particularly impactful event that continues to be remembered and discussed by the stakeholders.

While all the stakeholders examined are affected by climate induced disasters, some are more vulnerable than others. Notably, the fishing community, heavily reliant on the sea for their livelihood and sustenance, emerges as a particularly susceptible group. When climate-related events like heavy

rainfall, cyclones, or floods occur, it becomes extremely difficult for them to fish, resulting in significant income loss. Following such occurrences, the damage to property and the compromised access to basic infrastructure exacerbate their situation, often prompting migration as an adaptive measure. Similarly, those living in slums face challenges during and after disasters, dealing with flooded homes and loss of access to essential services like clean water and electricity. Stakeholder interviews emphasize that while government assistance is present, it's often slow, leading to substantial economic setbacks.

The broader population of Visakhapatnam also faces a variety of climate-related issues. Community representatives frequently cited failures in the city's drainage system, leading to flash floods and the spread of vector borne diseases like cholera. Vital urban services such as electricity, transportation, and water supply experience disruptions, accompanied by inconvenience caused from traffic congestion and internet outages. These, along with work disruptions and school closures, intensify the challenges encountered by the residents of the city.

4.2 Crisis Response of Visakhapatnam

The city of Visakhapatnam employs a number of mechanisms when faced by disasters like cyclones, floods or heavy rainfall. Findings from interviews and focus group discussions highlight the engagement of a range of stakeholders in disaster preparedness prior to, during, and after such events. During the initial data analysis, important elements or actions within each of these phases were identified, subsequently categorized, and will be further detailed in the following sections.

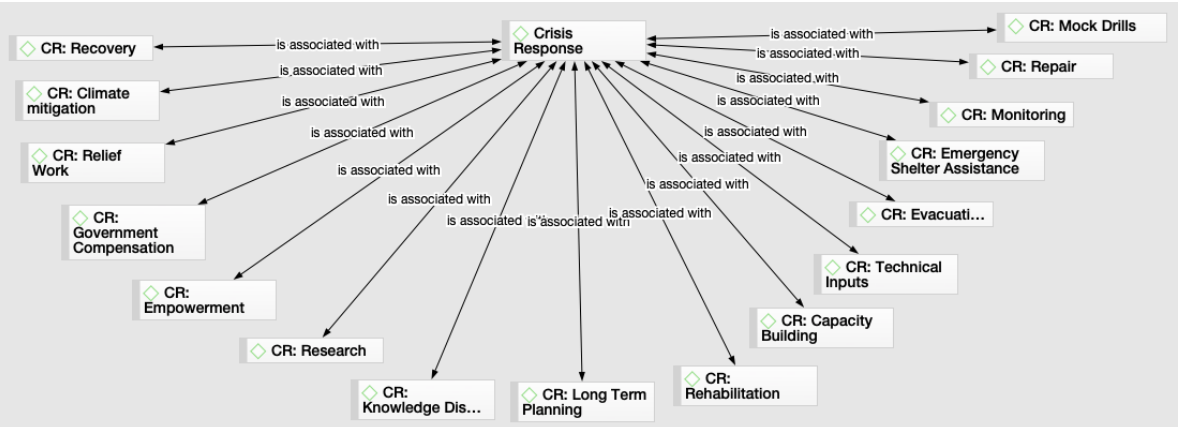


Figure 20 Atlas.ti Network Diagram: Crisis Response Analysis for Disasters

Pre-Disaster Preparedness

The three primary stakeholder groups - GVMC (local government), Academia, and CSOs and NGOs - exhibit varying levels of engagement in the pre-disaster phase. GVMC stands as the most active entity, engaging in tasks spanning disaster detection, information dissemination, preparing resource

inventory, as well as the formulation of long-term strategies such as local disaster management and climate action plans.

Visakhapatnam maintains a City Disaster Management Plan, consisting of procedural guidelines for different departments, including administrative protocols, disaster operations and road networks. Nevertheless, the plan acknowledges the absence of cyclone intensity consideration and stresses the need to segment procedures based on intensity levels.

As per the insights gathered from interviews, the government's initiatives to combat climate impacts primarily revolve around climate mitigation strategies, including pollution control and afforestation. SRU's Environment Cell and Disaster Management Cell regularly carry out plantation drives, while GVMC's Education Department actively involves school children.
Academic institutions like Andhra University also conduct disaster management courses to prepare students for performing tasks in disaster management.

The disaster preparedness phase gets initiated when the Municipal Commissioner receives information about a cyclone or heavy rainfall from the early warning system placed under the Cyclone Warning Centre, IMD, Visakhapatnam. GVMC Departments, such as the Urban Community Development Department, Town Planning Department and SRU come together and identify the vulnerable localities. All departments actively coordinate and engage in conveying information and alerts to citizens, frequently with support from NGOs and Academia. This is facilitated through diverse means such as SMS, social media, phone calls, WhatsApp groups, satellite phones, FM radio, and hoardings.

Among the heads of the fishing community, the "FMAA - Fishermen Member Association App" is notably employed to receive alerts, apart from alerts sent by the Fisheries Department. The government also uses the "dhindora system," along with speakerphones in police patrol cars, to physically announce and spread information. In contrast, some fishermen interviewed voiced concerns that government alerts frequently experience delays, resulting in insufficient evacuation time.

Outreach is facilitated through the ICCC, with the installation of Smart Poles and Variable Message Displays (VMD) across the city to convey messages to the general public.

At the village level, task force groups are ready to conduct mock drills for vulnerable segments of the population. A resource inventory is additionally compiled to guarantee sufficient emergency supplies of water, food, and medicine. In this regard, NGOs play a pivotal role by gathering resources for distribution in the event of a disaster striking the city.

The Atlas.ti Network Diagram presented below illustrates the pre-disaster actions and components undertaken by the city in the form of codes. These codes are subsequently categorized based on stakeholders and incorporate relevant quotations from representatives, aiding in the analysis of the data. Some codes, such as ‘Knowledge Dissemination’, ‘Outreach and Communication’ co-occur under all three stakeholder activities, showing collaboration for disaster preparedness.

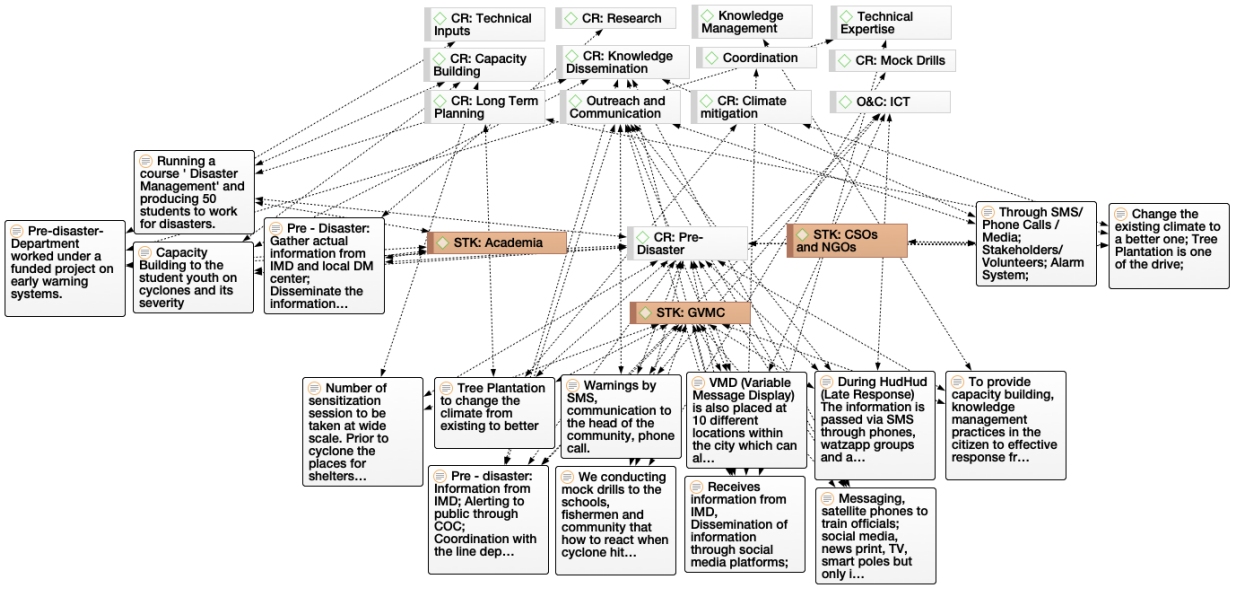


Figure 21 Atlas.ti Network Diagram: Pre-Disaster Actions and Components undertaken by the City

Effectiveness During Disaster

During a disaster, particularly in cyclonic scenarios, all stakeholders prioritize the communication of information regarding compromised city zones, evacuation procedures, and resource mobilization. Collaborative efforts are observed among the government, educational institutions, and NGOs, where effective coordination emerges as key.

