Capacity Building Programme

On

NATURAL RESOURCE MANAGEMENT FOR CLIMATE CHANGE MITIGATION AND ADAPTATION

10th March – 14th March 2025

A - C U P C B - S P A V

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 Program (CBP)

Climate change is one of the most pressing global challenges, affecting ecosystems, biodiversity, and human livelihoods. Addressing this challenge requires a multi-disciplinary approach involving sustainable environmental management, climate resilience strategies, and urban planning innovations. Recognizing this need, the Capacity Building Development Program (CBP) on Natural Resource Management for Climate Change Mitigation and Adaptation was designed to provide participants with in-depth knowledge and practical skills to combat climate change.

This five-day program focused on equipping professionals with the expertise required to integrate climate adaptation and mitigation strategies into their respective domains. The training covered a diverse range of topics, including climate change impacts, urban resilience, biodiversity conservation, energy efficiency, green infrastructure, and sustainable resource management. Sessions were structured to incorporate theoretical concepts, real-world case studies, interactive discussions, and hands-on exercises.

The program emphasized the importance of Sustainable Development Goals (SDG) 11 (Sustainable Cities and Communities) and 13 (Climate Action) while also exploring policy frameworks, financial mechanisms, and institutional collaborations that enhance climate resilience. Experts from various fields shared valuable insights on traditional knowledge systems, sustainable agriculture, water resource management, and carbon sequestration.

Through this initiative, participants gained a holistic understanding of climate-sensitive planning, fostering a proactive approach to environmental challenges. The CBP program successfully provided a platform for knowledge-sharing, networking, and the development of innovative solutions to advance sustainability in urban and rural settings.

Brief of Sessions of Capacity Building Covered

Schedule: Day 1 (10/3/25)		
Forenoon Session (Tuesday)		
Sr.No	**Session Title**	**Experts name**
Inaugural Session & Programme Briefing		
1	Introduction to Climate change & its impacts @ Global and National level	Dr.Janmejoy Gupta
Afternoon Session		
2	Nature based solutions for Climate change Resilience	Dr. Shanmuga Priya
3	Environmental issues: The Rural Urban Divide	Dr. Faiz Ahmed

Schedule: Day 2 (11/3/25)		
Forenoon Session (Tuesday)		
Sr.No	**Session Title**	**Experts name**
1	Climate adaptation through Urban Design	Dr. Karteek Guturu
2	Sustainable water Management for Climate change mitigation	Dr. Srinivas. D
Afternoon Session		
3	Integrating NRM with Urban & Regional development Planning	Dr. Prashanti Rao
4	Climate Resilient urban planning	Dr. Ayon Tarafdar

Schedule: Day 3 (12/3/25)		
Forenoon Session (Tuesday)		
Sr.No	**Session Title**	**Experts name**
1	Indian Traditional knowledge systems	Dr. Srinivas. D
2	Biodiversity Conservation-A case study	Mr. Rajneesh Sareen
Afternoon Session		
3	The role of Architects, Planners and engineers in addressing Climate change impacts	Dr. Prashant Vardhan
4	Climate resilient cities: adaptive and mitigative approaches for a warming habitat	Mr. Rajneesh Sareen

Schedule: Day 4 (11/3/25)		
Forenoon Session (Tuesday)		
Sr.No	**Session Title**	**Experts name**
1	Sustainable agriculture for Climate change mitigation	Mr. Rajneesh Sareen
2	Sustainable Buildings and Energy Efficiency for Climate change mitigation	Dr. Nagaraju Kaja
Afternoon Session		
3	Funding and partnership for NRM and Climate change projects	Mr. Rajneesh Sareen
4	Carbon sequestration through urban planning and agriculture	Mr. Ajay Katuri

Schedule: Day 5 (12/3/25)		
Forenoon Session (Tuesday)		
Sr.No	**Session Title**	**Experts name**
1	Successful climate change adaptation in Urban areas	Mr. Ajay Katuri
2	Eco friendly/Green building materials for climate resilience	Dr. Nagaraju Kaja
Afternoon Session		
3	Technologies for Natural resource management	Mr. Ajay Katuri
Closing remarks and Valedictory Session		

Contents

List of Figures

CBP Trainer's 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. Nagaraju Kaja

SPA Vijayawada

Co-Principal Trainer

Dr. Srinivas Daketi

SPA Vijayawada

Trainer

Ar. Siddesh Mundle

SPA Vijayawada

List of Experts

Dr. Shanmuga Priya G, SPA Vijayawada

Dr. Janmejoy Gupta, SPA Vijayawada

Dr. Nagaraju Kaja, SPA Vijayawada

Dr. Prashanth Vardhan, SPA Vijayawada

Dr. Faiz Ahmed C, SPA Vijayawada

Dr. Prashanti Rao, SPA Vijayawada

Dr. Karteek Guturu, SPA Vijayawada

Prof. Dr. Ayon K Tarafdar, SPA Vijayawada

List of External Experts

Mr. Ajay Katuri, Urban Planner & Risk expert, New Delhi

Mr. Rajneesh Sareen, Programme Director Sustainable Habitat Programme Centre for Science and Environment

Inauguration of CPB on 10th March 2025

The Capacity Building Development Program (CBP) commenced with a Welcome Address delivered by Ar. Siddesh (Trainer), who warmly welcomed all participants and introduced the dignitaries gracing the occasion. He set the tone for the event by emphasizing the relevance of the program and the key discussions that would take place over the coming days.

