A-CUPCB-SPAV

Atal Mission for Rejuvenation and Urban Transformation

School of Planning and Architecture Vijayawada

# CLIMATE RESILIENCE THROUGH SIMULATION OF URBAN ENVIRONMENTS

## CAPACITY BUILDING PROGRAMME

## 17-21 FEBRUARY 2025

## TRAINING OUTCOME REPORT

# *Summary of Capacity Building Programme (CBP) on "Climate Resilience through Simulation of Urban Environments: Hands-on Training of Tools and Techniques"*

With rapid urbanization, urban systems are becoming increasingly complex making the planning and design of urban built environment more challenging. A combination of buildings, man-made materials, vegetation, urban parks and linkages to the rural surroundings are part of this complexity. Scarce resources and climate change add further challenges to the urban planning decision- making process. Hence, critically evaluating the alternate planning and design solutions at various scales are vital for developing optimum solutions. Urban simulation models and their visualization enable the evaluation and selection of alternatives. Knowledge and ability to assess the planning and design solution through simulations are essential for those involved in the planning and design of urban environment to address the challenges of climate change and to steer the urban development towards the Sustainable Development Goal - SDG 11.

ENVI-met is a holistic 3D modelling software with a focus on climate adaptive urban planning. This three-dimensional microclimate simulation model allows users to design, simulate and analyse the impact of different Nature based Solutions on the urban microclimate for any urban setting for any climate zone around the globe. ENVI-met can be used in an interdisciplinary way to investigate the influences of urbanisation as it includes solar analysis, building physics, green and blue technologies, wind flow, outdoor thermal comfort, bioclimatology, and pollutant dispersion.

The CBP was designed to combine expert lectures with hands-on training sessions of ENVI-met software to empower architects, urban planners, scientists, geographers and landscape architects to simulate the changes in the urban environment and develop appropriate planning and design solutions for climate resilience.

The objectives of the CBP:

- To simulate and analyse urban environments.
- To arrive at optimum urban planning and design solutions for climate resilience.

The programme was conducted over FIVE days, with each day dedicated to specific modules and activities. The CBP session was divided into the following 05 modules. Each module consisted of a lecture followed by hands-on sessions with the ENVI-met software. In addition, climate resilient planning of urban environments was explained through multiple case studies and one hands-on session on field.

**Module 1**: Urban Resilience through Environmental Simulation: An Overview of ENVI-met

**Module 2**: Passive Cooling Strategies for Sustainable Buildings

**Module 3**: Local Climate Zone Classification and OTC Analysis using ENVI-met

**Module 4**: Built form & Outdoor Thermal Comfort at neighbourhood scale using ENVI-Met

**Module 5**: ENVI-Met: Data Visualization and Troubleshooting

The CBP utilized a mix of instructional methods to ensure an engaging and comprehensive learning experience – Lectures, Presentations, Interactive Discussions, Hands-on training sessions, Field Measurements and their validation through ENVI-met software was also introduced to the participants.

Participants of the CBP highlighted that the Capacity Building Programme on Climate Resilience through Simulation of Urban Environments successfully delivered valuable knowledge and hands-on skills, with strong practical relevance. The overwhelmingly positive response suggests a well-structured, impactful, and industry-relevant training that participants found both informative and transformative.

| | | |
|---|---|---|
| **Dr. Lilly Rose A.** | **Dr. Shanmuga Priya** | **Ar. Deepthi Varghese** |
| Principal Trainer | Principal Co-Trainer | Trainer |

# Table of Contents

# CBP Day-Wise Programme Schedule

| | | |
|---|---|---|
| **DAY 01 (17.02.2025)** | | |
| **Session 1** | **09.00 AM - 09.30 AM** | ***Registration (at SPAV)*** |
| | **09.30 AM - 10.45 AM** | **Inauguration**<br>Welcome Address by Principal Co-Trainer<br>Inaugural Address by Director, SPAV<br>Special Address by Centre Coordinator, A-CUPCB-SPAV<br>Overview of the Programme by Principal Trainer<br>Vote of Thanks |
| | 10:45 AM -11:00 AM - High Tea | |
| **Session 2** | **11.00 AM – 01:00 PM** | Urban Resilience through Environmental Simulation: An Overview of ENVI-met<br>**Dr. Shreya Banerjee, IIT Jodhpur** |
| | 01.00 PM - 02.00 PM (Lunch) | |
| **Session 3** | **2:00 PM – 3.30 PM** | ENVI-met basic concepts, Exploring ENVI-Headquarters<br>***Hands-on sessions***<br>**Dr. Lilly Rose A, Dr. Shanmuga Priya G** |
| | 03:30 PM -03:45 PM - High Tea | |
| **Session 4** | **3:45 PM – 5:30 PM** | ***Hands-on sessions***<br>**Dr. Lilly Rose A, Dr. Shanmuga Priya G, Ar. Deepthi Varghese** |
| **DAY 02 (18.02.2025)** | | |
| **Session 1** | **09.00 AM - 10.45 AM** | Passive Cooling Strategies for Sustainable Buildings<br>**Dr. Prashant Anand, IIT Kharagpur** |
| | 10:45 AM -11:00 AM - High Tea | |
| **Session 2** | **11.00 AM – 01:00 PM** | ENVI-met SPACES and ENVI-met guide<br>**Dr. Lilly Rose A, SPA Vijayawada** |
| | 01.00 PM - 02.00 PM (Lunch) | |
| **Session 3** | **2:00 PM – 3.30 PM** | Creating environments and work spaces<br>Hands-on sessions - **Dr. Lilly Rose A, Dr. Shanmuga Priya G** |
| | 03:30 PM -03:45 PM - High Tea | |
| **Session 4** | **3:45 PM – 5:30 PM** | Hands-on sessions<br>Dr. Lilly Rose A, Dr. Shanmuga Priya G, Ar. Deepthi Varghese |

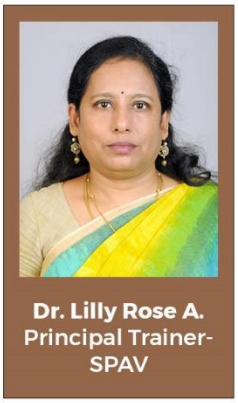
| | | |
|---|---|---|
| **DAY 03 (19.02.2025)** | | |
| **Session 1** | **09.00 AM - 10.45 AM** | Local Climate Zone Classification and OTC Analysis using ENVI-met<br>**Dr. Anurag Bagade, SPA Vijayawada** |
| | 10:45 AM -11:00 AM - High Tea | |
| **Session 2** | **11.00 AM – 01:00 PM** | Climate Resilient Urban Planning<br>**Dr. Surabhi Mehrotra, MANIT Bhopal** |
| | 01.00 PM - 02.00 PM (Lunch) | |
| **Session 3** | **2:00 PM – 3.30 PM** | Field measurements in Urban Environments<br>**Dr. Lilly Rose A, Dr. Shanmuga Priya G, Ar. Deepthi Varghese** |
| | 03:30 PM -03:45 PM - High Tea | |
| **Session 4** | **3:45 PM – 5:30 PM** | Field measurements in Urban Environments<br>**Dr. Lilly Rose A, Dr. Shanmuga Priya G, Ar. Deepthi Varghese** |
| **DAY 04 (20.02.2025)** | | |
| **Session 1** | **09.00 AM - 10.45 AM** | Built form & Outdoor Thermal Comfort at neighborhood scale using ENVI-Met<br>**Ar. Subham Das, CARBSE, CEPT University** |
| | 10:45 AM -11:00 AM - High Tea | |
| **Session 2** | **11.00 AM – 01:00 PM** | Database manager tools<br>Albero, Monde, Project Manager<br>**Dr. Shanmuga Priya G, SPA Vijayawada** |
| | 01.00 PM - 02.00 PM (Lunch) | |
| **Session 3** | **2:00 PM – 3.30 PM** | Running Simulation with small blocks and vegetation<br>Hands-on sessions<br>**Dr. Lilly Rose A, Dr. Shanmuga Priya G** |
| | 03:30 PM -03:45 PM - High Tea | |
| **Session 4** | **3:45 PM – 5:30 PM** | Model Output Visualization with Leonardo and Bio-met<br>Hands-on sessions<br>**Ar. Deepthi Varghese** |