It is GVMC's responsibility to strategically identify and map emergency shelters in proximity to affected areas. With the assistance of NGOs, GVMC facilitates the evacuation of vulnerable groups like fishermen and slum dwellers to designated emergency shelters, also referred to as 'toofan ghar' by the fishermen community. Additional shelters such as schools and community halls are also utilized.

Transportation facilities are sourced from the state government, private organizations, and sometimes educational institutions (using their bus fleets) to aid in evacuating people and transporting essential resources like first aid, food, and water to the shelters. Universities and NGOs play a critical role in mobilizing these resources, often employing dedicated volunteers for such relief work.

GVMC, along with Andhra University, maintain oversight during the disaster, regularly sharing alerts and updates with other stakeholders, thereby reinforcing effective coordination. Internally, GVMC's Centralized Operations Center (COC)/ Integrated Command and Control Centre (ICCC) assume a crucial monitoring role throughout the disaster. As per the analysis, the ICCC functions as a centralized system, monitoring the disaster's impacts and subsequently disseminating information to other GVMC departments. Smart poles deployed within the Area Based Development (ABD)

regions serve dual purposes, enabling announcements and allowing individuals to trigger an emergency SoS by pressing a red button.

The Atlas.ti Network Diagram below sums up the activities performed by stakeholders during a disaster, with relevant quotations from them supporting the codes.

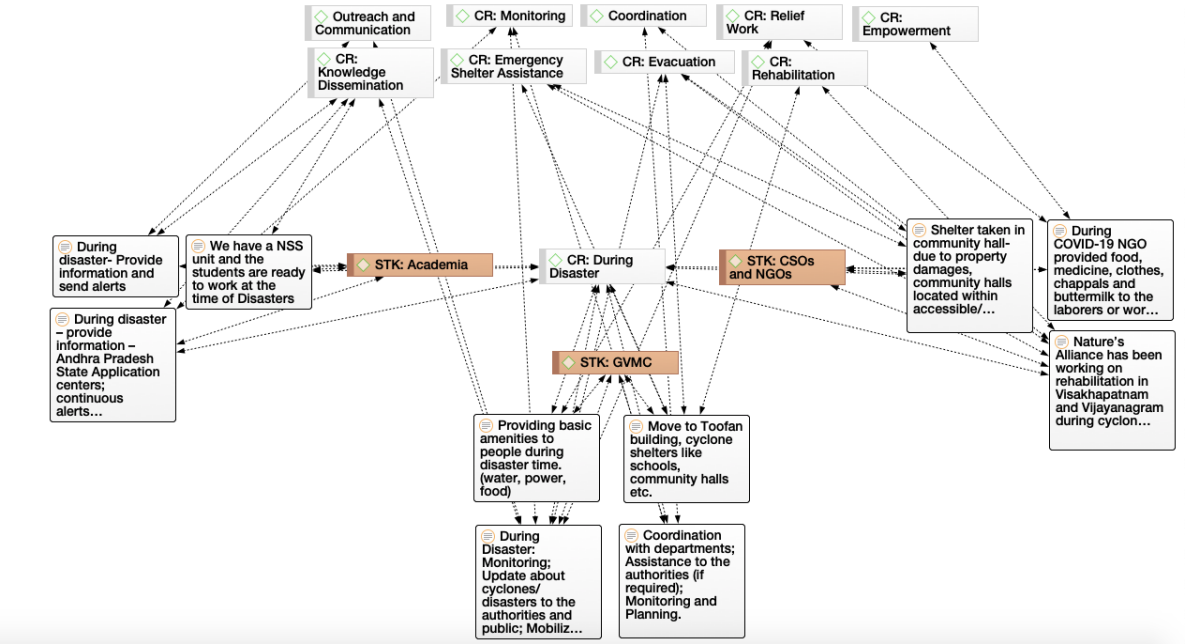


Figure 22 Atlas.ti Network Diagram: Activities performed by Stakeholders during Disaster

Post Disaster Management

Post-disaster management encompasses not only recovery operations such as repair, rehabilitation, and damage evaluation, but also extends to long-term planning for climate mitigation and capacity building.

In the immediate aftermath of a disaster, the government ensures provision of healthcare through medical camps, and offers basic necessities such as food, water, shelter, and clothing to affected groups. This effort is assisted by universities and NGOs, particularly Nature and Vasavya Mahila Mandali among the interviewed NGOs. Additionally, the government extends compensation to affected groups, particularly those who have suffered economic losses or property damage, through its Relief Fund.

When engaging in conversations about post-disaster activities with impacted groups, such as fishermen and slum dwellers, majority of them voiced their grievances concerning government compensation. As stated by the fishermen community, the government frequently delays the provision essential necessities like food, at times spanning up to a month, which places individuals in a situation of self-reliance. Women of the community expressed the difficulties of sustaining their families after a disaster, often resorting to their neighbours for essential provisions on credit basis. Women frequently undertake domestic work in nearby households to secure income for their

sustenance. Furthermore, the community also raised concerns about the government's minimal compensation. For instance, during an interview, the President of a fishermen community pointed out that a compensation of Rs. 5000 for a damaged boat valued at Rs. 1.5 Lakh is inadequate for them. Importantly, there is a lack of dedicated government subsidies or insurance coverage tailored to address damages incurred due to disasters.

In addition to relief efforts and rehabilitation, GVMC collaborates with Andhra University to conduct post-disaster assessments focusing on the damage caused. Subsequently, this information is shared with other departments to facilitate infrastructure restoration and cleaning initiatives. The academic sector contributes significantly through extensive research on subjects including ecosystem conservation, climate resilience, disaster management, and overarching strategies to enhance future preparedness. Within this context, NGOs like LAYA also contribute by organizing meetings to deliberate on long-term strategies for disaster preparedness and climate mitigation.

Both academia and NGOs are actively involved in conducting capacity-building exercises aimed at enhancing public awareness. Organizations like Nature Alliance and similar NGOs effectively work towards implementing initiatives such as the Cash for Work program to aid individuals coping with economic losses. These groups also place significant emphasis on youth and women empowerment.

The Atlas.ti Network Diagram below sums up the activities performed by stakeholders post disaster, with relevant quotations from them supporting the codes.

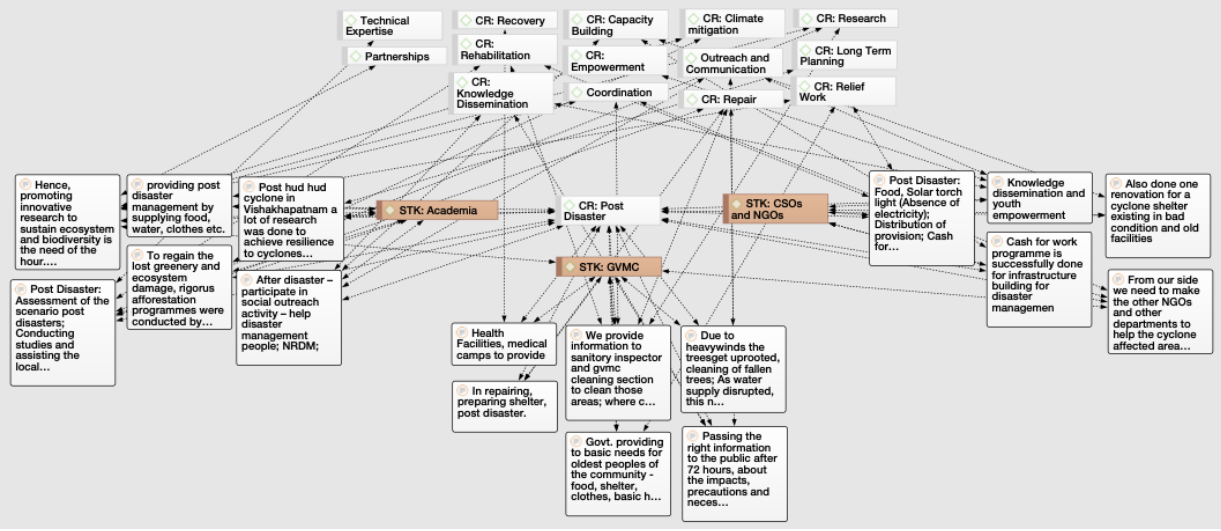


Figure 23 Atlas.ti Network Diagram: Activities performed by Stakeholders Post Disaster

4.3 Discussion, Correlations and Key Insights

Visakhapatnam has a well-functioning mechanism for disaster preparedness, response, and recovery. It is important to highlight that a significant portion of stakeholders focused on cyclones as a prevalent disaster scenario, making it the most frequently occurring climate impact within the

analysis. The subsequent co-occurrence analysis illustrates the participation of the government, NGOs, and Academia in conducting activities related to crisis response and disaster management.

