Capacity Building Programme

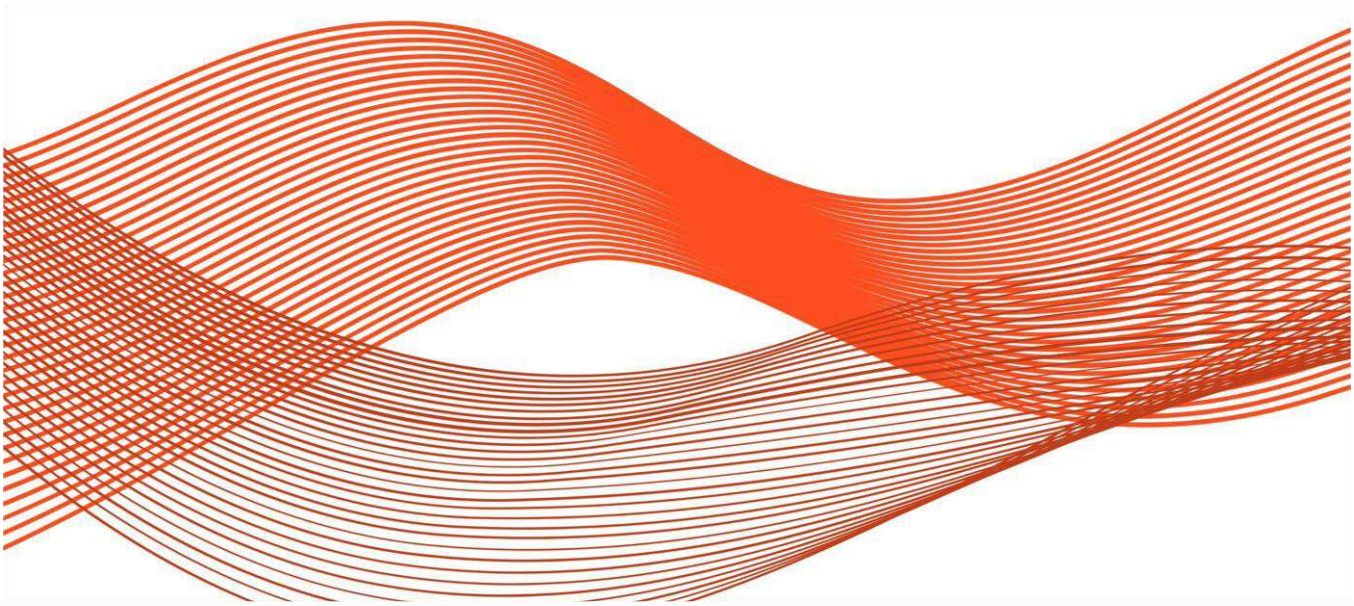
on

Climate Actions for Local Area Planning: Combating Heat Extremes

06th February – 10th February 2025

A-CUPCB-SPAV

TRAINING OUTCOME REPORT



Atal Mission for Rejuvenation and Urban Transformation

AMRUT Centre of Urban Planning for Capacity Building

A-CUPCB-SPAV

Summary of Capacity Building Programme (CBP) on "Climate Actions for Local Area Planning: Combating Heat Extremes"

Cities around the world had been aiming towards net-zero emissions and working to keep the global average temperature rise well within 2 degrees Celsius. By that time, more than half of the world's population was already living in urban areas, with projections indicating that it would reach 60% by the end of 2030. As cities expanded both horizontally and vertically to accommodate rising populations and the growing gap between resource demand and supply, more natural landscapes were converted into artificial surfaces.

While the real world grappled with the climate crisis and its multiple consequences, scientists and researchers had been developing ways to support planners, engineers, and architects in tackling these challenges through new tools and techniques. A critical question remained: how could climate-sensitive planning be implemented without first understanding the degree of sensitivity in existing landscapes have?

This capacity-building and skill-enhancement training provided a pathway toward Sustainable Development Goal 11 (Sustainable Cities and Communities) and Goal 13 (Climate Action). The training offered an opportunity for various urban stakeholders to gain hands-on experience with urban climate theories and practices, including exercises ranging from on-ground environmental measurement to computational simulation of real and ideal-case scenarios. Participants were equipped with a deeper understanding of regional and local climate conditions and the ability to identify mitigation and adaptation measures for climate challenges, particularly in relation to heat extreme. Additionally, the training fostered practical knowledge in evidence-based, climate-centric planning for combatting heat extremes.

Brief of Modules of Capacity Building Covered:

Day 1: Climate-centric Planning: Sensitization

- Human Settlement and Climate Change
- Heat Island
- Local Climate Zone
- Land Surface Temperature Mapping

Day 2: Measuring Urban Environment

- Climate Vulnerability
- Thermal Comfort and Measuring Instruments
- Site Visit

Day 3: Simulating Micro-Climate

- Adaptation and Mitigation
- Scenario Development
- Micro-Climate Modelling
- Hands-on Session

Day 4: Localized Heat Action Planning

- Heat and Health
- Heat action planning framework
- Interactive Session

Day 5: Projectization and Climate Finance

- Urban finance
- Projectization
- Interactive Session
- Review

The training provided participants with a platform to address local climate risks and enhance their strategic approach to urban development. Participants were equipped with the knowledge, tools, and strategies necessary to integrate climate considerations, focusing on extreme heat, into key aspects of urban planning and design. By understanding local urban design and vulnerabilities, stakeholders were better prepared to mitigate the adverse effects of climate change, including adapting infrastructure, buildings, and public spaces to withstand extreme weather events related to heat.

The training also emphasized sustainable development practices that not only mitigated climate change but also promoted long-term environmental sustainability. It highlighted the importance of incorporating green infrastructure—such as parks and green roofs—to improve air quality, reduce urban heat island effects, and enhance biodiversity. Participants gained insights into the complexities of urban projects and their interactions with climate conditions.

Furthermore, the training facilitated linkages between academia and industry, fostering collaboration for sustainable and implementable solutions. Overall, it served as a platform for

knowledge sharing and networking among urban planners, architects, engineers, policymakers, and community stakeholders, helping to advance climate-responsive urban development.

Dr. Anurag Bagade
Principal Instructor

Mr. Rajeev R
Co-Principal Instructor

Contents

List of Figures

CBP Day-wise Program Schedule

Day 1: Introduction to Urban Climate and Heat Extremes (Conceptual)		
Day 1: Thursday - Morning Session		
Time	**Session Details**	**Expert/Activity**
9:00 - 9:30 AM	Reporting to the institute, Kit Distribution	Registration reporting, Kit Distribution near 1st Floor Seminar Hall
9:30 - 9:50 AM	Welcome Address	SPAV (Director, Centre Head, PI and Co-PI)
9:50 - 10:00 AM	High Tea	
10:00- 11:00 AM	Human Settlement and Climate Change	Mr. Rajeev R, Expert, SPAV
11:00 – 12:00 PM	Urban Heat Island Effect	Dr. Anurag Bagade, Expert, SPAV
12:00 – 1:00 PM	Local Climate Zones	
1:00 - 1:30 PM	Lunch	
Day 1: Thursday - Afternoon Session		
Time	**Session Details**	**Expert/Activity**
1:30 - 2:30 PM	Land Surface Temperature (LST) Mapping	Dr. Anurag B, Expert, SPAV
2:30 - 4:00 PM	Local Climate Zone (LCZ) Mapping	
4:15 - 4:30 PM	High Tea	
4:30 - 5:30 PM	Interaction Session: LCZ and LST	Dr. Anurag B and Mr. Rajeev R , Expert, SPAV
Day 2: Assessments and Site Evaluations (Field-Based Investigations)		
Day 2: Friday - Morning Session		
Time	**Session Details**	**Expert/Activity**
9:00 - 10:30 AM	Vulnerability Assessment	Mr. Rajeev R, Expert, SPAV
10:30 - 10:40 AM	High Tea	
10:40 - 12:10 PM	Thermal Comfort and Measuring Device	Dr. Faiz A, Expert, SPAV
12:10 - 12:40 PM	Lunch Break	
Day 2: Friday - Afternoon Session		
Time	Session Details	Expert/Activity
1:00 - 6:00 PM	Field/Site Visit: Investigating, Measuring and Monitoring	
Day 3: Micro-Climate Simulations (Micro-Climate Simulations)		
Day 3: Saturday - Morning Session		
Time	**Session Details**	**Expert/Activity**