| DAY 05 (21.02.2025) | | |
|---|---|---|
| **Session 1** | **09.00 AM - 10.45 AM** | ENVI-Met: Data Visualization and Troubleshooting<br>**Dr. Shreya Banerjee, IIT Jodhpur** |
| | 10:45 AM -11:00 AM - High Tea | |
| **Session 2** | **11.00 AM – 01:00 PM** | Outdoor thermal comfort analysis using Envi-Met:<br>Review of Participants Presentations |
| | 01.00 PM - 02.00 PM (Lunch) | |
| **Session 3** | **2:00 PM – 3.30 PM** | Outdoor thermal comfort analysis using Envi-Met:<br>Review of Participants Presentations |
| | 03:30 PM -03:45 PM - High Tea | |
| **Session 4** | **3:45 PM – 5:30 PM** | **Feedback & Interactions**<br>**Valedictory Session** |

# CBP: Trainers' Team

**Chief Patron.**
Prof. Dr. Ramesh Srikonda
Director, SPA Vijayawada

**Patron**
Prof. Dr. Ayon Kumar Tarafdar
Head, A-CUPCB-SPAV

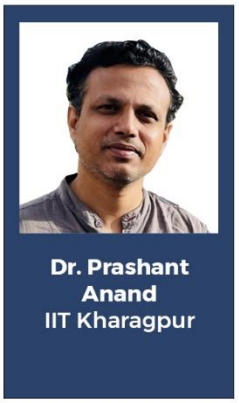


**Dr. Lilly Rose A.**
Principal Trainer-
SPAV

**Dr. Shanmuga P.**
Principal
Co-Trainer, SPAV

**Deepthi V**
Trainer
SPAV

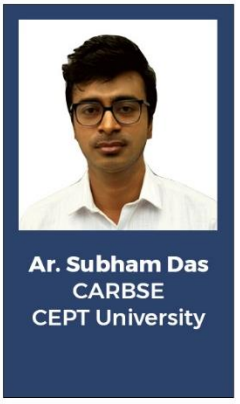
**Dr. Shreya Banerjee**
IIT Jodhpur



**Dr. Prashant Anand**
IIT Kharagpur

**Dr. Anurag Bagade**
SPA, Vijayawada

**Dr. Surabhi Mehrotra**
MANIT, Bhopal



**Ar. Subham Das**
CARBSE
CEPT University

# Inauguration of CBP on 17.02.2025

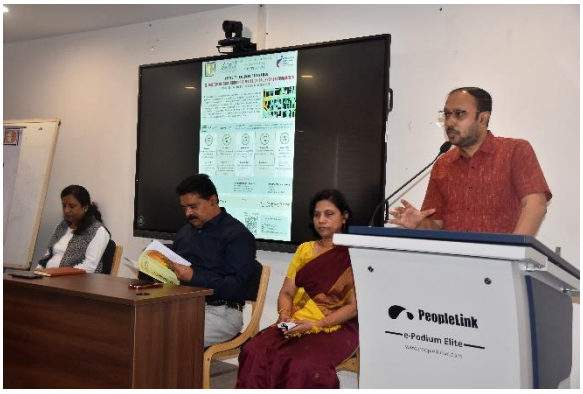
The 5 day Capacity Building Programme titled "Climate Resilience through Simulation of Urban Environments: Hands-on Training of Tools and Techniques" was inaugurated on 17th February 2025 (Monday) at SPA Vijayawada campus. The sessions were held from the Conference Room of SPAV and the Computer Lab, which are equipped with all infrastructure to support interactive sessions and lectures. This programme was meticulously designed for professionals and academics across diverse disciplines—architects, planners, government officials, engineers, faculty members, NGOs, and researchers— and aimed to equip participants with advanced strategies to address the complexities of climate resilient urban planning.

The inaugural session commenced with an inspiring Welcome Address and context setting by the Principal Co-Trainer, Dr. Shanmuga Priya, who underscored the critical importance of climate resilient planning in the urban context. An insightful overview of the programme structure, which includes 05 comprehensive modules and 6 expert lectures, crafted to delve into the multifaceted aspects of climate resilient urban planning was introduced to the participants by the Principal Trainer, Dr. Lilly Rose A.

The inaugural address was delivered by Prof. Dr. Ramesh Srikonda, Director of SPAV, who officially inaugurated the event, emphasizing the critical role of climate resilience in urban planning. He highlighted how thermal comfort considerations must be integrated into development control regulations, ensuring that built form design responds effectively to microclimatic conditions.

Prof. Srikonda underscored the increasing challenges posed by urbanization and climate change, stressing that scientific tools and simulation models like ENVI-met provide a data-driven approach to designing sustainable urban environments. He commended the Capacity Building Program for its practical, hands-on training, which equips professionals with the necessary skills to assess and implement climate-sensitive planning strategies.

He further reaffirmed SPAV's commitment to academic excellence, research, and capacity building, positioning this initiative as a significant step toward promoting sustainable urban development. His address set the tone for an engaging and insightful program, fostering collaboration between academia, practitioners, and policymakers in shaping climate-resilient cities.



Dr. Ayon Kumar Tarafdar, Head of A-CUPCB-SPAV, further enriched the event by introducing the audience to the transformative vision of the centre. The AMRUT Division of Ministry of Housing and Urban Affairs (MoHUA, Government of India) has recognised SPA Vijayawada as one of the few centres in the country, that shall undertake top notch, cutting edge research, projects, and training in the field of urban planning and climate sensitive development. SPA Vijayawada has entered into a MoU with MoHUA Govt of India, for setting up of the "AMRUT Centre of Urban Planning for Capacity Building (A-CUPCB)" at SPA Vijayawada. He also highlighted the Centre's ongoing research initiatives, capacity-building programmes, and its expanding collaborations with urban local bodies and think tanks in South India.

This was followed by a round of introductions of all the CBP participants. The Trainer, Ar. Deepthi Varghese, delivered the vote of thanks. This programme further proceeded with the insightful lectures by experts.