	STK: Academia 24	STK: CSOs an... 44	STK: GVMC 92
Coordination 12	2	2	7
CR: Capacity Building 7	3	2	2
CR: Climate mitigation 5	2	1	3
CR: Emergency Shelter Assistance 3		2	1
CR: Empowerment 2		2	
CR: Evacuation 4		2	2
CR: Government Compensation 3			1
CR: Information Integration 2			2
CR: Knowledge Dissemination 24	8	3	10
CR: Long Term Planning 7	1	2	2
CR: Mock Drills 2			1
CR: Monitoring 7	1		2
CR: Recovery 2			1
CR: Rehabilitation 7	1	2	2
CR: Relief Work 9	1	2	4
CR: Repair 4	1		3
CR: Research 5	3		2
CR: Technical Inputs 2	1		
Outreach and Communication 35	3	9	13

Figure 24 Atlas.Diagram: Co-occurrence Analysis

The co-occurrence analysis shows GVMC's extensive involvement in nearly all crisis response activities, except for areas like empowerment and technical inputs, where they rely on NGOs and Academia, respectively. The component of collaboration is also prominent, with NGOs and Academia playing a significant role in assisting GVMC across disaster management, climate mitigation, and capacity-building endeavours.

Nonetheless, the analysis has highlighted specific challenges and identified opportunity areas for improvement within these procedures. These aspects are elaborated in the subsequent sections

Driving Forces of Crisis Response

GVMC excels in effective coordination, right from getting information from the early warning system at IMD, to involving Schools, Universities and NGOs in relief work and long-term planning.

Stakeholders consistently prioritize the dissemination of climate information through diverse communication channels, which emerges as the most commonly co-occurring activity among them.

The presence of the Integrated Command and Control Centre (ICCC), as noted by a stakeholder, significantly enhances disaster monitoring efficiency by centralizing operations. The ICCC presently helps in information dissemination via smart poles and Variable Message Displays, while simultaneously monitoring disaster situations. This proves crucial for tasks like traffic management, identifying compromised areas, and promptly assisting citizens in need. Stakeholders highlight the ICCC's role in integrating data from departments like transportation and police, further streamlining processes.

The academic community assumes an important role in the city's crisis management, leveraging their technical expertise to aid the government. They engage in research focused on topics related to enhancing climate resilience and contribute to the development of models for accurate weather prediction.

In the case of NGOs, their primary function revolves around relief efforts, comprising evacuating affected populations to secure shelters and providing fundamental necessities like food, water, and clothing. Affected groups, like the fishermen community, particularly emphasize the indispensable role of NGO volunteers in relocating them to designated safe spaces and complementing the efforts of GVMC.

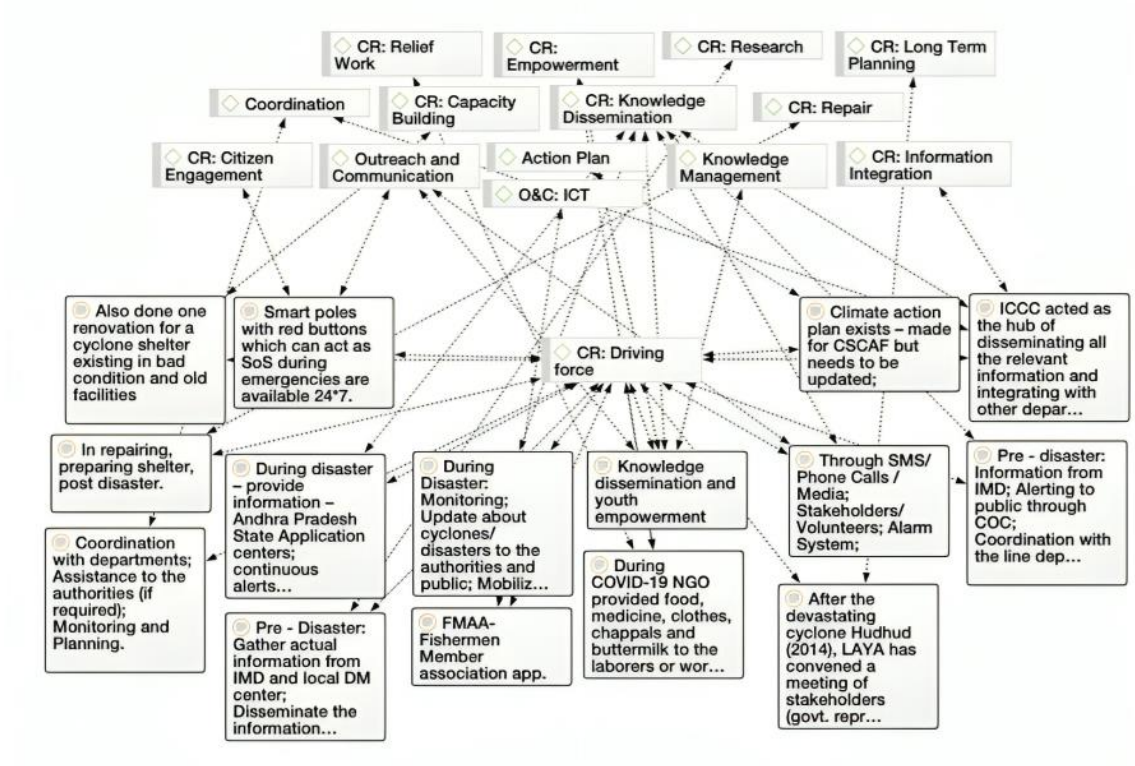


Figure 25 Atlas.ti Network Diagram: Driving Forces Analysis

Restraining Forces of Crisis Response

While the city's crisis response mechanisms have been established, stakeholders have identified areas where further improvement is possible.

A major restraining force in crisis response was observed to be knowledge and information management, i.e., the processes and tools to collect, store, share and implement knowledge/information. Primarily, data related to weather predictions, vulnerable areas and groups, and resource inventory within GVMC appear fragmented. Accessing specific information often requires navigating through an extended chain of officials and documents. This compartmentalized information lacks effective integration, often hindering comprehensive decision-making and causing delays. Although departments like the Urban Community Development Department within GVMC maintain lists of vulnerable areas and groups, these records are manually generated and sometimes outdated, necessitating substantial manual efforts for updating.

Absence of a robust digitized knowledge management system makes it difficult to track resource availability and mobilization and increases the amount of coordination within departments as well as with other stakeholders. While the ICCC addresses this concern in some capacity, it remains at a nascent stage with limited activities and has scope of increasing its efficiency. The analysis also highlights the underutilization of digital elements in knowledge management, showing potential for enhancing crisis response mechanisms.

Additionally, as mentioned previously, stakeholders also voiced concerns about the existing process of receiving disaster information, citing delays. Presently, GVMC follows an extended hierarchy, where cyclone information from IMD is first conveyed to the Commissioner, which is subsequently disseminated to various departments, citizens, and other stakeholder groups via messages, phone calls, or social media. Certain stakeholders emphasized the potential benefits of a centralized warning and forecasting system that would be universally accessible, aiming to address delayed communication and facilitate timely responses. However, it's important to acknowledge that digital information was also identified as a potential constraint, potentially introducing a communication gap for individuals as well as government officials less familiar with digital applications or approaches.

Affected groups also pointed out instances of delays in restoring vital services and delivering economic compensation. Although residents of the city participate in mock drills coordinated by GVMC, the fishermen community stressed their lack of involvement in any form of preparatory exercises or capacity-building initiatives dedicated to disaster management. Lastly, a substantial number of stakeholders highlighted a fundamental issue – the lack of comprehensive knowledge about climate change (both adaptation and mitigation) among government officials, specifically those in leadership positions. This knowledge gap was acknowledged as a potential obstacle to achieving effective climate action.