9:00 - 10:00 AM	Mitigation and Adaptation	Dr. Anurag Bagade, Expert, SPAV
10:00- 11:30 AM	Micro-climate Modelling: ENVI-met	Dr. Lily Rose, Expert, SPAV
11:30 - 11:40 AM	High Tea	
11:40 - 12:20 PM	Micro-climate Modelling: Drafting and Simulation (Part II)	Dr. Anurag Bagade, Expert, SPAV
12:20 - 1:10 PM	Micro-climate Modelling: Visualization of Output and Case Representation	
1:10 - 2:00 PM	Lunch Break	
Day 3: Saturday - Afternoon Session		
Time	**Session Details**	**Expert/Activity**
2:00 - 4:15 PM	Simulating Urban Micro-Climate (Base Case)	Dr. Anurag Bagade, Expert, SPAV
4:15 - 4:30 PM	High Tea	
4:30 - 5:30 PM	Micro-climate Modelling: Scenario Development	
Day 4: Developing Localised Heat Action Plans (L-HAPs)		
Day 4: Sunday - Morning Session		
Time	**Session Details**	**Expert/Activity**
9:00 - 10:00 AM	Heat and Health Implications	Dr. Mahavir, IIPH, Gandhinagar
10:00- 11:30 AM	Framework for Preparing Heat Action Plans	Dr. Rajashree Kotharkar, Professor, VNIT, Nagpur
11:30 - 11:40 AM	High Tea	
11:40 - 1:00 PM	Micro-climate Modelling: Visualisation and Decision Making	Dr. Anurag Bagade, Expert, SPAV
1:00 - 1:30 PM	Lunch Break	
Day 4: Sunday - Afternoon Session		
Time	**Session Details**	**Expert/Activity**
1:30 - 2:45 PM	Interactive Session: Heat Action Planning	Dr. Aveek, Assistant Professor and Research Co-ordinator, NITTE Institute of Architecture, NITTE (DU), Mangalore,
2:45 - 4:15 PM	Interactive Session	Dr. Aveek, Assistant Professor and Research Co-ordinator, NITTE Institute of Architecture, NITTE (DU), Mangalore,
4:15 - 4:30 PM	High Tea	
4:30 - 5:30 PM	Interactive Session	

Day 5: Institutionalizing Climate Actions		
Day 5: Monday - Morning Session		
Time	**Session Details**	**Expert/Activity**
9:00 - 10:30 AM	Plan/Project Appraisal	Dr. Arpan P
10:30 -10:40 AM	High Tea	
10:40 - 12:00 AM	Urban finance	Dr. Prasanth V
11:40 - 1:10 PM	Interaction Session: Hands-on and Presentation Work	Mr. Rajeev R
1:10 - 2:00 PM	Lunch Break	
Day 5: Monday - Afternoon Session		
Time	**Session Details**	**Expert/Activity**
2:00 - 4:00 PM	Interaction Session: Presentation and Project summary	Trainers, SPAV
4:00 - 4:15 PM	High Tea	
4:15 - 5:00 PM	Presentation/Written Exam, Feedback and Distribution of Training Certificates	Presentation/Written exam by Participants
5:15 - 5:30 PM	Concluding Session & Feedback	Feedback and Distribution of Training Certificates

CBP's Trainer Team

Patrons

Dr. Amogh Kumar Gupta

Chairman BoG, SPA Vijayawada

Prof. Dr. Ramesh Srikonda,

Director, SPA Vijayawada

Prof. Dr. Ayon K Tarafdar

Head A-CUPCB-SPAV, SPA Vijayawada

Principal Trainer

Dr. Anurag Bagade

SPA Vijayawada

Co-Principal Trainer

Mr. Rajeev R.

SPA Vijayawada

List of Experts

Prof. Dr. Mahaveer Golecha, Head, IIPH, Gandhinagar

Prof. Dr. Rajashree Kotharkar, Professor, VNIT, Nagpur

Mr. Aveek Ghosh, Assistant Professor & Research Coordinator, NITTE (DU), Mangalore

Dr. Lily Rose, SPA Vijayawada

Dr. Prasanth V, SPA Vijayawada

Dr. Faiz Ahmed C, SPA Vijayawada

Inauguration of CBP on 06-02-2025

The five-day Capacity Building Programme titled "Climate Actions for Local Area Planning: Combating Heat Extremes" was inaugurated on 06th February 2025 at SPA Vijayawada Campus. The session was held in the smart conference room of SPAV which is equipped with the necessary infrastructure to support interactive sessions and lectures.

The inaugural session commenced with the Welcome Address by the Principal Instructor Dr. Anurag Bagade, who welcomed the participant for the CBP and introduced the chair. The inaugural chair was graced by Chief Patron Dr. Amogh Gupta, Chairman BoG, Prof. Dr. Ramesh Srikonda, Director, SPA Vijayawada and Prof. Dr. Ayon Tarafdar, Head A-CUPCB-SPAV. The opening of the CBP program was announced by Prof. Dr. Ramesh Srikonda. He emphasised the need for and importance of this topic. Further Prof. Dr. Ramesh highlighted how SPAV can play a pivotal role in integrating climate-responsive planning, disaster risk reduction, and adaptive infrastructure strategies to address the regional to local challenges and opportunities.

Dr. Ramesh introduced the Chief Patron BoG Chaiman, Dr. Amogh Gupta and invited him to share his thoughts and words of encouragement to the participants. Dr. Amogh discussed about how urban development and urban challenges are inter-linked with the needs and aspiration of people. He discussed how the capacity building program gives insight to the climate actions at local level. Dr. Amogh stressed on the aspects of global challenges needs local level solutions. He lauded the efforts of SPAV and Head ACUPCB-SPAV for organising the training programme on the much-needed topic.

Figure 1: Chief Patron Prof. Dr. Ramesh Srikonda in the Inaugural session of the CBP-1

Figure 2: Inaugural session address by Chief Patron Dr. Amogh Gupta ji (left) and Patron Prof. Dr. Ayon Tarafdar (right)

The inaugural session further continued with the deliberations on the activity undertaken under Amrut Centre of Urban Planning for Capacity Building by the Head A-CUPCB-SPAV Prof. Dr. Ayon Kumar Tarafdar. He discussed on how the training programmes and research projects were selected by the centre and how it played an important role in building capacity towards resilient urban planning and development. Dr. Ayon further discussed the various ongoing projects in different cities under the A-CUPCB-SPAV.

The inaugural session was closed with the program overview of the 5-days CBP presented by the Principal Instructor Dr. Anurag Bagade. The session discussed about the design of the

training program and how it paves way towards not just understanding the heat related urban challenges but to take scientific measures to address the same. Dr. Anurag closed the inaugural session with thanks to the chair and announcement for a tea-break.

Figure 3 Participants and Experts attending the Inaugural Session

Session Proceedings

The entire training session was conducted in five days with a combination of theory, lab-based, activity-based and participation-based approach. The first day completed the registration process. A total of 28 participants reported the workshop. The first day of training consisted of 4 sessions by 2 experts. Day 1 focused on the conceptual understanding of the subject. Day 2 focused on the analysis and field-based investigations of local area. Day 3 provided understanding on lab-based simulations of local areas for mitigations. Day 4 imparted training on heatwave and heatwave action planning (HAP) with interactive exercise on inter-departmental coordination for developing HAP. Day 5 with focus on institutionalising climate action examining plan appraisal, urban finance and projectisation. The training concluded with the valedictory session and feedback from the participants were taken and certificates were distributed.

Day 1 Conceptual understanding

Session 1: Human Settlement and Climate Change

Expert: Mr. Rajeev R, SPAV

The session sensitized the participants with the discussion on how climate, cities and land have symbiotic relation. The presentation provided evidence from the international panel on climate change related to the extreme risk the human population especially those living in urban areas. The session also introduced an interactive learning activity wherein the participants were given a web-link with series of photos related to the topic and were asked their take on the image seen.

Figure 4 Session 1 delivery by the expert Rajeev R.

The session imparted training on how urban form is responsible for climatic variation and what is the approach towards understanding of urban development and its impact on climate and vis-a-viz. The session also discussed the accounting of emissions in various geographic and demographic situation.

Session 2: Urban Heat Island Effect

Expert: Dr. Anurag B, SPAV

The session discussed about the urban climate and urban development challenges. The session grouped the urban challenges based on human-induced and climate-based and discussed each component. It presented a detailed approach on how various urban phenomenon led to urban heat island (UHI) development. The session discussed the evolution and scales of UHI Studies. It introduced various types of Urban heat island reporting to the

participants. Further the session discussed the various factors influencing the development of UHI. The session also introduced case examinations of Indian cities and how they dealt with UHI examination. The training session concluded on the discussion on urban climate investigation and its evolution.