# Session Proceedings

## Day 01 Session 2: Urban Resilience through Environmental Simulation: An Overview of ENVI-met (Lecture)

The first lecture was delivered by Dr. Shreya Banerjee (Centre for Emerging Technologies for Sustainable Development) from IIT Jodhpur. This lecture was divided into two parts:

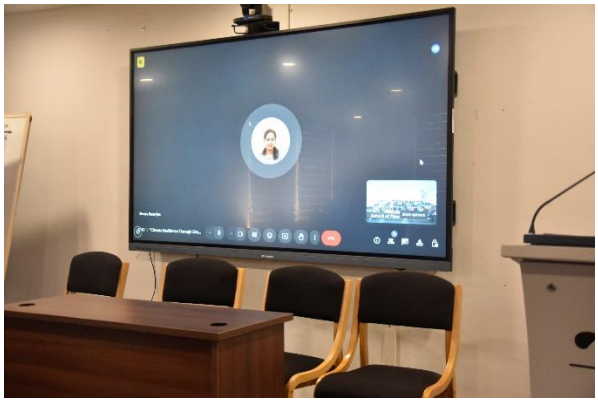
Part 1: Assessing the Impact of Urban Densification on Outdoor Microclimate

Dr. Banerjee presented a research study using ENVI-met simulations to analyze how urban densification affects microclimatic conditions, focusing on thermal comfort and heat stress zones in tropical urban environments. The study used Singapore as a case and examined different building typologies, densities, and spatial layouts to assess variations in air temperature, mean radiant temperature, and physiological equivalent temperature (PET). Findings highlighted that compact, well-shaded buildings performed better in ensuring outdoor thermal comfort (OTC), while high-density, poorly oriented layouts exacerbated heat stress.

Part 2: Introduction to ENVI-met Software

The second part introduced ENVI-met, a 3D microclimate simulation tool used for analyzing wind flow, radiation fluxes, temperature, and humidity. Dr. Banerjee explained its atmospheric, vegetation, and soil models, how to input weather data, set up simulations, and analyze results. The session emphasized ENVI-met's capability in urban climate research and climate-responsive urban design.

This lecture provided participants with insights into both the application of microclimate simulations in urban planning and a practical introduction to ENVI-met's functionalities.

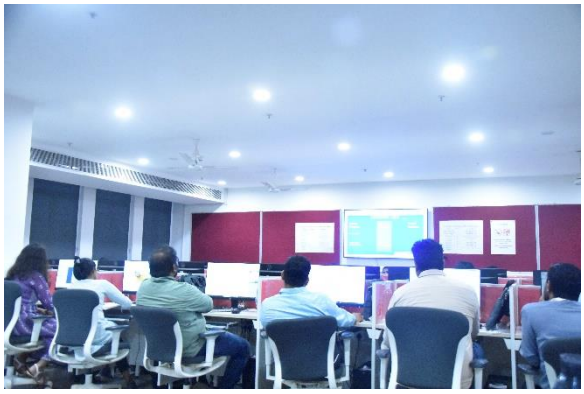


## Day 01 Session 3 and 4: ENVI-met basic concepts, Exploring ENVI-Headquarters (Hands-On Session)

The first hands-on session of the program was led by Dr. Lilly Rose A. and Dr. Shanmuga Priya G., introducing participants to the fundamental concepts of ENVI-met and guiding them through its core interface and workflow. The session aimed to familiarize participants with

ENVI-Headquarters, the central hub for creating, managing, and executing simulations. Participants explored the Workspace, understanding how to set up unique projects, organize files, and configure essential parameters within the software.

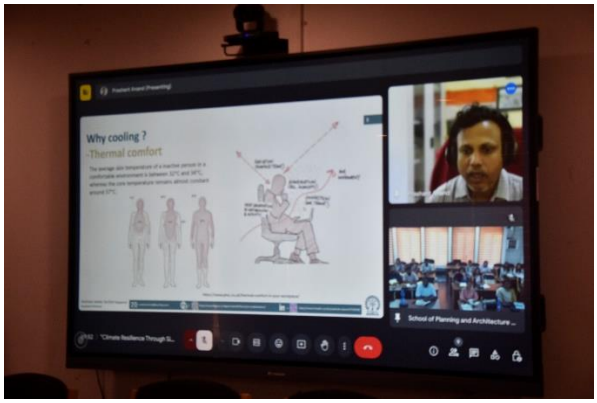
Key topics covered included the basic structure of ENVI-met, its simulation environment, and the step-by-step process of initializing a new project. Through hands-on exercises, participants navigated the software interface, practiced importing datasets, and learned how to define simulation settings for microclimate modeling.



## Day 02 Session 1: Passive Cooling Strategies for Sustainable Buildings (Lecture)

The second lecture was delivered by Dr. Prashant Anand from IIT Kharagpur, who presented through case studies various passive cooling strategies that can be implemented in the design of sustainable buildings. He emphasized the importance of thermal comfort, highlighting factors like air temperature, humidity, and material properties. The session explored passive vs. active cooling, showcasing how vernacular architecture effectively used natural materials for climate adaptation. The role of building materials in heat modulation and the integration of renewable energy to enhance energy efficiency was also explained. He also examined city-scale mitigation strategies, cautioning against unintended thermal impacts, such as the heating effects of rooftop solar panels.

The session concluded with recommendations on reflective shading, radiative cooling materials, and integrated cooling approaches to minimize energy demand and urban heat. His insights reinforced the need for climate-responsive urban planning and sustainable design solutions.




## Day 02 Session 2: ENVI-met SPACES and ENVI-met guide (Lecture)

Dr. Lilly Rose's session explored urban microclimate modeling using ENVI-met to assess the impact of urban built form on thermal comfort and the urban heat island (UHI) effect.

She introduced the Local Climate Zone (LCZ) approach, analyzing Chennai's built form variations under different development regulations. ENVI-met simulations revealed that increased vegetation and optimized building height significantly improved outdoor thermal comfort. Case studies from Ahmedabad and Vijayawada highlighted the importance of building orientation, green cover, and street geometry in UHI mitigation. Key recommendations included optimizing sky view factor (0.2-0.3), promoting taller buildings with reduced plot coverage, and mandatory green setbacks for better climate resilience. The session reinforced ENVI-met's role in urban climate research, demonstrating how simulation tools can support evidence-based urban planning for more sustainable and thermally comfortable cities.

## Day 02 Session 3 and 4: Creating environments and work spaces (Hands-On Session)

The second hands-on session was conducted by Dr. Lilly Rose A., Dr. Shanmuga Priya G., and Ar. Deepthi Varghese, focusing on the creation of environments in ENVI-met using SPACES, a tool designed for setting up simulation areas and urban environments.

Participants were guided through the process of designing realistic urban models, including the placement of buildings, vegetation, surface materials, and open spaces. The trainers explained how to modify terrain, adjust spatial configurations, and define boundary conditions to replicate real-world urban environments effectively.

Following the environment setup, the session delved into simulation settings, where participants explored how to configure environmental parameters such as wind patterns, temperature variations, and radiation fluxes. The session concluded with a step-by-step walkthrough of running a simulation, ensuring that participants understood how to test and analyze climate scenarios within the ENVI-met framework.

## Day 03 Session 1: Local Climate Zone Classification and OTC Analysis using ENVI-met (Lecture)

The fourth lecture was delivered by Dr. Anurag Bagade from SPA Vijayawada. Dr. Anurag Bagade's session focused on urban heat islands (UHI), local climate zones (LCZ), and outdoor thermal comfort (OTC) using ENVI-met simulations to assess microclimate variations in Indian cities.

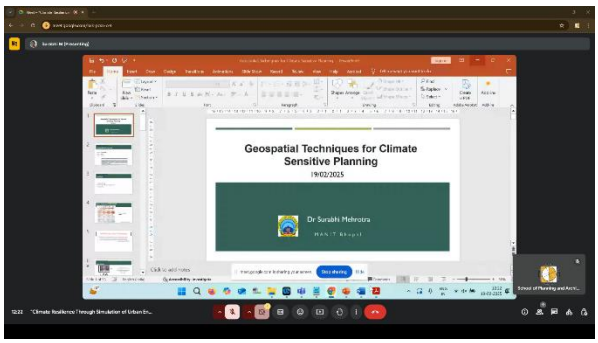
The session introduced UHI formation and impacts, highlighting how urbanization alters local climates through artificial surfaces, building morphology, and anthropogenic heat sources. It discussed the LCZ classification system as a standardized method to study urban microclimates and its role in identifying heat-vulnerable zones. Through case studies, Dr. Bagade demonstrated how ENVI-met simulations can evaluate thermal comfort indices (PET, MRT, SET) and mitigation strategies such as increasing vegetation, optimizing building orientation, and using reflective materials to reduce heat stress. The session reinforced the importance of LCZ-based urban planning, showing how scientific modeling can inform policy and design strategies for climate-resilient cities.