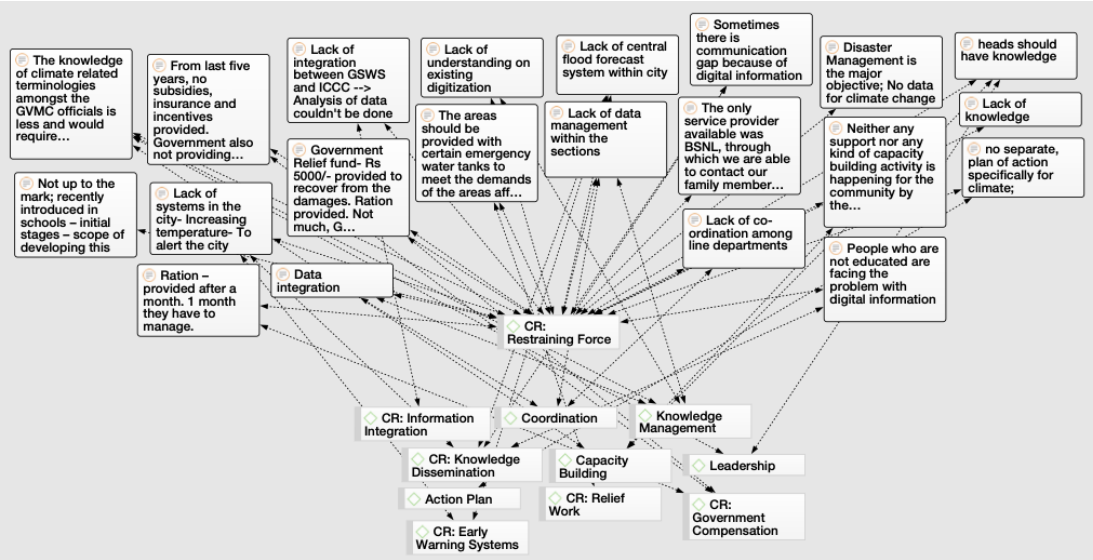


Figure 26 Atlas.ti Network Diagram: Restraining Force Analysis

4.4 Capacity Needs Assessment in the City for Climate Action

Apart from being a coastal city, Visakhapatnam is also known to be an industrial hub, underscoring the city's need to prioritize not only disaster management but also overall climate resilience.

Visakhapatnam has excelled in some areas of climate policy, evidenced by the establishment of a Climate Cell within SRU. In addition to its disaster management plan, the city has formulated its own climate action plan. This plan was developed in alignment with the Climate Smart Cities Assessment Framework (CSCAF), reflecting vertical policy integration from the national to the municipal level. Nevertheless, it's noteworthy that this plan has remained stagnant and outdated over time.

While the city's smart city vision is apparent, aspects of climate action, participation, and digitalization remain fragmented throughout the city level processes. Several reasons can be attributed to this fragmentation.

Firstly, there is a lack of comprehensive understanding about climate action, which encompasses both mitigation and adaptation, among all stakeholders. A significant portion of GVMC's departments exhibit uncertainty regarding the nature of climate action projects, often associating them with pollution control and plantation drives only. The SRU has an overarching role, with all climate activities occurring under its purview. Other departments exhibit limited to no awareness of ongoing climate projects, highlighting an absence of effective horizontal integration. Moreover, there is no indication of any capacity-building endeavours within GVMC aimed at climate action or integration. Although GVMC does conduct capacity-building activities for external stakeholders, these activities are unrelated to climate matters.

When inquiring about the inclusion of climate action in the educational curriculum, an interviewee from the Education Department mentioned that climate-related topics are predominantly incorporated within the environmental studies course, without a specific focus. Furthermore, it was

evident from the interviews that senior officials within GVMC possess a limited technical understanding of climate action, although they display significant interest in carrying out relevant initiatives. Consequently, institutional strengthening was highlighted as a key element in enhancing climate action.

Likewise, in terms of digitalization, there is a noticeable disparity between the high level of interest and the low level of actual digitalization in urban activities. As previously mentioned, the mapping of vulnerable groups and NGOs is done manually by the Urban Community Development Department, and there is no connection with the ICCC for this.

In terms of participation, GVMC consistently arranges interactions with citizens. An example is the weekly grievance program called 'Spandana,' conducted at the Mayor's office, where individuals can express their concerns. Additionally, other forms of engagement at the ward level, such as through Sacchi Valay systems, were also mentioned. However, there is uncertainty about the utilization of digital apps for engagement. Despite the existence of apps like Smart City Vizag, which has over 10 lakh registrations according to the ICCC, there is no reference to this app among other stakeholder groups. Furthermore, while citizens presently have the ability to be informed and express their views, the power to shape decisions has not been fully realized.

Regarding NGOs, it was deduced that only a few are presently engaged in climate action within the city. Many NGOs have a broader focus on empowerment and human rights, with climate aspects primarily limited to disaster management. LAYA stands out as one of the NGOs actively involved in climate mitigation, showcasing significant technical expertise in this realm.

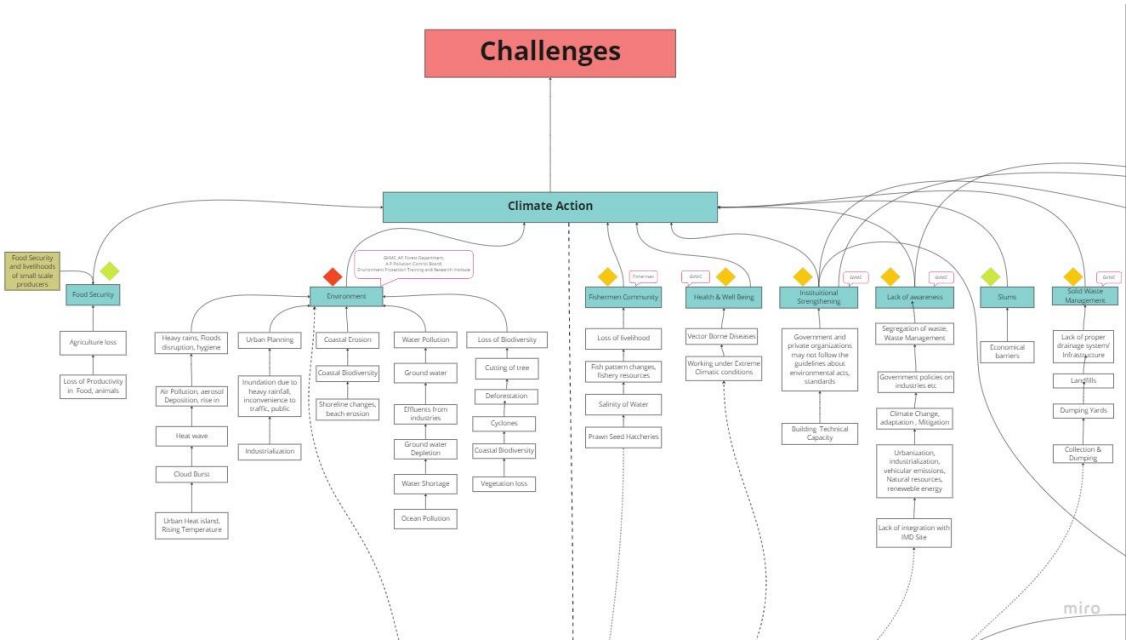
Interestingly, a representative from the citizens, through LAYA, argued that while GVMC collects a substantial amount of data, citizens have limited access to it. Information shared via SMS and WhatsApp groups tends to be siloed. The suggestion was made that citizens should have access to ward-level information through an online website or open data platform. An emphasis was placed on the development of a resource repository for citizens, enabling access and contributions. This approach could enhance governance while involving/enhancing the three aspects of climate action, participation, and digitalization.

On the academic front, interviewees demonstrated a substantial wealth of technical expertise concerning climate action, climate dynamics, weather forecasting, and early warning systems. Representatives from Andhra University also highlighted collaborations with GVMC, particularly on initiatives like the early warning system, reiterating existing synergy and productive partnerships.