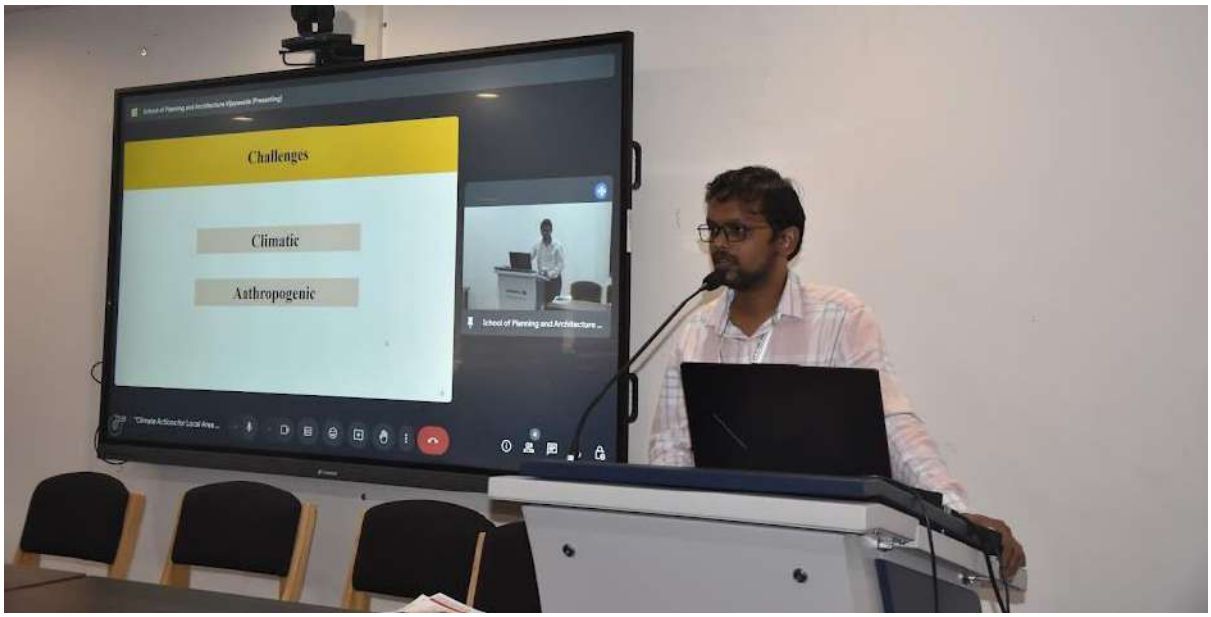


Figure 5 Session by Dr. Anurag Bagade on Day 1

Session 3: Local Climate Zone

Expert: Dr. Anurag B, SPAV

The session detailed the issues pertaining to the various approaches used in urban heat island mapping and measurement. It highlighted the challenges pertaining to reporting of UHI and using the appropriate scale to measure UHI intensity. The session introduced various zoning strategies and emphasized the importance of local climate zone – a landscape classification system for urban heat island mitigation. The session imparted knowledge on how the mapping of local climate zones is done and explained the same with a case study of Nagpur.

Activity 1: Land Surface Temperature

Expert: Dr. Anurag B, SPAV

The session was held in the GIS lab of the institute. It demonstrated the mapping of land surface temperature through use of satellite imagery. It demonstrated various data source to be used for surface temperature understanding and also discussed the various challenges involved in merely using satellite-based exploration in UHI assessment. Participants were

provided with resource material using which they derived Land Surface Temperature using GIS Software.

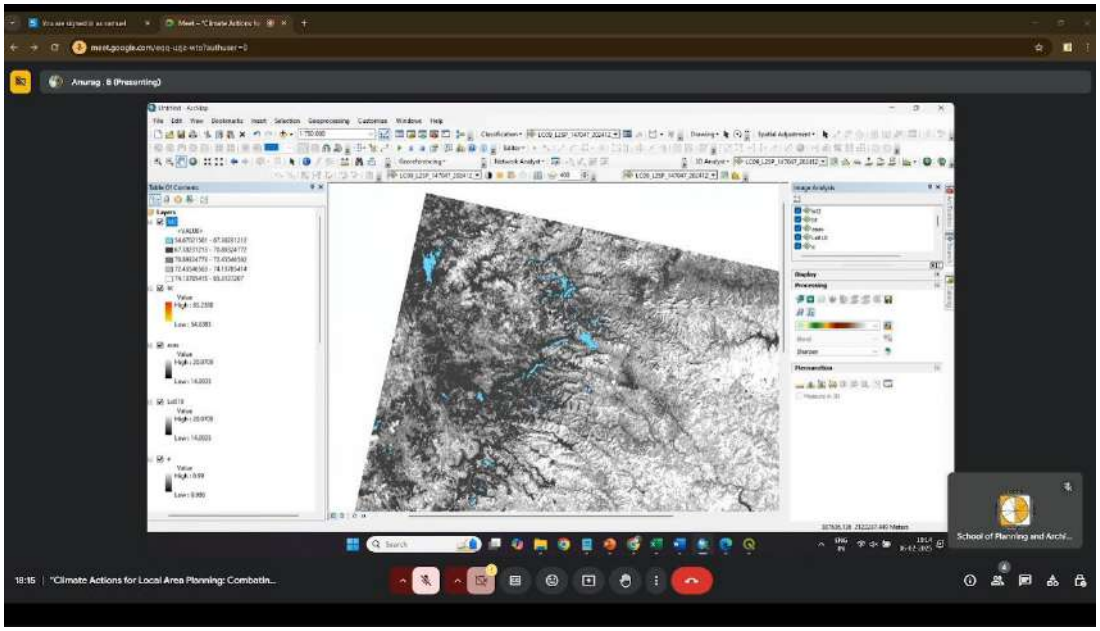


Figure 6 Land Surface Temperature Mapping demonstration to participants

Activity 2: Local Climate Zone

Expert: Dr. Anurag B, SPAV

The session was extension of Local Climate Zone (LCZ) understanding. It explained participants on how to develop a local climate zone map using online tools and technique. The hands-on exercise dealt with producing an LCZ map of Vijayawada with sample training areas. The participants learnt about automated and non-automated mapping techniques of LCZ.

Figure 7 Local Climate Zone Discussion and Hands-on in GIS lab of SPAV

Day 2 Field Based Investigations

Session 1: Vulnerability Assessment

Expert: Mr. Rajeev R, SPAV

The session discussed manifestation of hazards and its implications. It demonstrated what are the fundamental aspects of vulnerabilities. It discussed about sensitivity, exposure and adaptive capacity components in the vulnerability assessment. The session gave a detailed description for each component of vulnerability and how to prepare list of parameters to measure vulnerability. Participants were able to conduct a vulnerability assessment related to heat hazards in the hands-on exercise conducted by the expert.

Figure 8 Expert lecture on Vulnerability

Session 2: Thermal Comfort and Measuring Device

Expert: Dr. Faiz A, SPAV

This session introduced the concepts of thermal comfort. It took the local scale discussions of heat to a micro and human thermal comfort discussion space. The session presented meteorological findings on growing concerns of heat and heatwaves. It discussed basics of heat, temperature and comfort aspects in outdoor environment. The session imparted the knowledge of various index used in measuring outdoor thermal comfort. The session also provided highlights on how different indices report different level of comfort. It briefed participants about careful selection of index while dealing with heat related studies for the city.

Figure 9 Expert lecture on thermal comfort and measuring devices (top); Participants interacting with expert (bottom left) and SPAV volunteer demonstrating a Weather Station, its setup and use (bottom right)

Session 3: Field Visit

Expert: Dr. Anurag Bagade, SPAV

The session began with orientation of participants for conducting site investigation by the expert. The participants were divided in a group of three and each group was assigned a neighbourhood of a local scale to document the various factors affecting urban heat island based on the training sessions. The objective of this exercise included mapping and measuring the urban environment along with collecting site data for computational modelling. The participants along with the experts surveyed the site covering all internal streets of the selected sites and documenting climatic variables such as air temperature, wind speed and wind direction. The participant learnt the placement of weather station and the technique to document site condition.