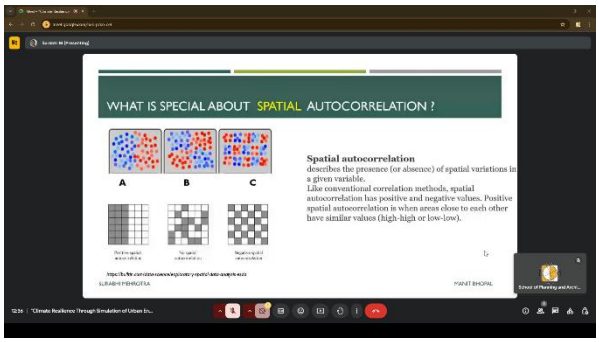

## Day 03 Session 2: Climate Resilient Urban Planning (Lecture)

The fifth lecture was given by Dr. Surabhi Mehrotra from MANIT Bhopal. Dr. Surabhi Mehrotra's session explored geospatial techniques and spatial analysis for climate-sensitive urban planning. She emphasized the role of GIS-based spatial statistics in analyzing urban heat islands (UHI), land surface temperature (LST), and climate variability.

Key topics included spatial autocorrelation, Moran's I statistic, and local indicators of spatial association (LISA), which help identify climate vulnerability hotspots. Case studies from Mumbai and Bhopal illustrated how remote sensing and Geographically Weighted Regression (GWR) can assess relationships between urban form, vegetation, and temperature distribution.

Dr. Mehrotra highlighted strategies for thermal load mapping and climate adaptation, proposing zoning solutions for heat mitigation and urban cooling. The session reinforced the importance of GIS-driven climate resilience planning, offering insights into how spatial modeling can guide evidence-based urban policies for sustainable, climate-responsive development.




## Day 03 Session 3 and 4: Field measurements in Urban Environments (Hands-On Session)

On the third day, participants engaged in a Field Measurement Exercise designed to validate the results obtained from ENVI-met simulations. The exercise involved collecting real-time environmental data at six selected locations across the SPAV campus to compare with simulated microclimate outputs.

Using specialized measurement tools, participants recorded multiple readings of air temperature, surface temperature, wind speed, and humidity at each location. These data points were gathered at different times of the day to observe spatial and temporal variations in microclimatic conditions.

The session provided hands-on experience in field data collection techniques, emphasizing the importance of on-site validation in urban climate modeling. By comparing the measured values with ENVI-met-generated results, participants gained a deeper understanding of model accuracy, calibration, and real-world application.

## Day 04 Session 1: Built form & Outdoor Thermal Comfort at neighbourhood scale using ENVI-Met (Lecture)

The sixth lecture was delivered by Ar. Subham Das from CARBSE, CEPT University. Ar. Subham Das's session focused on urban morphology and its impact on outdoor thermal comfort (OTC) using ENVI-met simulations. He highlighted key geometric and semantic parameters, including plot layout, building footprint, street orientation, vegetation, and material properties, that influence urban microclimates.

The session explored various thermal comfort indices such as Physiological Equivalent Temperature (PET), Universal Thermal Climate Index (UTCI), and Standard Effective Temperature (SET), demonstrating their relevance in urban heat mitigation strategies. Through case studies, modelling workflows in ENVI-met were explained, covering building physics, vegetation modeling, and boundary conditions for accurate microclimate assessment. Ar. Das also presented scenario-based simulations, illustrating how optimized urban layouts, volumetric setbacks, and green infrastructure can enhance thermal comfort. The session emphasized the role of climate-sensitive urban design in reducing heat stress, improving energy efficiency, and creating more livable cities through evidence-based planning strategies.

## Day 04 Session 2: Database manager tools, Albero, Monde, Project Manager (Lecture/ Hands-On)

This hands-on session, led by Dr. Shanmuga Priya, focused on the database management tools in ENVI-met, providing participants with practical insights into customizing environmental parameters for microclimate simulations.

Dr. Priya guided participants through the database logic of ENVI-met, explaining how to create and manage custom databases by assigning unique IDs to various elements. The session covered the use of Albero, a powerful tool for modifying plant characteristics, including tree height, leaf area density (LAD), and seasonal variations, allowing users to simulate diverse urban greening scenarios. Additionally, the session introduced Monde and Project Manager, demonstrating their role in organizing climate and material data within ENVI-met simulations.

Participants engaged in modifying database parameters, ensuring a deeper understanding of customizing vegetation, soil, and material properties for realistic microclimate modeling.

This hands-on experience reinforced the importance of database management in refining ENVI-met simulations, enabling participants to create more precise and site-specific climate models.


## Day 04 Session 3 and 4: Running Simulation with small blocks and vegetation. Model Output Visualization with Leonardo and Bio-met (Hands-On Session)

Participants also engaged in a hands-on session focused on running ENVI-met simulations and visualizing model outputs using Leonardo and Bio-met. This session provided practical training on setting up and analyzing microclimate simulations with small blocks and vegetation, helping participants understand the impact of urban design elements on outdoor thermal comfort.

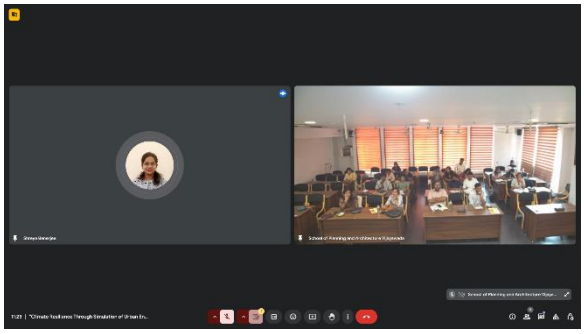
Participants first configured simulation parameters, including building geometry, vegetation placement, and environmental conditions, before running simulations to observe interactions between air temperature, wind patterns, and radiation fluxes. Trainers guided them through best practices for optimizing simulation accuracy and troubleshooting common errors.

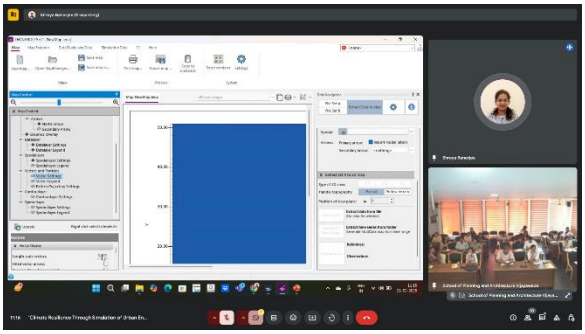
Following the simulation, participants used Leonardo to visualize results through temperature, wind, and humidity maps, while Bio-met was introduced for assessing thermal comfort indices such as PET and UTCI. This session reinforced the role of data visualization in microclimate analysis, enabling participants to interpret and apply ENVI-met results in urban planning and climate-sensitive design.