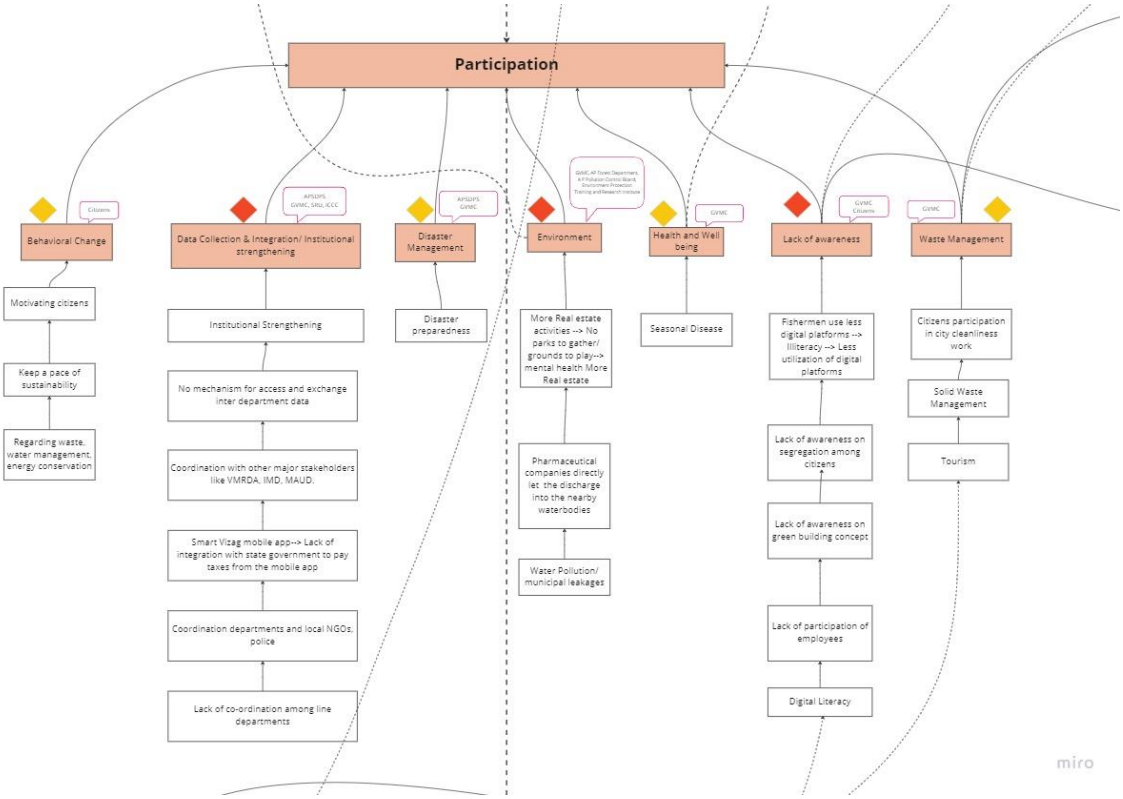
Lastly, the matter of securing sufficient funding for climate-related projects was highlighted by several interviewees within GVMC. While disaster management funds are allocated directly from the state level, the availability of funding for climate initiatives remains constrained. Presently, resources for projects are drawn from the smart city fund, the 15 Finance Commission, and a previous climate project facilitated in partnership with UNDP. To address this issue, suggestions were put forth to establish financial self-sufficiency for the climate cell of SRU, thereby enhancing the efficiency of climate-related activities. This avenue could be further explored through the urban living lab initiative, which is proposed to be housed within the Climate Cell itself.

Annexure

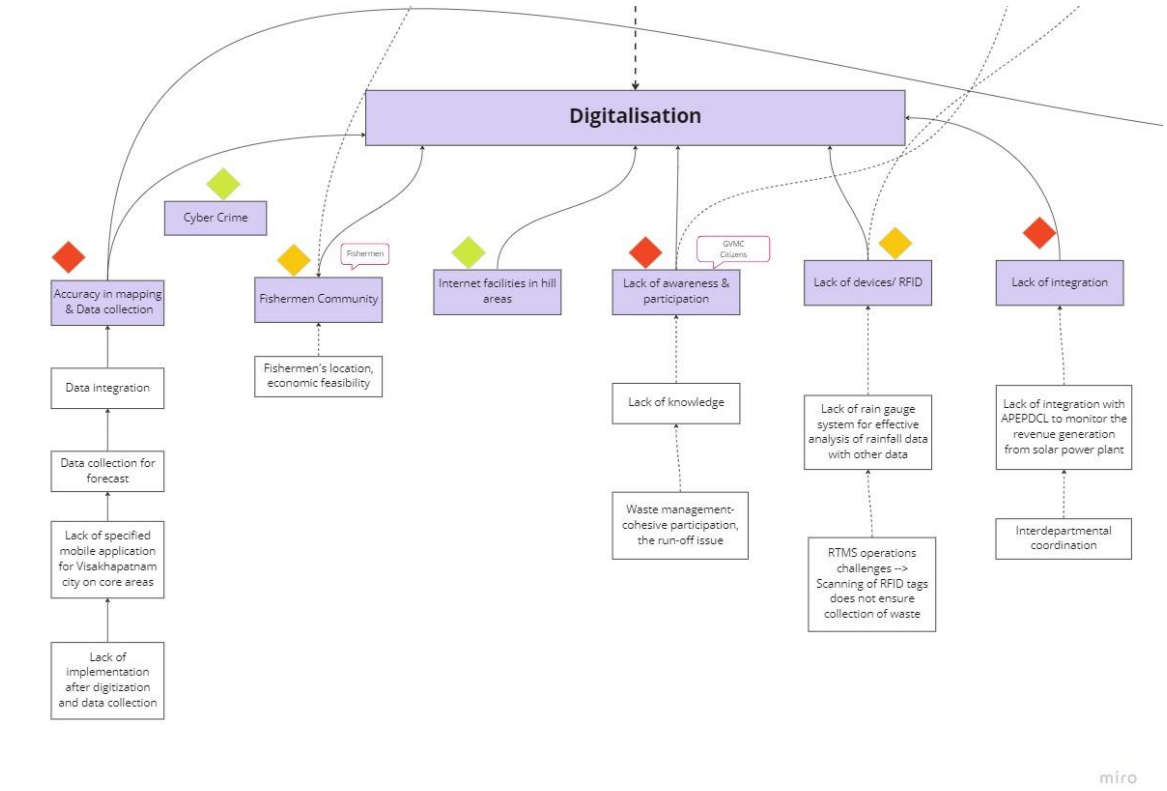
Annexure



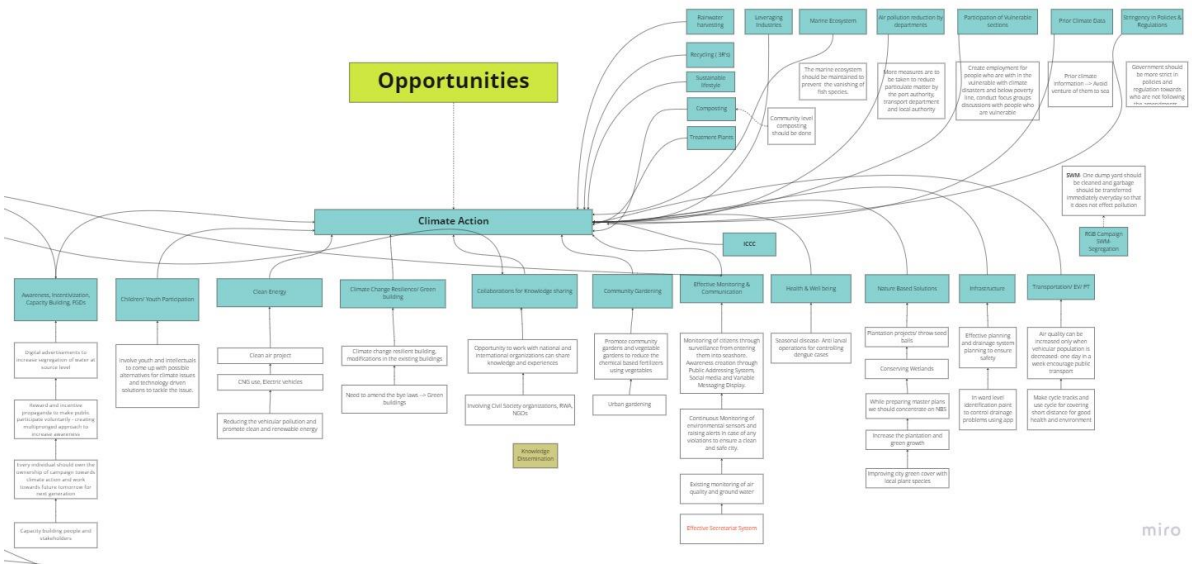
1. Mapping on Miroboard from Stakeholder Consultation Workshop: Challenges under Climate Action