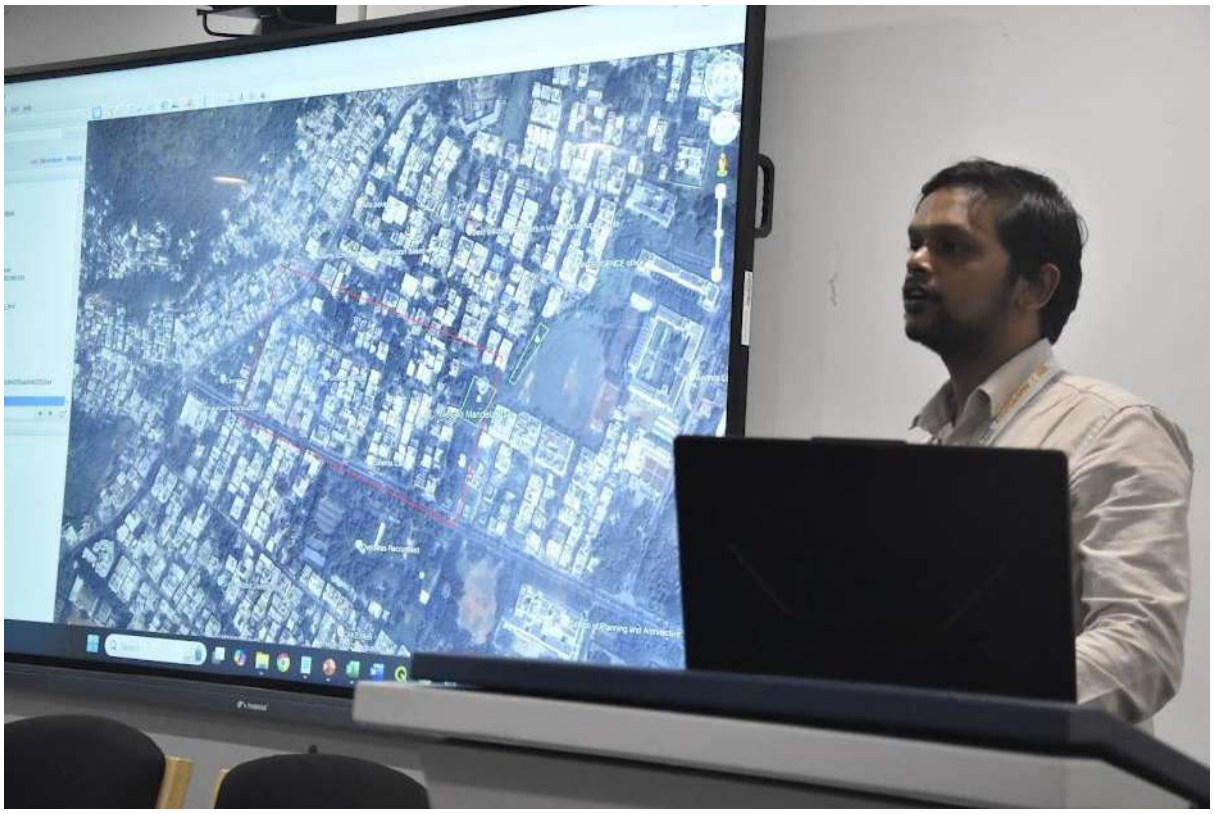


Figure 10 Introduction of Site visit activities by expert

Figure 11 Glimpses of Field visit

Day 3 Micro-climate Simulations

Session 1: Mitigation and Adaptation

Expert: Dr. Anurag B, SPAV

This session gave insights into the various approach to mitigation and adaptation to the participants. It demonstrated on how to consider controllable and uncontrollable factors of heat propagation to develop alternatives for mitigation. The session discussed the major and minor considerations while devising the strategies to intervene. It also introduced the mitigation scenario simulation software Envi-met. The training session imparted knowledge on how different scales and different local climate zones need different mitigation approach and one blanket fits all solutions may not always work.

Session 2: Micro-climate Modelling: ENVI-met

Expert: Dr. Lily Rose, Expert, SPAV

The session discussed the various scenario building exercise for UHI mitigation using ENVI-met. The session provided insights on mitigation strategies in line with development planning approaches. This session gave an understanding to the participants to integrate concepts of FAR, TOD and plot area ratio utilization in developing climate responsive strategies. The session also discussed the challenges of redevelopment strategies and new cluster development opportunities in line with climate sensitive approaches.

Figure 12 Participants engaged in session on Envi-met

Figure 13 Computer lab based interaction

Session 3: Micro-climate Modelling II: Drafting and Simulation
Dr. Anurag Bagade, Expert, SPAV

Based on the learning of previous sessions, this session demonstrated hand-on lecture on a micro-climate simulation software – Envi-met. The sites which were investigated in the previous day were modelled in the software and its thermal behaviour was studied. The

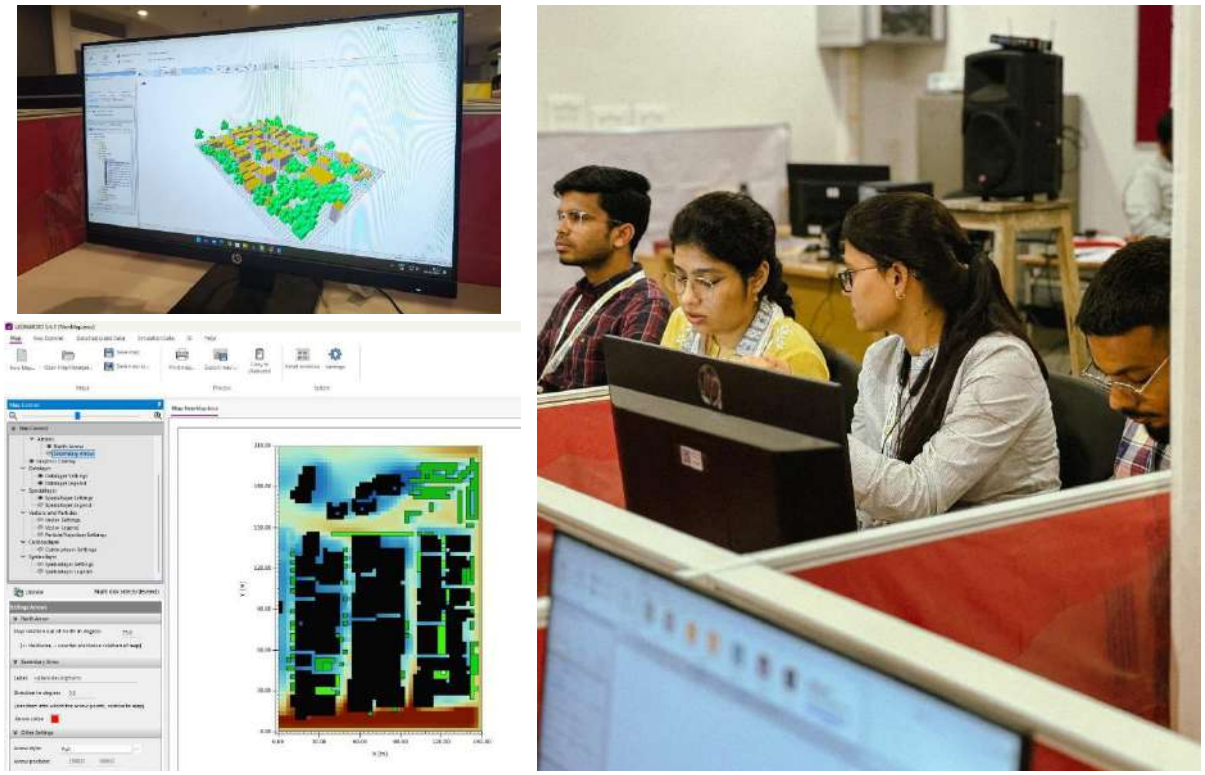


Figure 14 Hands-on exercise

`CBP on Climate Actions for Local Area Planning organised by A-CUPCB-SPAV – Training Outcome Report