The Inaugural Chair was honoured by the presence of Chief Patron, Prof. Dr. Ramesh Srikonda (Director, SPA Vijayawada), Prof. Dr. Ayon K. Tarafdar (Head, CUPCB, SPA Vijayawada), and Co-Principal Trainer, Dr. Srinivas Daketi.

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

The formal opening of the CBP Program was announced by Prof. Dr. Ramesh Srikonda, who delivered the Inaugural Address. He highlighted the urgency of climate change mitigation and adaptation strategies, stressing the role of natural resource management in building resilience against climate challenges. He underscored the importance of interdisciplinary collaboration and the need for capacity building in this domain.

Following this, Prof. Dr. Ayon K. Tarafdar (Head, CUPCB) addressed the participants and introduced the AMRUT Funded Centre of Urban Planning for Capacity Building (A-CUPCB) at SPA Vijayawada, established through an MoU with the Ministry of Housing and Urban Affairs (MoHUA), Government of India. He highlighted that SPA Vijayawada has been recognized as a key research and training center for urban planning and climate-sensitive development, reinforcing the institution's role in advancing research, advocacy, and skill development in urban planning and settlement design.

The session concluded with Dr. Srinivas Daketi (Co-Principal Trainer) outlining the five-day program structure. He provided insights into the key themes and topics that would be covered, highlighting the interactive nature of the sessions and the expert-led discussions planned for the participants. The inaugural session set the stage for an engaging and insightful training program, encouraging participants to actively contribute to discussions and make the most of the learning experience.

Figure 2: Participants and Experts attending the Inaugural Session

Session Proceedings

The Capacity Building Development Program (CBP) was conducted over five days using a mix of theoretical discussions, interactive sessions, and case study-based learning. The program was attended by 29 participants, who actively engaged in discussions and exercises designed to enhance their understanding of natural resource management and climate change adaptation strategies.

Day 1 focused on providing a conceptual foundation on climate change impacts, resilience strategies, and environmental planning. The sessions covered the global and national impacts of climate change, landscape-based climate adaptation, and the rural-urban environmental divide.

Day 2 emphasized urban adaptation strategies, with discussions on climate-sensitive urban design, water resource management, and regional planning. Experts guided participants through methodologies for sustainable urban development and the role of green infrastructure.

Day 3 provided insights into biodiversity conservation and environmental governance, with a focus on Indian traditional knowledge systems, case studies on conservation strategies, and the role of professionals in climate adaptation.

Day 4 delved into resource efficiency and carbon management, covering sustainable agriculture, energy-efficient buildings, climate financing, and carbon sequestration techniques. Practical examples and policy frameworks were explored to demonstrate real-world applications.

Day 5 concluded with a focus on institutional strategies and implementation, covering climate change adaptation at the urban scale, eco-friendly materials, and technological solutions for natural resource management. The final session included discussions on integrating climate strategies into urban policies.

The training program ended with the valedictory session, where participants provided feedback, reflecting on the learning outcomes and key takeaways. Certificates were distributed, and experts emphasized the importance of continued engagement in climate action and urban resilience planning.

Day 1

Session 1: Introduction to Climate Change & Its Impacts at Global and National Level

Expert name: Dr. Janmejoy Gupta (Associate Professor - Department of Architecture, SPAV)