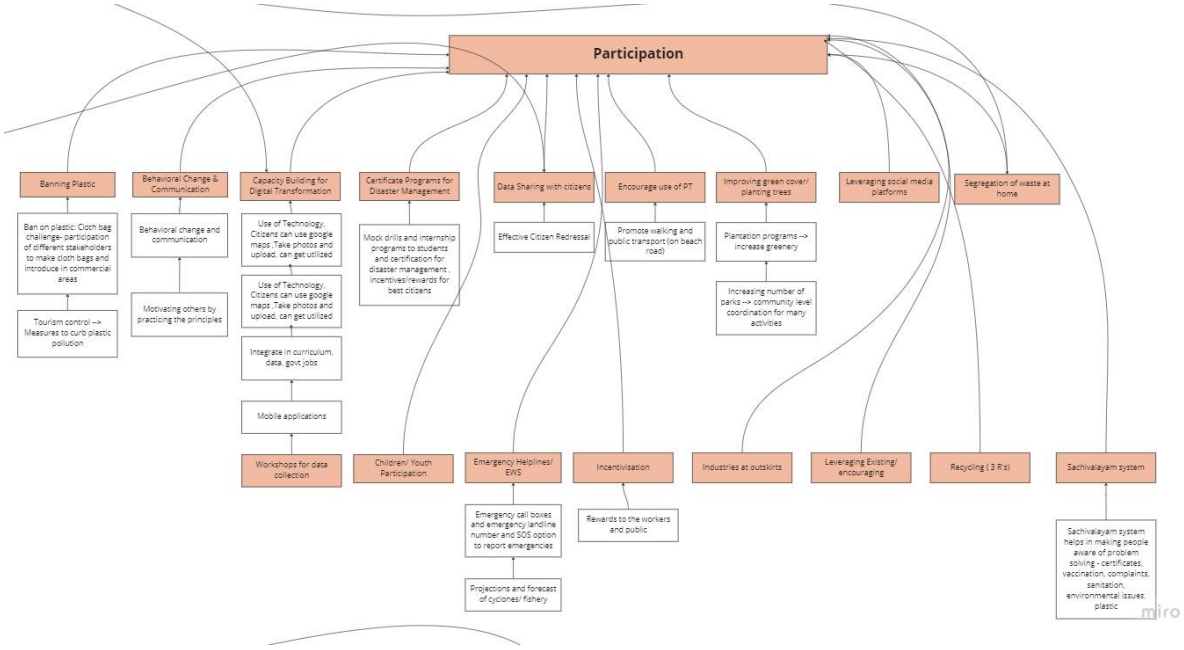
2. Mapping on Miroboard from Stakeholder Consultation Workshop : Challenges under Participation



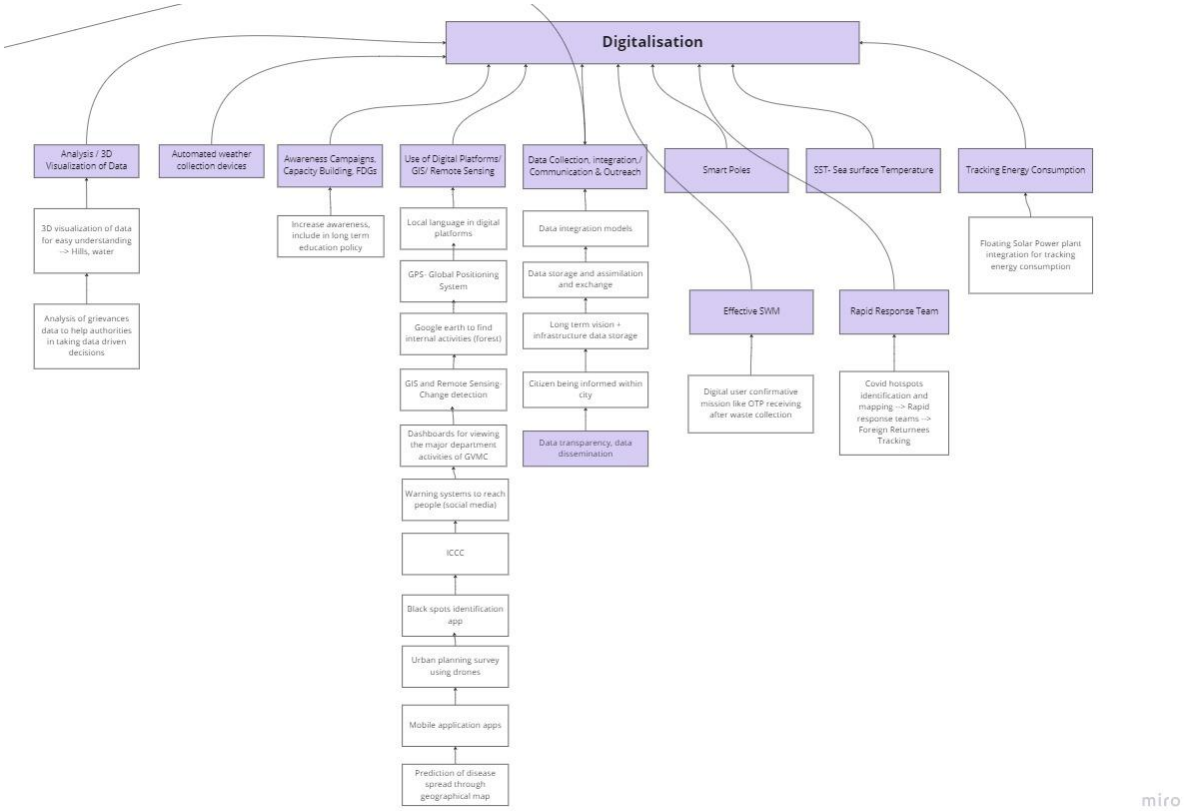
3. Mapping on Miroboard from Stakeholder Consultation Workshop: Challenges under Digitalisation



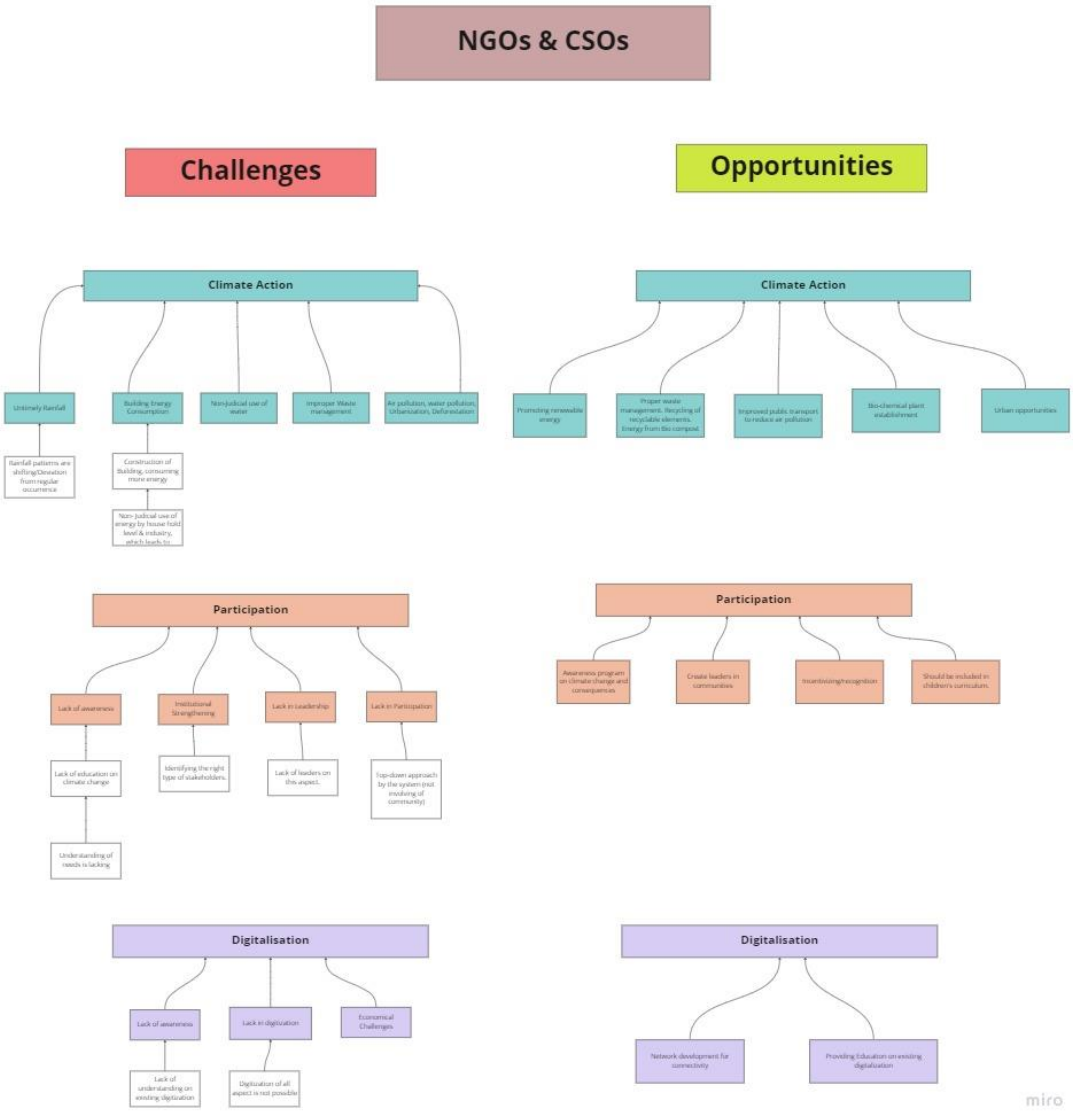
4. Mapping on Miroboard from Stakeholder Consultation Workshop: Opportunities under Climate Action