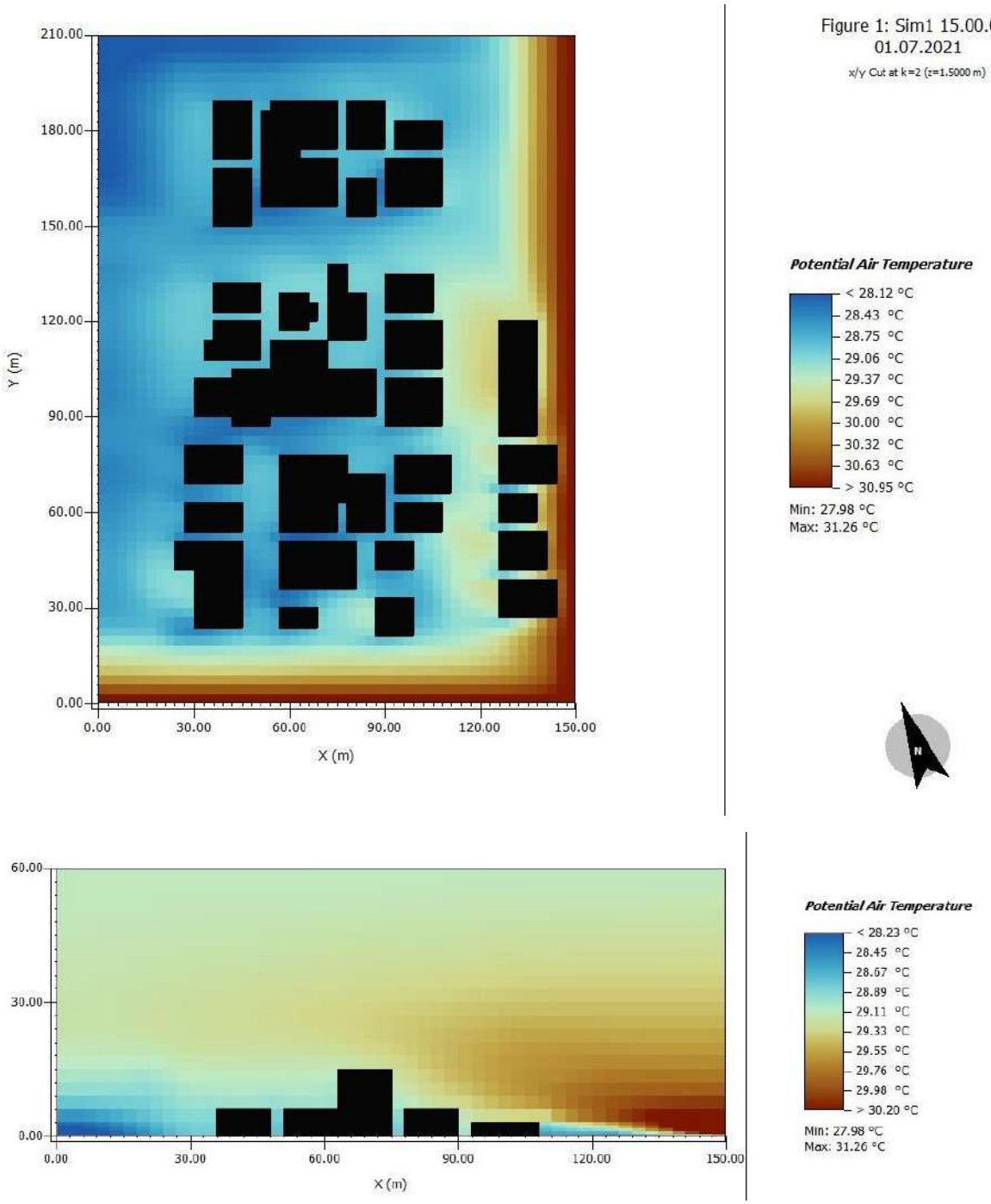


Figure 15 Model simulation output by participant

Day 4 Localized Heat Action Planning

Session 1: Heat and Health

Speaker: Prof. Dr. Mahaveer Golachha, IIPH, Ahmedabad

This session delved into the growing concerns of heat exposure and its direct implications on public health. It outlined four key components essential for mitigating heat-related health risks: early warning systems, public awareness initiatives, capacity building for medical response, and adaptive measures to minimize heat exposure. Early warning systems, driven by meteorological data, were highlighted as a crucial tool for pre-empting heatwaves and enabling timely interventions. Public awareness campaigns, including educational programs on heat mitigation practices, were discussed as an effective means of reducing vulnerability among communities. Capacity building in the medical sector was emphasized, with a focus on training healthcare workers to handle heat-induced illnesses efficiently. Adaptive measures, such as passive cooling techniques, increasing urban greenery, and promoting heat-resilient infrastructure, were presented as long-term solutions.

Figure 16 Session on Heat and Health

The session also explored both short-term and long-term strategies for heat mitigation. Short-term strategies included the expansion of urban tree cover, installation of cool roofs with reflective surfaces, and establishment of temporary cooling centres during peak summer months. In contrast, long-term strategies involved conducting vulnerability assessments to identify high-risk areas and integrating heat mitigation policies into urban planning frameworks. The Ahmedabad Heat Action Plan was presented as a case study, showcasing successful interventions such as the application of cool roofs, strategic urban infrastructure planning to reduce localized heat pockets, and water-based cooling solutions like the BBG India Riverfront Project.

Key takeaways included the preventability of heat illness through proactive measures, the necessity of understanding the link between heat and climate change, and the importance of incorporating morbidity assessments into Heat Action Plans (HAPs). The discussion also emphasized the role of municipal corporations in policy implementation and the need for a multi-sectoral approach to climate adaptation.

Session 2: Heat and Health Framework for Preparing Heat Action Plan (HAP) for Indian Cities

Speaker: Prof. Dr. Rajashree Kotharkar, VNIT Nagpur

The session provided a comprehensive framework for formulating and implementing Heat Action Plans (HAPs) in Indian cities. It emphasized key milestones in heat mitigation efforts, from initial research in 1995 to the formal development of HAP guidelines. The core objectives of a Heat Health Action Plan (HHAP) were outlined, focusing on minimizing the adverse effects of extreme heat through proactive interventions and improving public preparedness.

The session covered essential elements of HAPs, starting with the designation of a lead authority responsible for overseeing planning and execution. The development of an accurate early warning system was emphasized, with a focus on effective communication channels to disseminate heatwave alerts to vulnerable populations. Health information dissemination was another critical component, involving public advisories and educational campaigns on protective measures against extreme heat. The session also provided insights on developing strategies for reducing indoor heat exposure through heat-resilient building designs and energy-efficient cooling methods.

The session expert also discussed critical considerations for HAP implementation, including the identification of heat stress hotspots and setting thresholds for heatwave classification. The importance of Local Climate Zones (LCZ) in urban heat island mitigation was underscored, along with policy integration strategies to align heat adaptation measures with existing urban regulations. Community engagement and awareness were emphasized as key drivers of effective heat mitigation, ensuring that residents are equipped with the knowledge and resources to protect themselves from extreme temperatures.

Figure 17 Session on heat action plan and its framework

Session 3: Interactive Session
Expert: Aveek Ghosh, NITTE, Mangalore

The interactive session and lecture provided information on how heat action planning evolved and what is the difference in heat action plan and heat-health action plans. The session demonstrated the various agencies involved in heat action planning and how their coordination plays pivotal role in managing heat extremes. The session culminates with the role-playing activity wherein the participants were divided into multiple groups, and they

enlist the long term, medium-term and short-term activity. The groups then coordinated amongst each other and developed an integrated action plan.

Figure 18 Interactive session by expert on Heat Action Plan development

Figure 19 Memento awarded to the expert by the instructors

Day 5 Institutionalising Climate Actions

Session 1: Project Planning and Appraisal

Expert: Dr. Arpan Paul Singh, SPA Vijayawada

This session explored the planning and financial appraisal of urban projects, with a specific focus on the feasibility of cool roofs. The assessment of cool-roof implementation was analysed through multiple lenses, including market demand, financial viability, technical considerations, socio-economic impacts, and ecological benefits. The discussion emphasized that cool roofs, by reflecting more sunlight and absorbing less heat, play a significant role in reducing indoor temperatures and enhancing energy efficiency.

Financial appraisal methodologies for urban projects were thoroughly examined. The session covered project cost estimation, funding sources such as public-private partnerships (PPPs), land value capture, community-based contributions, and tax incentives. Revenue generation models were explored, assessing potential returns on investment through energy savings and reduced healthcare costs linked to lower heat exposure.

Figure 20 Expert session on project appraisal

Key challenges in urban project implementation were also discussed, including unintended environmental impacts, equity concerns, and economic disruptions. The necessity for Environmental Impact Assessments (EIA) was highlighted to ensure sustainable material use and prevent over-extraction of resources. Socioeconomic equity was addressed, emphasizing the risk of urban projects disproportionately benefiting higher-income groups while excluding marginalized communities. Regulatory frameworks, localized adaptation of Heat Action Plans, and transparent financial tracking mechanisms were recommended to overcome these challenges.

The session concluded by underscoring the importance of balancing financial sustainability with social and environmental considerations. A well-structured project planning and appraisal process can lead to the successful implementation of heat mitigation strategies, contributing to resilient and sustainable urban development.

Figure 21 Expert discussion with participants on project appraisal

Session 2: Urban Finance, Vulnerability, and Climate Change

Expert: Dr. Prashanth Vardhan, Head, Planning, SPA Vijayawada

This session examined the financial challenges associated with urban climate adaptation and infrastructure development. A key discussion point was the financial dependency ratio of municipal bodies, which compares revenue generation to expenditures. High dependency on external funding was identified as a significant barrier to urban sustainability, prompting discussions on increasing own-source revenue through local taxation, service charges, and value capture mechanisms.

The session explored the backlog in infrastructure investments and rising energy demands due to rapid urbanization. Climate finance was presented as a crucial enabler of adaptation, with funding mechanisms such as green bonds, beneficiary-pay models, and conditional grants. Alternative financing models, including PPPs, congestion pricing, and development impact fees, were examined as potential solutions for optimizing urban finance.

Policy recommendations included enhancing fiscal autonomy for Urban Local Bodies (ULBs), ensuring financial transparency and encouraging strategic public and private investments. The discussion underscored the necessity of integrating climate finance into urban planning to build resilient cities capable of mitigating heat-related vulnerabilities while promoting sustainable development.

Figure 22 Session expert discussing urban finance with the participants

Session 3: Interactive Session

Expert: Dr. Anurag Bagade, SPAV

Participants were engaged in a Q & A session on the overall sessions covered till date. They were provided with opportunity to complete the assignments and micro-climate modelling of the site. The participants moved to GIS and Computer simulation lab for further completing the assigned work. The participants

Session 4: Review

Expert: Dr. Anurag Bagade & Mr Rajeev R, SPAV

Figure 23 Group Review showcasing participants learning received from training and activity sessions.

The participants were divided into three groups. Each group presented the outcome of training exercises assigned. Each group showcased an innovative approach in addressing heat and its extreme problems. The model outcome was discussed and the reviewed by trainers. The trainers gave insights on what could further improve the localised investigations into heat action planning and how to take the work further.