## Day 05 Session 1: ENVI-Met: Data Visualization and Troubleshooting (Interactive Session)

On Day 5, Dr. Shreya Banerjee led an interactive session on data visualization techniques in ENVI-met and addressed participant queries on troubleshooting simulation challenges. She demonstrated methods to effectively interpret simulation outputs using Leonardo, including temperature maps, wind flow patterns, and thermal comfort indices.

Participants discussed common issues, such as grid resolution errors, boundary conditions, and model calibration, while Dr. Banerjee provided practical troubleshooting strategies to enhance simulation accuracy. The session ensured participants gained a clear understanding of data interpretation and best practices for refining ENVI-met simulations for climate-sensitive urban analysis.



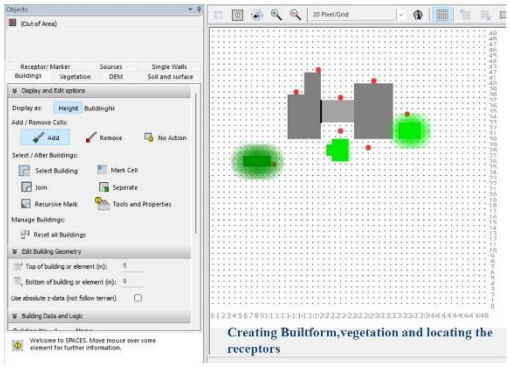


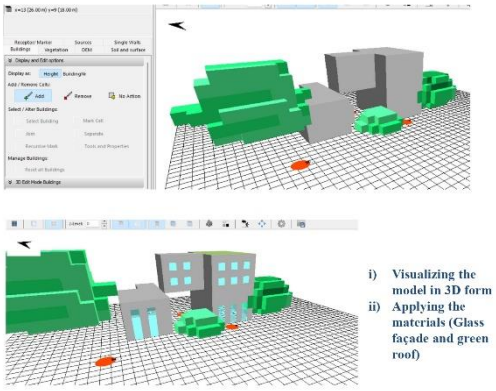
## Day 05 Session 2 and 3: Outdoor thermal comfort analysis using Envi-Met: Review of Participants Presentations

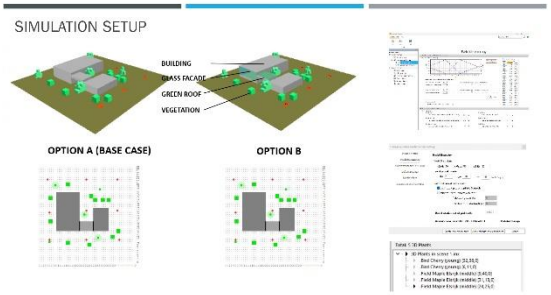
Finally, all 23 participants presented their findings from Outdoor Thermal Comfort (OTC) analysis using ENVI-met simulations. This session provided an opportunity for participants to apply their learning, analyze microclimate data, and discuss the implications of their results in climate-sensitive urban design.

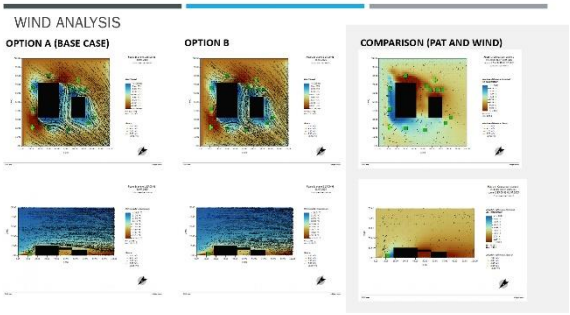

Each participant presented their simulation setups, highlighting key parameters such as building geometry, vegetation, surface materials, and meteorological conditions. They

showcased output visualizations using Leonardo and Bio-met, interpreting data on air temperature, wind patterns, and thermal comfort indices like Physiological Equivalent Temperature (PET) and Universal Thermal Climate Index (UTCI). To further understand the impact of parameters such as building material, vegetation etc. on outdoor thermal comfort, a comparative analysis of two simulation set ups was also undertaken. Few snippets from participants' presentations are shown below.




Trainers provided constructive feedback, discussing strengths, areas for improvement, and potential real-world applications of the findings. The session fostered peer learning and critical discussions, reinforcing how ENVI-met can support evidence-based climate resilience strategies in urban planning.

# Participant Profile

## Registered and Attended

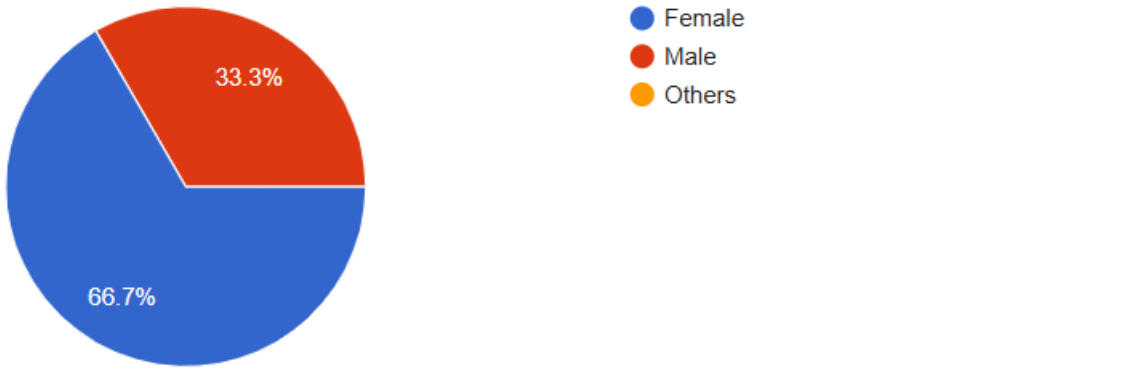
| S. No. | Participant Name | Participant ID | Affiliation | Participant Designation | Gender | State |
|---|---|---|---|---|---|---|
| 1. | Somani Goswami | | Private | Faculty, Woxsen University | Female | Telangana |
| 2. | Vigneswaran A | | Private | Architect/ PhD Scholar | Male | Puducherry |
| 3. | Deepthi S | | Govt. | Researcher, Thiagarajar College, Madurai | Female | Tamil Nadu |
| 4. | CH Shiva Kumar | | Private | Researcher, Woxsen University | Male | Telangana |
| 5. | Senthil Kumar P | | Private | Faculty, KLUF | Male | Andhra Pradesh |
| 6. | Sahaya Judu | | Govt. | Researcher, Vidyasagar University | Male | West Bengal |
| 7. | Damarla Sai Puneeth | | Private | Employee, Woxsen University | Male | Telangana |
| 8. | Dr. Kaaviya R | | Govt. | Faculty, SAP, Chennai | Female | Tamil Nadu |
| 9. | Indumathi B | | Govt. | Faculty, SAP, Chennai | Female | Tamil Nadu |
| 10. | Dr. Joshima V M | | Private | Faculty, Amity University | Female | UAE |
| 11. | Aravamudhan Arumugam Swaminathan | | Govt. (Contract) | Faculty, University of Technology and Applied Sciences Salalah | Male | Oman |
| 12. | Arun Unnikrishnan | | Private/ Student | Architect & PG Student Researcher | Male | Kerala |
| 13. | Fida Henna U | | Private/ Student | Architect & PG Student Researcher | Female | Kerala |
| 14. | Abhirami C P K | | Private/ Student | Architect & PG Student Researcher | Female | Kerala |

| | | | | | | |
|---|---|---|---|---|---|---|
| 15. | Preethi M A | | Private/ Student | Architect & PG Student Researcher | Female | Kerala |
| 16. | Divya R | | Private/ Student | Architect & PG Student Researcher | Female | Tamil Nadu |
| 17. | Swetha Sekhar | | Private | Faculty, Dr. M.G.R ERI | Female | Tamil Nadu |
| 18. | Sharon Sherani Daniel | | Private/ Student | Architect & PG Student Researcher | Female | Tamil Nadu |
| 19. | Haritha K | | Private/ Student | Architect & PG Student Researcher | Female | Tamil Nadu |
| 20. | S Santhana Divyaa | | Private | Faculty, Dr. M.G.R ERI | Female | Tamil Nadu |
| 21. | J Sharon Rose Aishwarya | | Private | Architect & PG Student Researcher | Female | Tamil Nadu |
| 22. | Donald D | | Private | Architect & PG Student Researcher | Male | Tamil Nadu |
| 23. | Shreeleha C | | Govt. (Contract) | Faculty/Researcher, SPAV | Female | Tamil Nadu |