5. Mapping on Miroboard from Stakeholder Consultation Workshop: Opportunities under Participation



6. Mapping on Miroboard from Stakeholder Consultation Workshop: Opportunities under Digitalisation

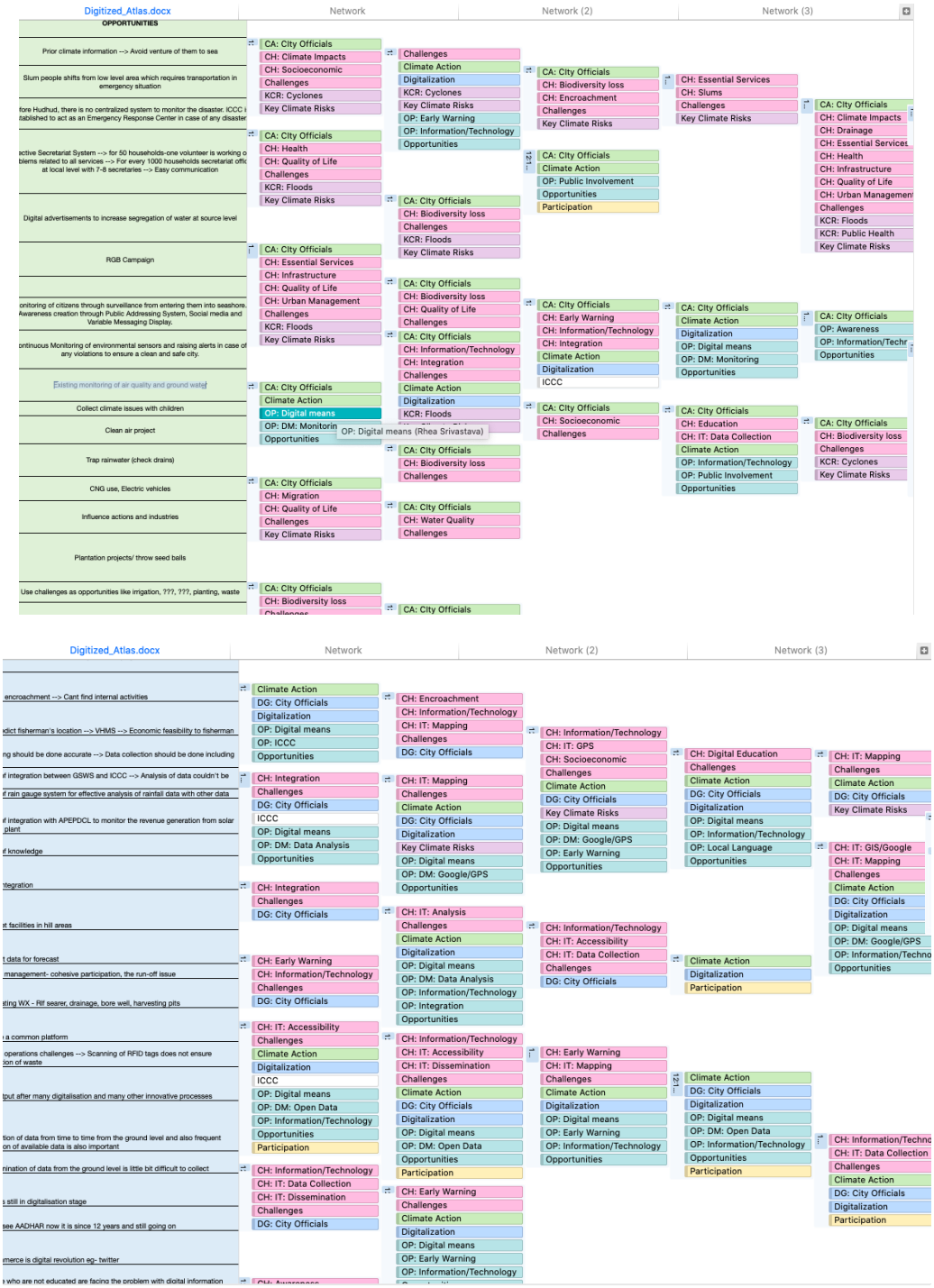


7. Mapping on Miroboard from Stakeholder Consultation Workshop: Challenges and Opportunities

Climate Action –City Officials	
CHALLENGES	**OPPORTUNITIES**
Fishermen lost livelihood --> No food --> falling under BPL	Prior climate information --> Avoid venture of them to sea
Cutting of trees (Encroachment)	Slum people shifts from low level area which requires transportation in emergency situation
Collapse of drainage system --> No water --> Diseases like Cholera and Salmonella	Before Hudhud, there is no centralized system to monitor the disaster. ICCC is established to act as an Emergency Response Center in case of any disaster.
Heavy rains, floods --> Cannot follow hygeine conditions	Effective Secretariat System --> for 50 households-one volunteer is working on problems related to all services --> For every 1000 households secretariat office at local level with 7-8 secretaries --> Easy communication
Mining activities --> Deforestation --> Global Warming	Digital advertisements to increase segregation of water at source level
Inundation problem occurs when heavy rain arises, due to most of the low laying areas. It gives lot of inconvenience to the traffic, public etc.	RGB Campaign
Due to climate changes most of the trees are fallen on the road side	
Lack of integration with IMD website	Monitoring of citizens through surveillance from entering them into seashore. Awareness creation through Public Addressing System, Social media and Variable Messaging Display.
Don't have mapping (GIS) for Inundation areas	Continuous Monitoring of environmental sensors and raising alerts in case of any violations to ensure a clean and safe city.
Behavioural changes	Existing monitoring of air quality and ground water
Economical barriers in slum areas	Collect climate issues with children