Participant Feedback

The Participant Feedback was obtained through Google Forms which was circulated to participants through email form the A-CUPCB-SPAV. A summary of the feedback received from the participants is presented below. The participants enjoyed the overall learning experience gained. They appreciated the mix of in-depth lectures with field and lab-based activity. The participants showed their gratitude for the institute for organising the training which allowed them to gain insights ranging from foundational knowledge to professional-level understanding.

Figure 24 Head ACUPCB-SPAV interacting with Participants in the concluding session

The combination of academic and practical learning made the training both informative and enriching. One of the participants highlighted the field study component, which offered hands-on learning opportunities and facilitated meaningful interactions with the urban environment. The interactive elements in training and especially the modelling of micro-

climate provided a dynamic learning experience, encouraging active participation and critical thinking.

Participants' Profile

Sr No.	Participant Name	Participant Number	Participant Type	Participant Designation	Participant Designation	Participant State
1	Shivani trivedi	CBP_24_01_01	Private / Student	Bachelors of Architecture Student	Bachelors of Architecture Student	Gujrat
2	Devleena Hazarika	CBP_24_01_02	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
3	Swathikka S	CBP_24_01_03	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
4	Krithikdev S	CBP_24_01_04	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
5	Sreesha S Bhat	CBP_24_01_05	Private	Faculty, RIT Bangalore	Faculty, RIT Bangalore	Karnataka
6	Sneha Jalindar Gangarde	CBP_24_01_06	Private / Student	COEP Technological University Pune	COEP Technological University Pune	Maharashtra
7	Runali Dnyaneshwar Pandit	CBP_24_01_07	Private / Student	COEP Technological University Pune	COEP Technological University Pune	Maharashtra
8	Juyee Ashok Rengde	CBP_24_01_08	Private / Student	COEP Technological University Pune	COEP Technological University Pune	Maharashtra
9	Pranoti Raut	CBP_24_01_09	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Maharashtra
10	Gayatri Govinf Thakar	CBP_24_01_10	Private / Student	Bachelor of Planning	Bachelor of Planning	Maharashtra
11	Tanaya Paul	CBP_24_01_11	Private / Student	Sustainable Architect & PhD Researcher	Sustainable Architect & PhD Researcher	Andhra Pradesh
12	Rachakonda Himaja	CBP_24_01_12	Private / Student	Bachelors of Planning	Bachelors of Planning	Andhra Pradesh
13	Anjana Lakshmi k	CBP_24_01_13	Private / Student	Bachelors of Planning	Bachelors of Planning	Andhra Pradesh
14	Subhash Singh	CBP_24_01_14	Private / Student	Geographer & PhD Researcher	Geographer & PhD Researcher	Uttar Pradesh
15	Purushottam Tiwari	CBP_24_01_15	Private / Student	Geographer & PhD Researcher	Geographer & PhD Researcher	Uttar Pradesh
16	Maria Asim	CBP_24_01_16	Private / Student	Geographer & PhD Researcher	Geographer & PhD Researcher	Uttar Pradesh
17	Harsh Jaiswal	CBP_24_01_17	Private / Student	Geographer & PhD Researcher	Geographer & PhD Researcher	Uttar Pradesh
18	Jyotsna Singh	CBP_24_01_18	Private / Student	Geographer & PhD Researcher	Geographer & PhD Researcher	Uttar Pradesh

Sr No.	Participant Name	Participant Number	Participant Type	Participant Designation	Participant Designation	Participant State
19	Sooham Mishra	CBP_24_01_19	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
20	Arun Prashanth C	CBP_24_01_20	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
21	Dravid D	CBP_24_01_21	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
22	Samiksha Sanjay Bhise	CBP_24_01_22	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
23	Toolika Mishra	CBP_24_01_23	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
24	Prashanth Kumar	CBP_24_01_24	Private / Student	PhD Researcher in Development Studies	PhD Researcher in Development Studies	Tamil Nadu
25	Samiksha Patil	CBP_24_01_25	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
26	Lipi Shrivastva	CBP_24_01_26	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
27	Malini Gopalakrishnan	CBP_24_01_27	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Andhra Pradesh
28	Sudarshan Shankar Dubal	CBP_24_01_28	Private / Student	Independent Architect Planner, & PG Student Researcher	Independent Architect Planner, & PG Student Researcher	Maharashtra

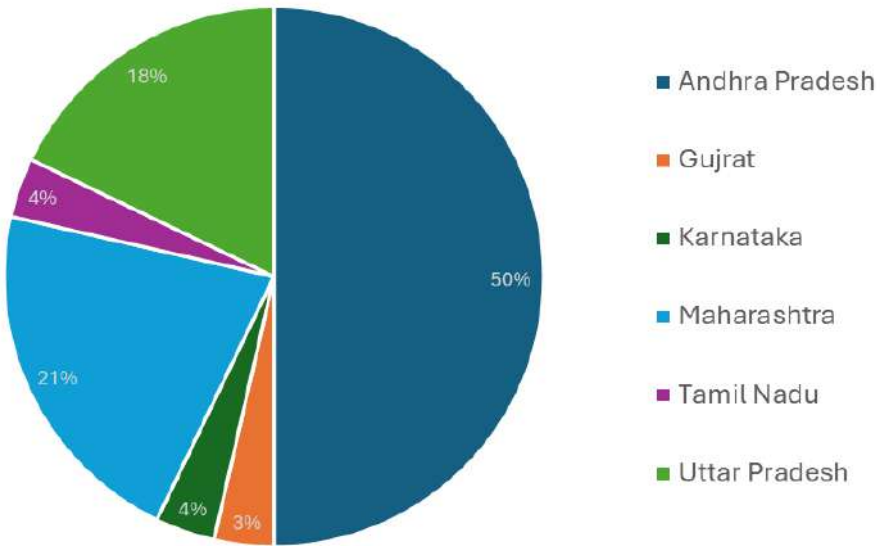


Figure 25 Participants' State

Participants Gender: 64 % Female 36% Male

Participant's Response

The Participant Feedback was obtained through Google Forms which was circulated to participants through email form the A-CUPCB-SPAV. A summary of the feedback received from the participants is presented below.

The training program received highly positive feedback from participants across various states, highlighting its effectiveness in knowledge transfer and practical learning.

Most participants rated the curriculum as "Quite Well Designed" or "Very Well Designed", indicating that the content was well-structured for the given duration. The quality of lectures was widely appreciated, with a majority rating them "Very Good" or "Excellent", reflecting the clarity and depth of instruction.

The training materials were highly valued, with responses ranging from "Very Good" to "Excellent." Many participants found the program "Quite Applicable in their Profession," signifying its practical relevance to their work in urban planning and climate resilience.

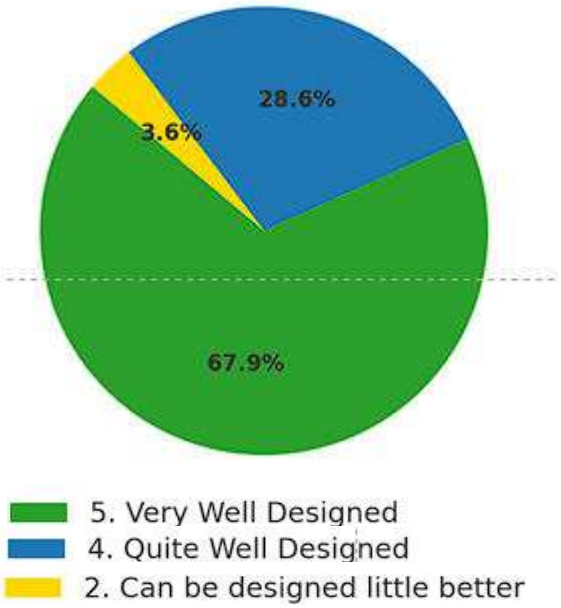
Participants particularly appreciated hands-on training, including Micro-Climate Modelling, ENVI-MET Software Training, Local Climate Zone Mapping, and Urban Heat Mapping. Many expressed interests in further exploring topics such as urban financing, heat hazard index (HHI) calculations, and simulation techniques.

The majority reported having "learned new things that they did not know before", demonstrating the program's success in capacity building. Almost all participants expressed willingness to recommend the training to others if offered again. Participants also suggested few scopes for improvement in the session management and allotting more time for the hands-on practice.