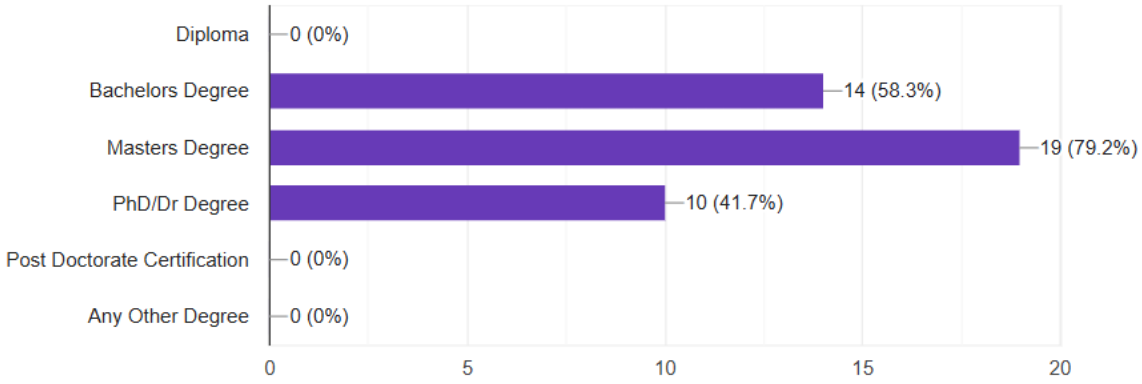
## Registered but Could Not Attend

| S. No. | Participant Name | Participant ID | Affiliation | Participant Designation | Gender | State |
|---|---|---|---|---|---|---|
| 1. | G. Sudha | | Private | Faculty, SRM, Kattankulathur | Female | Tamil Nadu |

# Participant Diversity

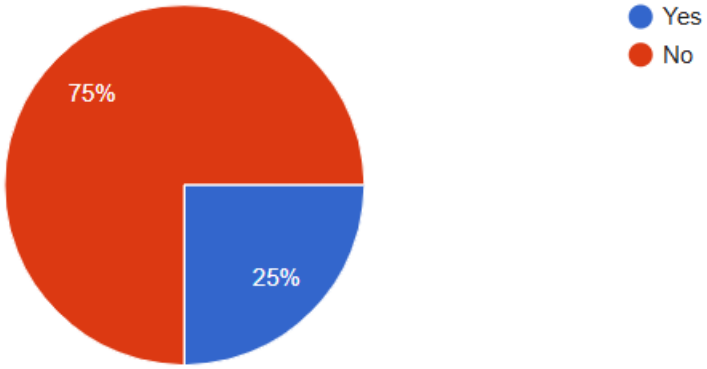






**Do you have any prior understanding / work experience / software proficiency on the theoretical or practical aspects of the theme of this training programme?**

24 responses

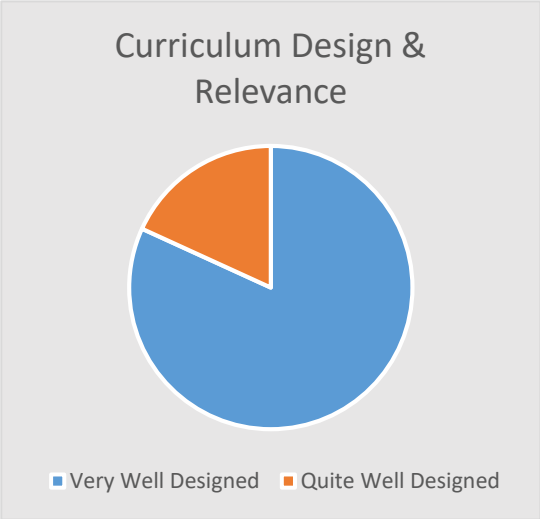


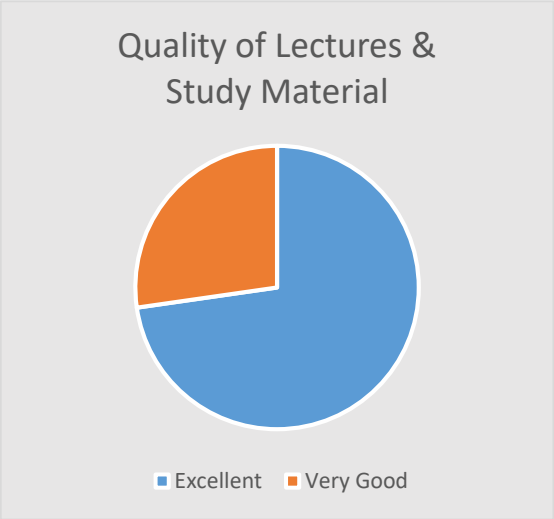

# Participant Feedback

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.

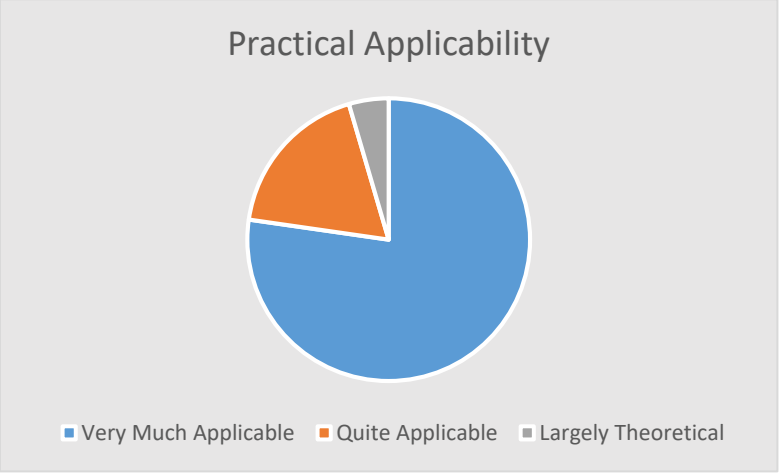
The participant feedback for the Capacity Building Program on Climate Resilience Through Simulation of Urban Environments was overwhelmingly positive, indicating that the training was well-received and effectively designed.

Curriculum Design & Relevance - Participants found the curriculum well-structured and appropriately designed for the given duration, with ratings between "quite well designed" and "very well designed."




Quality of Lectures & Study Material - 16 participants rated the lectures as excellent, while 6 rated them as very good, indicating high satisfaction with the content delivery and teaching approach. The study materials were also rated excellent by 16 participants and very good by 6, showing their usefulness in supporting learning.