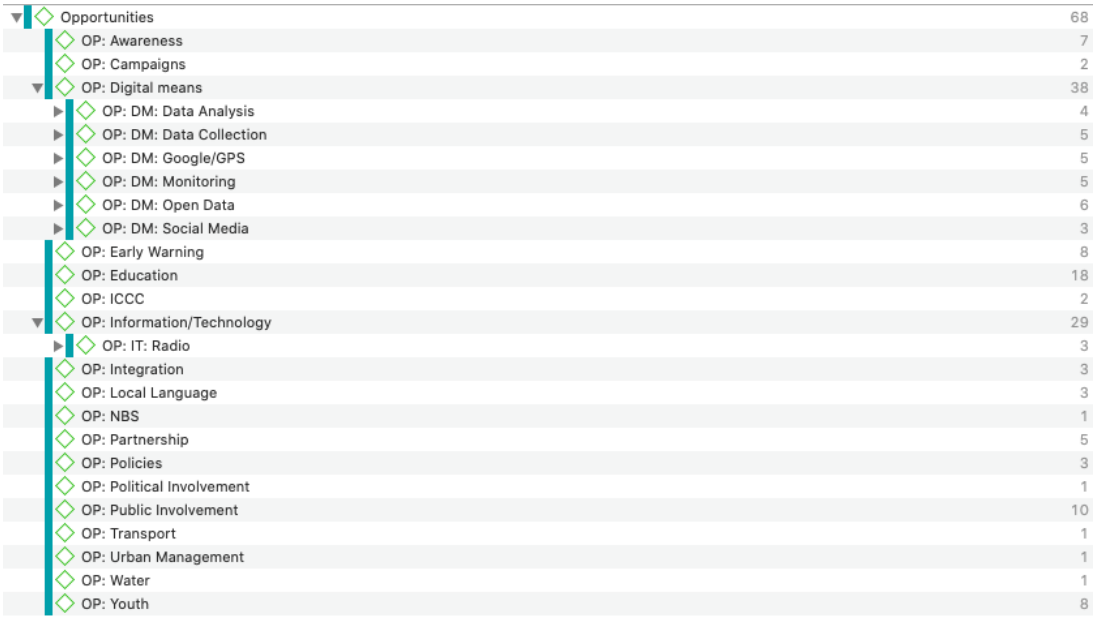
Digitalization – City Officials	
CHALLENGES	**OPPORTUNITIES**
Forest encroachment --> Cant find internal activities	Smart Poles
To predict fisherman's location --> VHMS --> Economic feasibility to fisherman	3D visualisation of data for easy understanding --> Hills, water
Mapping should be done accurate --> Data collection should be done including ???	Local language in digital platforms
Lack of integration between GSWS and ICCC --> Analysis of data couldn't be done	GPS- Global Positioning System
Lack of rain gauge system for effective analysis of rainfall data with other data	SST- Sea Surface Temperature
Lack of integration with APEPDCL to monitor the revenue generation from solar power plant	Google earth to find internal activities (forest)
Lack of knowledge	GIS and Remote Sensing- Change detection
Data integration	GSWS and VSWS app working for each household by volunteers and secretary --> Gram Sachiwaliya ward Sachiwaliya --> Volunteer (village and ward)
Internet facilities in hill areas	Analysis of grievances data to help authorities in taking data driven decisions
Collect data for forecast	Floating Solar Power plant integration for tracking energy consumption
Waste management- cohesive participation, the run-off issue	Tracking of revenue generationat Multi level car parking
Integrating WX - Rlf searer, drainage, bore well, harvesting pits	GPS Tracking of vehicles for effective solid waste management
Create a common platform	Dashboards for viewing the major department activities of GVMC
RTMS operations challenges --> Scanning of RFID tags does not ensure collection of waste	Covid hotspots identification and mapping --> Rapid response teams --> Foreign Returnees Tracking
	Every individual Household data of the citizen was

8. Digitized Data from the Consultation Workshop



9. Digitized Data on Atlas.ti

10. Codes Creation on Atlas.ti



11. Codes Creation on Atlas.ti

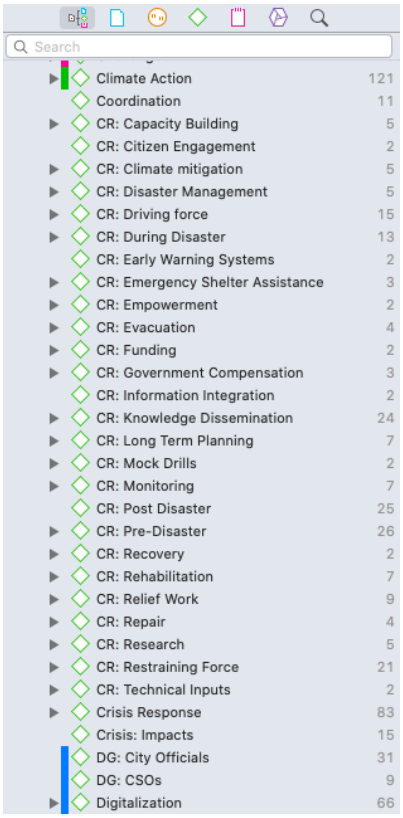
	Climate Action	Digitalization	Participation
	87	49	45
CH: Awareness 16	14	9	9
CH: Digital Education 11	9	7	6
CH: Drainage 3	1		
CH: Early Warning 11	10	10	2
CH: Education 4	4	1	3
CH: Information/Technology 26	19	12	8
CH: Infrastructure 8	2	1	2
CH: Integration 12	7	2	1
CH: IT: Accessibility 6	5	4	3
CH: IT: Accuracy 1	1		
CH: IT: Analysis 2	2	2	
CH: IT: Data Collection 7	3	1	1
CH: IT: Dissemination 3	2	2	2
CH: IT: GIS/Google 1	1	1	
CH: IT: GPS 1	1		
CH: IT: Mapping 6	5	4	
CH: PI: Equity 1	1		1
CH: Policies 7	3		2
CH: Political Involvement 2	2		1
CH: Public Involvement 3	2		3
CH: Recovery 1	1		1
CH: Socioeconomic 5	2	1	1
CH: Urban Management 6	1		
CH: Vulnerable 4	3	2	2
Challenges 117	61	38	32

	Climate Action	Digitalization	Participation
	87	49	45
OP: Awareness 7	5	1	3
OP: Campaigns 2	2		2
OP: Digital means 38	35	32	15
OP: DM: Data Analysis 4	3	3	1
OP: DM: Data Collection 5	4	3	4
OP: DM: Google/GPS 5	5	4	1
OP: DM: Monitoring 5	5	4	1
OP: DM: Open Data 6	6	6	4
OP: DM: Social Media 3	2	2	1
OP: Early Warning 8	7	6	
OP: Education 18	17	8	14
OP: ICCC 2	1	1	
OP: Information/Technology 29	26	24	11
OP: Integration 3	3	1	
OP: IT: Radio 3	3	3	
OP: Local Language 3	3	2	2
OP: NBS 1	1		
OP: Partnership 5	5		1
OP: Policies 3	3	1	1
OP: Political Involvement 1	1		
OP: Public Involvement 10	9	6	8
OP: Urban Management 1	1		
OP: Youth 8	8	1	8
Opportunities 68	59	35	28

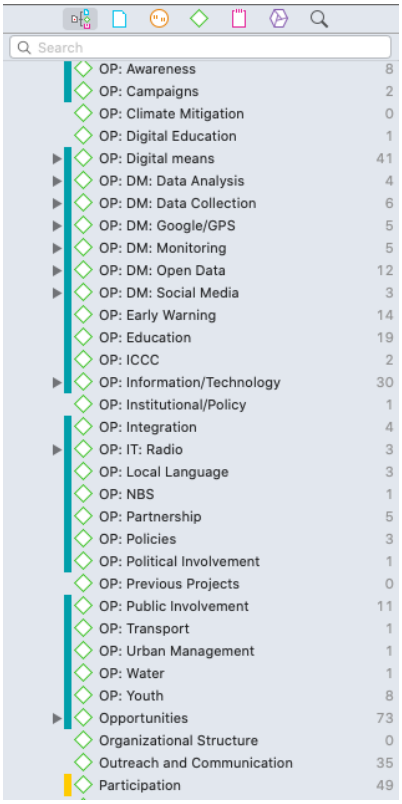
12. Atlas.ti Co-occurrence Table: Challenges & Opportunities

	OP: Awareness	OP: Digital m...	OP: DM: Moni...	OP: DM: Ope...	OP: Early War...	OP: Education	OP: Informati...	OP: Partnership	OP: Youth	Opportunities
	7	38	5	6	8	18	29	5	8	68
Stakeholders 76	6	24	2	5	6	9	21	4	4	44
STK: Academia 6	2					4		2		6
STK: APSPDCL 1										
STK: Citizens 6		3		3			2			3
STK: Communication 5		4			1		4			5
STK: CSOs and NGOs 18	1	5				6	4	4	1	12
STK: Fishermen 9	1	1			2		1			3
STK: GSWS 2		1								1
STK: GVMC 29	4	16	2	5	3	2	14		1	21
STK: ICCC 6		4	1	1	1		2			5
STK: IMD 5		3	1	1	3		4			4
STK: International Org... 1						1		1		1
STK: Police 2		1					1			1
STK: Slums 3						1				1
STK: Smart City 1										1
STK: Transportation D... 1										
STK: Tribal 6		1					1			1
STK: VMRDA 2										1
STK: Youth 11	3					5	1		4	8

13. Atlas.ti Co-occurrence Table: Stakeholders



13. Atlas.ti : Codes for Crisis Response



13. Atlas.ti: Codes for Opportunities