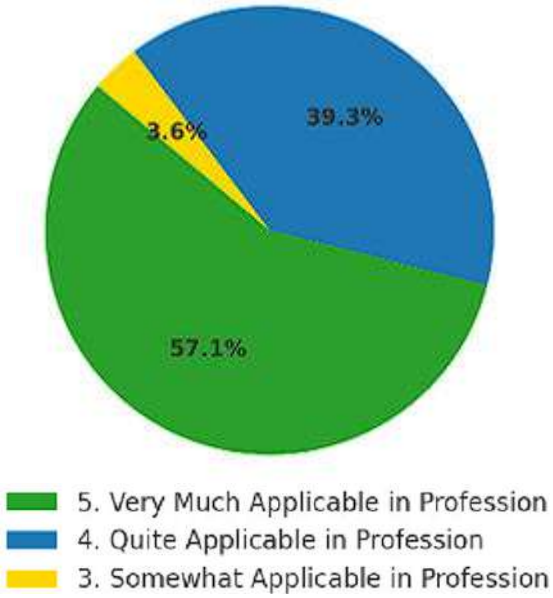
Overall, the training was well-received, offering a balanced mix of theoretical knowledge and practical applications. Participants found it valuable for professional growth and were eager for more advanced sessions in the future.

The response of the participants is further provided in next page.

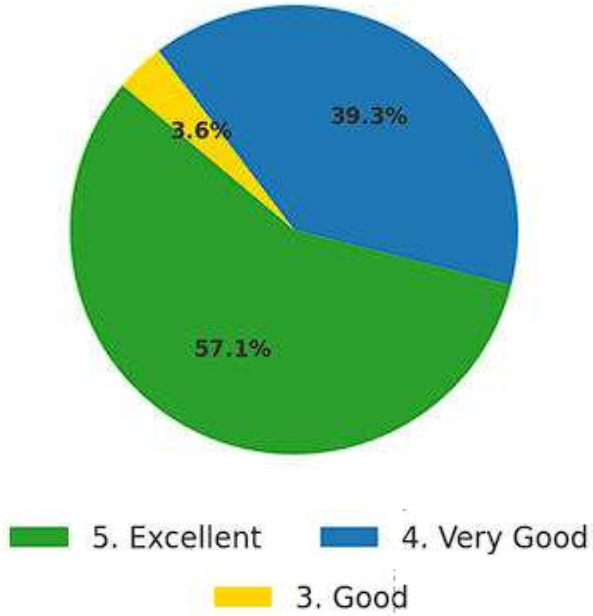
Q. How useful do you think has been the design of the Curriculum with respect to the Subject Theme, for the given duration?



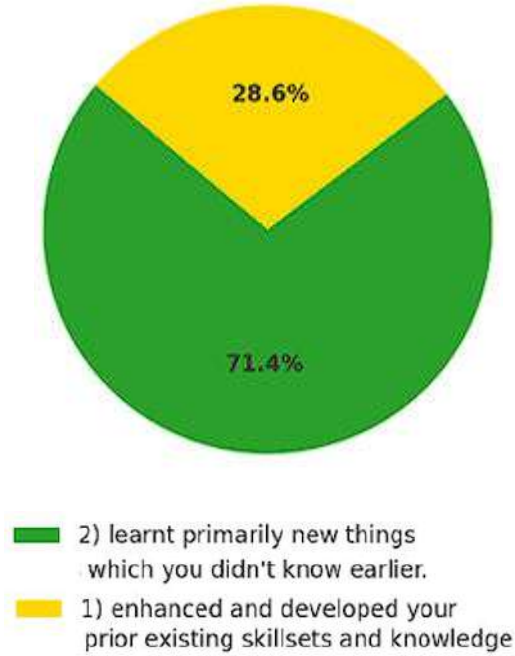
Q. What do you think of the practical applicability of the training programme?



Q. How did you find the quality of lectures



Q. Through this programme you..



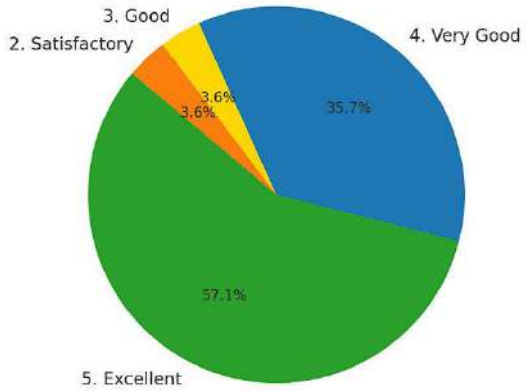
Q9. Do you think there is anything that can be improved?

82% responded No

Rest 18 % wrote:

- More handsome on session .
- The session management could be improved
- Perhaps more time can be given for hands-on sessions
- Focus on few sub-domains that have higher impacts on ground applicability instead of all
- Need for more working professionals for future such capacity building programs.

Q. How did you find the quality of study materials distributed?



Q. Do you think you would recommend someone to take this training, if offered in future?

100% mentioned YES

Q. Which part of the programme did you like the best

Q Which part of the programme do you think you are interested to know more and work more on ?

Figure 26 Participants Response to various Questions in Feedback

Valedictory Session

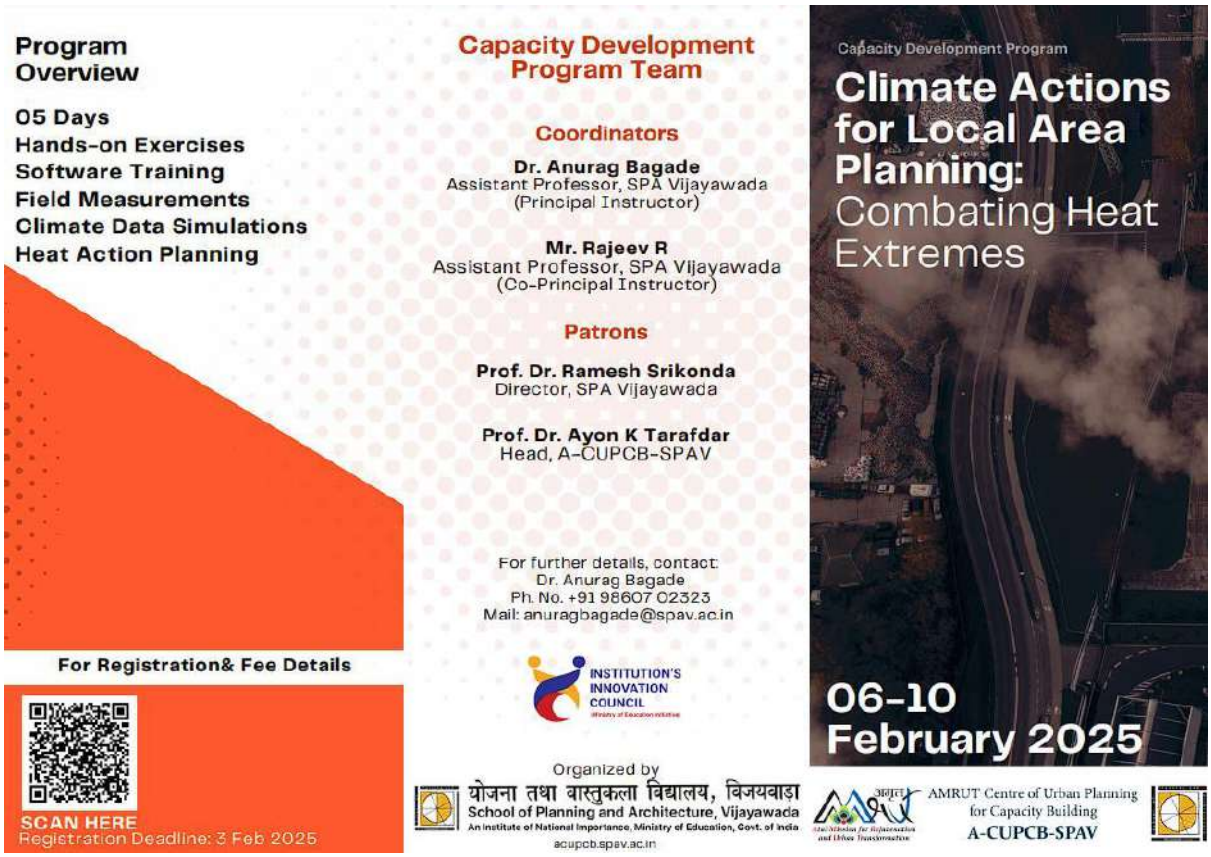
The five day capacity building training ended with the prize training certificate and memento distribution to the participants and trainers. The certificates were handed to the participants by the Head ACUPCB-DPAV, Head Planning Department and Principal Instructor. The Head ACUPCB-DPAV & Head Planning Department facilitated the Principal and Co-Principal Instructor with the memento. The CBP-1 concluded with the Vote of Thanks by t Dr. Anurag Bagade, Principal instructor SPA Vijayawada.

Figure 27 Certificate and memento distribution to the trainees

Figure 28 Memento distribution by the Head ACUPCB and Head Planning to the Trainers

Figure 29 Group Photo of the Training Batch with Head ACUPCB and Trainers CBP-1

BROUCHURE



About the Program

Today, more than half of the world's population lives in urban areas, and this figure is projected to reach 60% by 2030. Cities are expanding both horizontally and vertically to cope with the pressures of rising populations and the growing gap between the demand for and supply of resources. Consequently, natural landscapes are increasingly being converted into artificial surfaces, which has been shown to exacerbate climate-related challenges. Heatwaves and the urban heat island effect are among the most commonly observed issues in Indian cities today. While some cities have heat action plans in place, more localized actions are essential to effectively mitigate and adapt to these extreme scenarios.