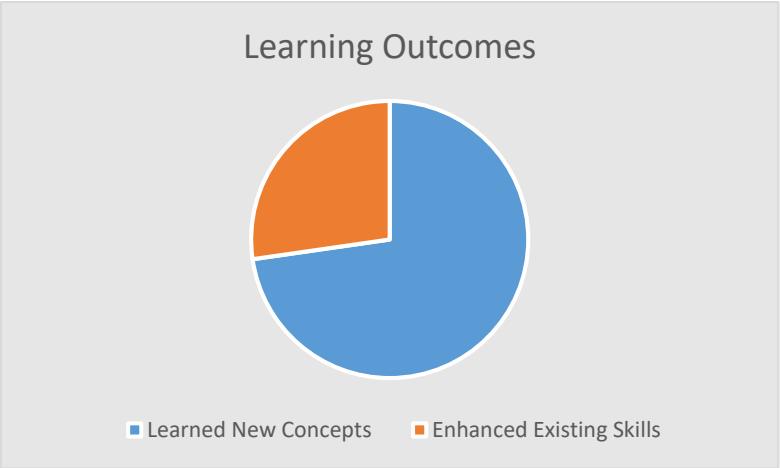


Practical Applicability - 17 participants found the training "very much applicable" to their profession, while 4 found it "quite applicable." Only one participant felt it was "largely theoretical with some applicability." This reflects the strong real-world relevance of the training.

Most Liked Aspects - The hands-on sessions were the most appreciated, with multiple participants praising their practical nature, clarity, and effectiveness. Specific mentions included sessions on Local Climate Zones (LCZ), microclimate modeling, simulations, and analysis, as well as the lectures by Dr. Shreya, Dr. Surabhi, and Dr. Anurag. The interactive and structured approach, along with facilitator expertise, made the sessions engaging and impactful.

Topics of Interest for Further Learning - Participants expressed interest in deepening their knowledge of LCZ, vegetation integration, ENVI-met correlation analysis, and data analysis. Many wished to explore the software's real-time applications and its implementation in landscape design and urban planning. Several participants suggested that extending the training duration or conducting more offline sessions would enhance learning.

Learning Outcomes - 16 participants reported learning entirely new concepts, while 6 stated that the training enhanced their existing knowledge and skills.




Program Recommendation & Improvement Suggestions - All 22 participants said they would recommend this training to others, underscoring its effectiveness. No participants suggested any improvements, with all stating they were completely satisfied with the training format and delivery.

# Valedictory Session & Certificate Distribution

The Director-SPAV, Principal Trainer, and Principal Co-Trainer together presented the participants with their participation certificates and momentos for their successful completion of the CBP. The participants also had an interactive session with the Director regarding their experience. Followed by which, proposed the Vote of Thanks. Few photographs of this session is placed below.






# CBP Poster and Brochure

AMRUT Centre of Urban Planning for Capacity Building
A-CUPCB-SPAV

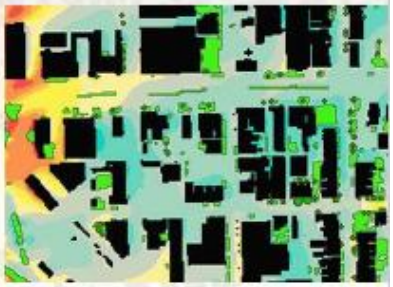
INSTITUTION'S INNOVATION COUNCIL (Ministry of HRD Initiative)

## CAPACITY-BUILDING PROGRAMME

## CLIMATE RESILIENCE THROUGH SIMULATION OF URBAN ENVIRONMENTS

### HANDS-ON TRAINING OF TOOLS AND TECHNIQUES

Rapid urbanization and climate change make urban planning increasingly complex, necessitating critical evaluation of design solutions at various scales. Urban simulation models like ENVI-met facilitate the assessment of climate-adaptive strategies through 3D microclimate modeling, analyzing solar effects, green infrastructure, wind flow, thermal comfort, and pollutant dispersion. Hands-on training with ENVI-met equips architects and planners to design sustainable, climate-resilient urban environments, supporting Sustainable Development Goal 11.



**17th to 21st FEBRUARY 2025**

**ELIGIBILITY** : Faculty members, research scholars, employees from government / private organizations, practicing architects and planners.

| 17th FEB | 18th FEB | 19th FEB | 20th FEB | 21st FEB |
|---|---|---|---|---|
| **Session 01:** Introduction, Overview of ENVI-met, Basic concepts and usage | **Session 03:** ENVI-met spaces and ENVI-met guide | **Session 05:** Database manager tools, Albero, Monde, Project Manager | **Session 07:** Running Simulation with small blocks and vegetation | **Session 09:** Results and data extrapolation, troubleshooting |
| **Session 02:** Exploring ENVI-Headquarters Hands-on sessions | **Session 04:** Digitization of blocks and Creating environments and work spaces - Hands-on sessions | **Session 06:** Field measurements & validation | **Session 08:** Visualization with Leonardo and Bio-met | **Session 10:** Presentation by Participants & Discussion |

Co-ordinators

**Dr. Lilly Rose A**
Principal Trainer
Associate Prof. &
Dean Academic, SPAV.

**Dr. Shanmuga Priya G**
Principal Co-Trainer
Associate Prof. & Deputy
Dean Academic, SPAV.

**Ar. Deepthi Varghese**
Trainer
Faculty,
Dept. of Arch., SPAV.

Patrons

**Prof. Dr. Ramesh Srikonda**
Director, SPA Vijayawada

**Prof. Dr. Ayon K Tarafdar**
Head, A-CUPCB - SPAV

## REGISTRATION OPEN

For Registration, Fees and Detailed programme:
https://acupcb.spav.ac.in/capacity-building/cbp_24_02/#

Accommodation for Participants will be provided on request basis
**Registration Deadline : 12th February, 2025**

SCAN TO REGISTER

For further details, Contact :

Ar. Deepthi Varghese
+91 9505662165
deepthi.vargheseespav.edu.in

AMRUT Centre of Urban Planning for Capacity Building
A-CUPCB-SPAV

***Five day Capacity Building and Skill Enhancement Program***

on

# Climate Resilience through Simulation of Urban Environments - Hands-on Training on Tools and Techniques

**17/02/2025 - 21/02/2025**

organized by

**AMRUT Centre of Urban Planning for Capacity Building**

योजना तथा वास्तुकला विद्यालय, विजयवाड़ा
School of Planning and Architecture, Vijayawada
An Institute of National Importance, Ministry of Education, Govt. of India

acupcb.spav.ac.in

## ABOUT SPA VIJAYAWADA

The School of Planning & Architecture, Vijayawada (SPAV), has been established as an autonomous Institution of National Importance (by the Ministry of Education, Government of India) under an Act of the Parliament of India. SPAV offers education in the fields of Planning and Architecture. The School has distinguished itself and has grown as a role model in the professional education, offering undergraduate, post graduate and doctoral programmes in the fields of planning and architecture, while at the same time fostering quality research in these domains.

SPA Vijayawada is ranked one of the best technical institutes in the country. The campus is green rated and is equipped with state-of-the-art infrastructure such as hostels, central library, ICT enabled teaching atmosphere, high end digital surveillance systems, modern laboratories, spacious studios, classrooms, open air theatres, auditorium, cafeteria, outdoor sports facilities, etc. SPAV is a leading Institution in terms of Innovation, use of latest computing platforms, state of the art labs and a pedagogy that encourages critical thinking.