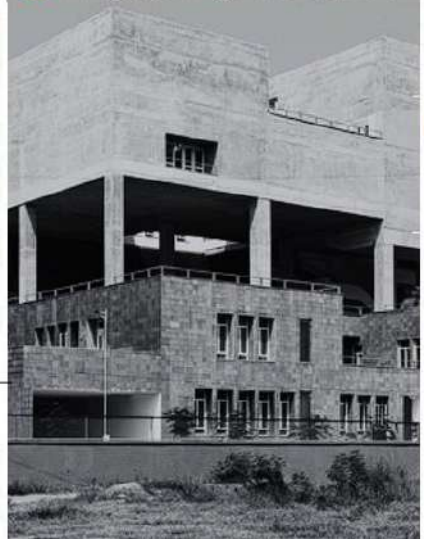
This capacity-building and skill enhancement program aligns with Sustainable Development Goal (SDG) 11—Sustainable Cities and Communities—and SDG 13—Climate Action. It enables participants with hands-on expertise on tools and techniques necessary to develop scientific understanding, technical assessment, support decision-making, and the implementation of localized strategies for combatting heat related challenges. Participants will develop skills in measuring urban climate parameters, mapping local climate zones, conducting vulnerability assessments, simulating micro-climates, and preparing localized heat action plans. By incorporating project appraisal techniques and exploring climate finance mechanisms, this program provides a comprehensive framework for addressing the complex challenges of climate change in urban areas, promoting sustainable, resilient, and climate-sensitive development.

Who Should Attend

The training session is designed for Planners, Government officials, Urban local bodies, Policy-makers, Environmental engineers, Disaster management professionals, Non-governmental organizations (NGOs), Academics and researchers in the field of urban climate and planning.

Outcomes

- Applied understanding on climate measuring tools
- GIS based spatial representation of land surface temperature
- Preparation of local climate zone maps
- Modelling and interpreting urban micro-climates
- Developing localised heat action plan
- Project planning and development



Program Structure

Day 01 — Introduction to Urban Climate and Heat Extremes
- Human Settlement and Climate Change
- Urban Heat Island Effect
- Local Climate Zones

Day 02 — Assessments and Site Evaluations
- Outdoor Thermal Comfort
- Vulnerability Assessment
- Measuring and Monitoring

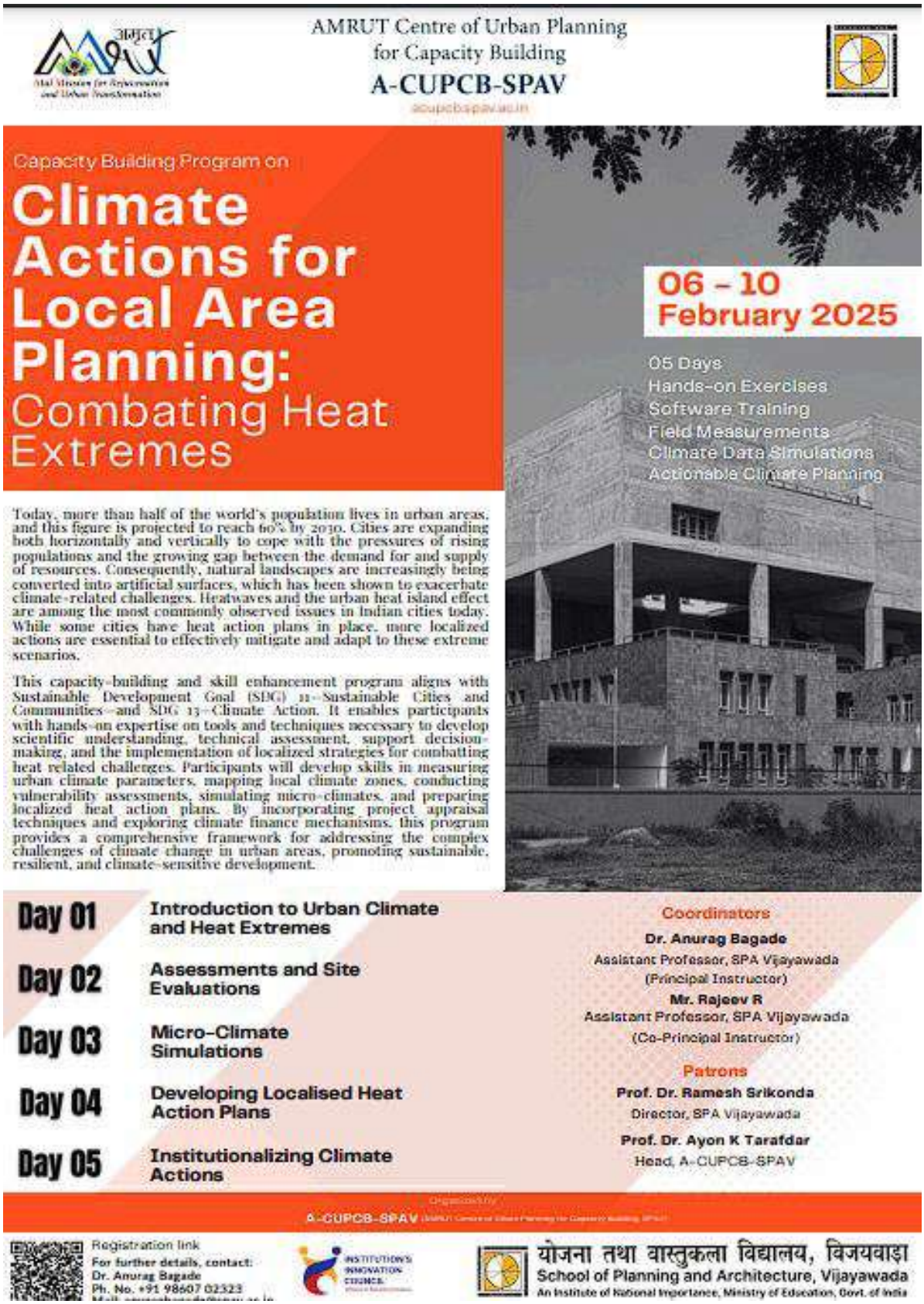
Day 03 — Micro-Climate Simulations
- Insights into Micro-climate Simulations
- Model Drafting and Simulation
- Scenario Development and Analysis
- Visualization of Output and Case Representation

Day 04 — Developing Localised Heat Action Plans
- Mitigation and Adaptation Scenario Building
- Framework for Preparing HAPs
- Simulating Urban Micro-Climate

Day 05 — Institutionalizing Climate Actions
- Plan/Project Appraisal
- Climate Finance Mechanism

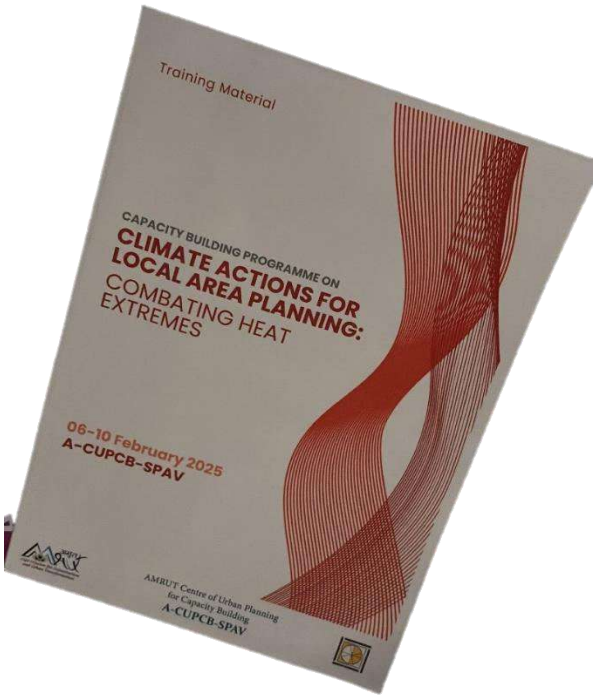
`CBP on Climate Actions for Local Area Planning organised by A-CUPCB-SPAV – Training Outcome Report

POSTER



`CBP on Climate Actions for Local Area Planning organised by A-CUPCB-SPAV – Training Outcome Report

Training Manual



Content

Contents

CAPACITY BUILDING PROGRAMME ON

CLIMATE ACTIONS FOR LOCAL AREA PLANNING: COMBATING HEAT EXTREMES

06-10 February 2025
A-CUPCB-SPAV

Atal Mission for Rejuvenation and Urban Transformation

AMRUT Centre of Urban Planning for Capacity Building

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School of Planning and Architecture Vijayawada