## ABOUT A-CUPCB-SPAV

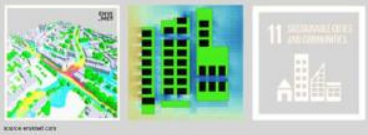
The AMRUT Division of Ministry of Housing and Urban Affairs (MoHUA, Government of India) has recognized School of Planning and Architecture Vijayawada as one of the few centers in the country, that shall undertake top-notch, cutting-edge research, projects, and training in the field of urban planning and climate sensitive development. This Centre is a hallmark of SPAV's capability, resources and potential in leading the path of research and advocacy in the domain of Urban Planning in India.

The A-CUPCB-SPAV center will serve as a nodal center to provide advocacy, research innovations and advice related to urban planning and design. The five main functions / activities of the A-CUPCB are Capacity Building, Research Projects, Spatial Data Infrastructure, Government Advocacy, and Industry Advisory. The A-CUPCB-SPAV shall endeavor to leverage and delve deep into "Climate Resilient Urban Planning and Design: A Focus on Coastal Vulnerability" through its functions and activities. Through each of its functions, it shall bring out new innovations, solutions and tools that can be useful for planners, settlement designers and architects, who work in the local bodies or engage with local bodies.

## ABOUT THE PROGRAM

With rapid urbanization, urban systems are becoming increasingly complex making the planning and design of urban built environment more challenging. A combination of buildings, man-made materials, vegetation, urban parks and linkages to the rural surroundings are part of this complexity. Scarce resources and climate change add further challenges to the urban planning decision-making process. Hence, critically evaluating the alternate planning and design solutions at various scales are vital for developing optimum solutions.

Urban simulation models, such as **ENVI-met**, enable the assessment of climate-adaptive solutions. This 3D microclimate modeling software supports interdisciplinary analysis of urban dynamics, including solar effects, green infrastructure, wind flow, thermal comfort, and pollutant dispersion. Hands-on training with ENVI-met empowers professionals like architects and planners to simulate urban changes and design sustainable, climate-resilient solutions aligned with Sustainable Development Goal 11.



## MODULES OF TRAINING

**Day 1: 17.02.2025**
Session 1: Introduction, Overview of ENVI-met, Basic concepts and usage
Session 2: Exploring ENVI-Headquarters - Hands-on sessions

**Day 2: 18.02.2025**
Session 1: ENVI-met spaces and ENVI-met guide
Session 2: Creating environments and work spaces - Hands-on sessions

**Day 3: 19.02.2025**
Session 1: Database manager tools, Albero, Monde, Project Manager
Session 2: Digitization of blocks in spaces - Hands-on sessions

**Day 4: 20.02.2025**
Session 1: Running Simulation with small blocks and vegetation
Session 2: Visualization with Leonardo and Bio-met

**Day 5: 21.02.2025**
Session 1: Results and data extrapolation, troubleshooting
Session 2: Presentation by Participants & Discussion

### WHO CAN ATTEND

Faculty members and research scholars from architecture, planning, engineering, geography and allied fields, participants from private/ government organizations, practicing architects and planners.

### REGISTRATION DETAILS

For registration, fees, more details, visit

register here

Last date of Registration
**12-02-2025**

https://acupcb.spav.ac.in/capacity-building/cbp_24_02/

Accommodation will be provided on request

## CAPACITY BUILDING AND SKILL ENHANCEMENT PROGRAM TEAM

### PATRONS

**Prof. Dr. Ramesh Srikonda**
Director, SPA Vijayawada

**Prof. Dr. Ayon K Tarafdar**
Head, A-CUPCB - SPAV

### Coordinators

**Dr. Lilly Rose A**
Principal Trainer
Associate Prof, Dept. of Architecture
SPA Vijayawada
Email: lillyrose@spav.edu.in

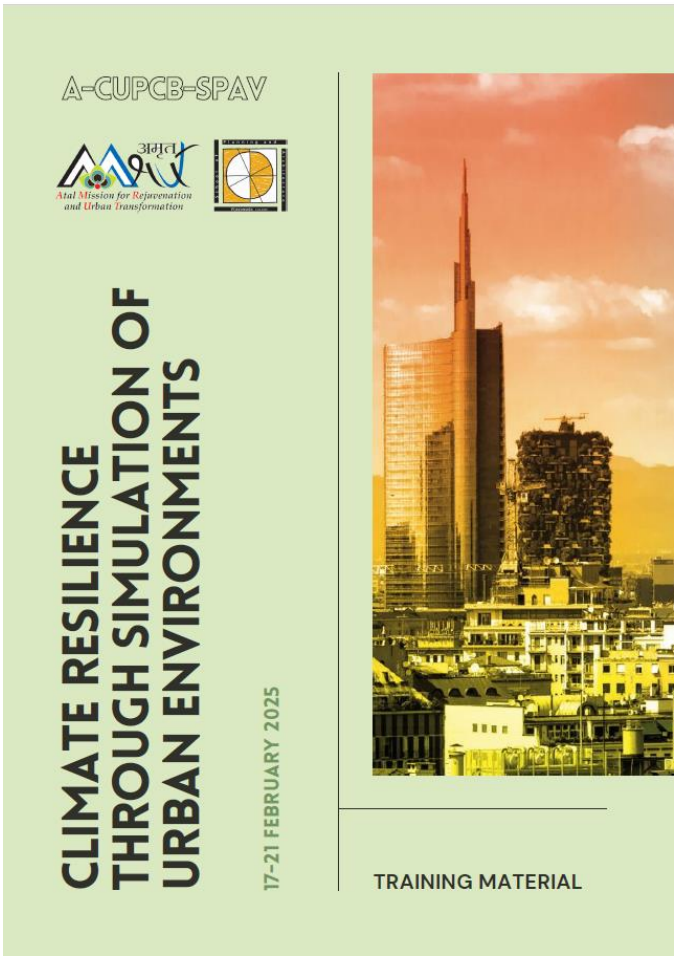
**Dr. Shanmuga Priya**
Principal Co-Trainer
Associate Prof, Dept. of Architecture
SPA Vijayawada
Email: shanmugapriya@spav.edu.in

**Ar. Deepthi Varghese**
Trainer
Asisstant Prof, Dept. of Architecture
SPA Vijayawada
Email: deepthi.varghese@spav.edu.in

For further details, contact:
Ar. Deepthi Varghese
Ph. No. +91 9505662165

INSTITUTION'S INNOVATION COUNCIL

# CBP Training Manual




**Training Material**

CAPACITY BUILDING PROGRAMME
on
Climate Resilience Through
Simulation of Urban Environments:
Hands-on Training of Tools and Techniques

(Reference for Participants)

**17 - 21 February 2025**

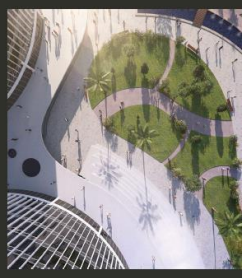
*Disclaimer:*

*This Training Material has been made solely for education and training purposes for the participants attending the CBP on 'Climate Resilience Through Simulation of Urban Environments: Hands-on Training of Tools and Techniques' organized from 17th to 21st February 2025 under the SPA Vijayawada AMRUT Centre of Urban Planning for Capacity Building (A-CUPCB-SPAV) by Ministry of Housing and Urban Affairs (AMRUT Division), GoI.*

*For permissions, citations and enquiries, please contact: lillyrose@spav.edu.in, shanmugapriya@spav.edu.in, deepthi.varghese@spav.edu.in, head.acupcb@spav.edu.in*

## TABLE OF CONTENTS





# A-CUPCB-SPAV

Atal Mission for Rejuvenation and Urban Transformation

School of Planning and Architecture Vijayawada

## CAPACITY BUILDING PROGRAMME
## 17–21 FEBRUARY, 2025