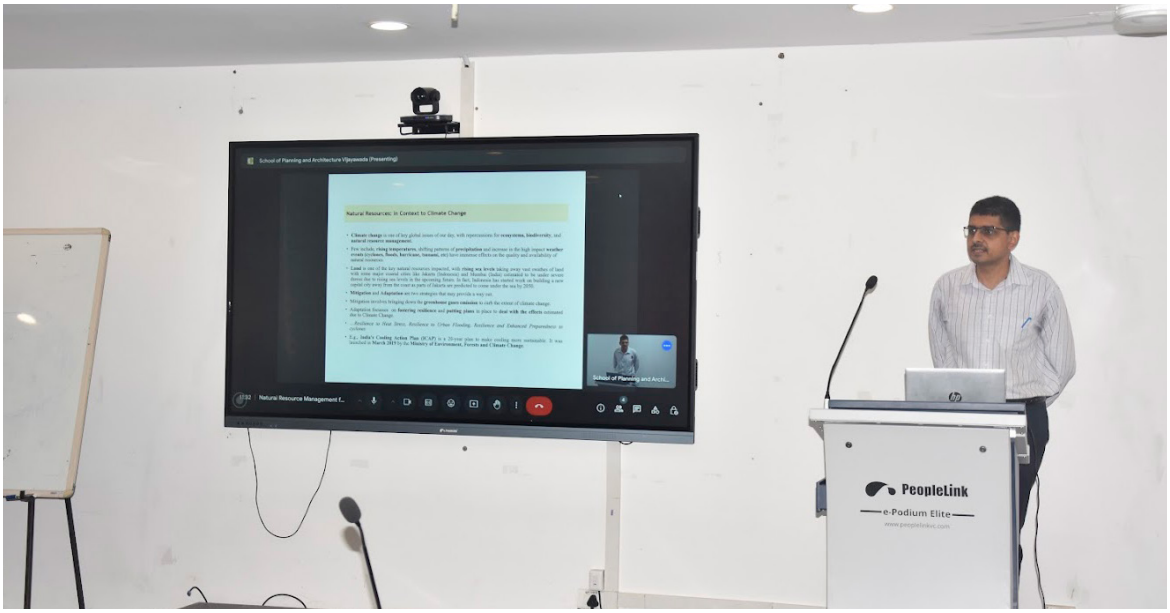


Figure 3: Session 1 delivery by the expert Dr. Janmejoy Gupta

This session provided a comprehensive overview of the primary contributors to climate change, including greenhouse gas emissions, deforestation, industrialization, and agricultural practices. Dr. Gupta discussed the impacts of climate change, such as migration and displacement, water scarcity, economic consequences, and biodiversity loss.

The session also introduced key mitigation and adaptation strategies, emphasizing India's Cooling Action Plan (ICAP) and urban resilience measures. Case studies of rising sea levels affecting cities like Jakarta and Mumbai highlighted the urgency of proactive climate adaptation. Participants gained insights into sustainable energy practices, carbon sequestration techniques, and natural resource management in response to climate change.

Session 2: Landscape Design and Planning Strategies for Climate Change Resilience –

Expert name: Dr. Shanmuga Priya (Associate Professor - Department of Architecture, SPAV)

Figure 4: Session by Dr. Shanmuga Priya on Day 1

This session explored the role of Nature-Based Solutions (NbS) in enhancing climate resilience through landscape design and urban planning. Dr. Priya introduced the ecosystem services approach, emphasizing how natural systems like wetlands, forests, and urban green spaces can mitigate climate risks. She outlined NbS strategies, such as protection of natural ecosystems, sustainable management of modified ecosystems, and the design of new ecological systems. Case studies demonstrated successful climate-adaptive urban projects.

Figure 5: Lecture deliverd by Dr. Shanmuga Priya on Day 1

Session 3: Environmental Issues: The Rural-Urban Divide

Expert name: Dr. Faiz Ahmed (Assistant Professor - Department of Architecture, SPAV)

Figure 6: Session by Dr. Faiz Ahmed on Day 1

This session examined urbanization's impact on environmental quality, highlighting issues such as urban heat islands, air pollution, and biodiversity loss. Dr. Ahmed introduced concepts like Local Climate Zones (LCZs) and how urban-rural dynamics influence climate adaptation. Case studies showcased sustainable urban-rural linkages and planning strategies.

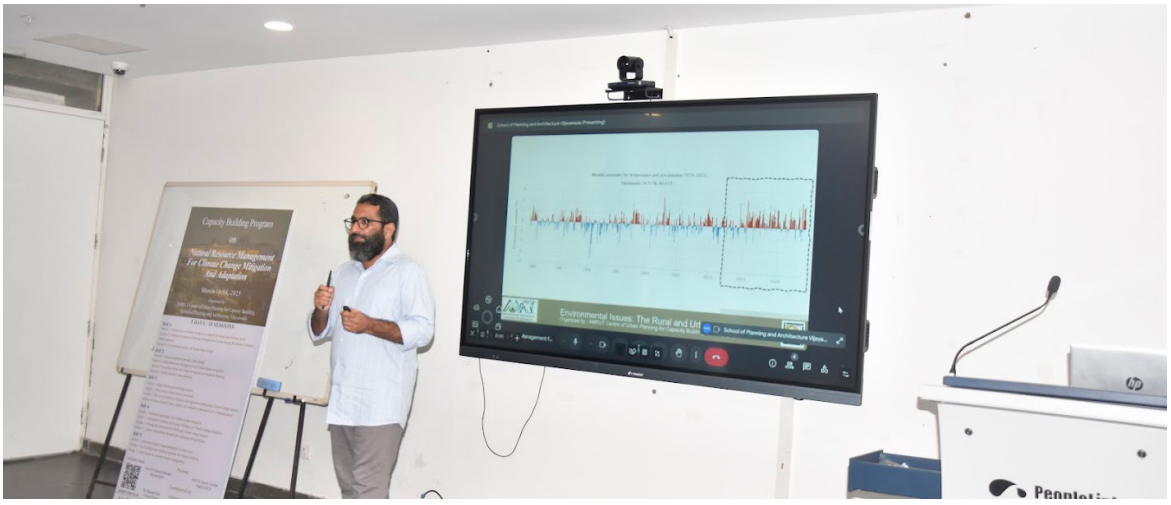


Figure 7: Lecture deliverd by Dr. Faiz Ahmed on Day 1

Day 2

Session 1: Climate adaptation through Urban Design

Expert name: Dr. G Karteek (Assistant Professor - Department of Architecture, SPAV)

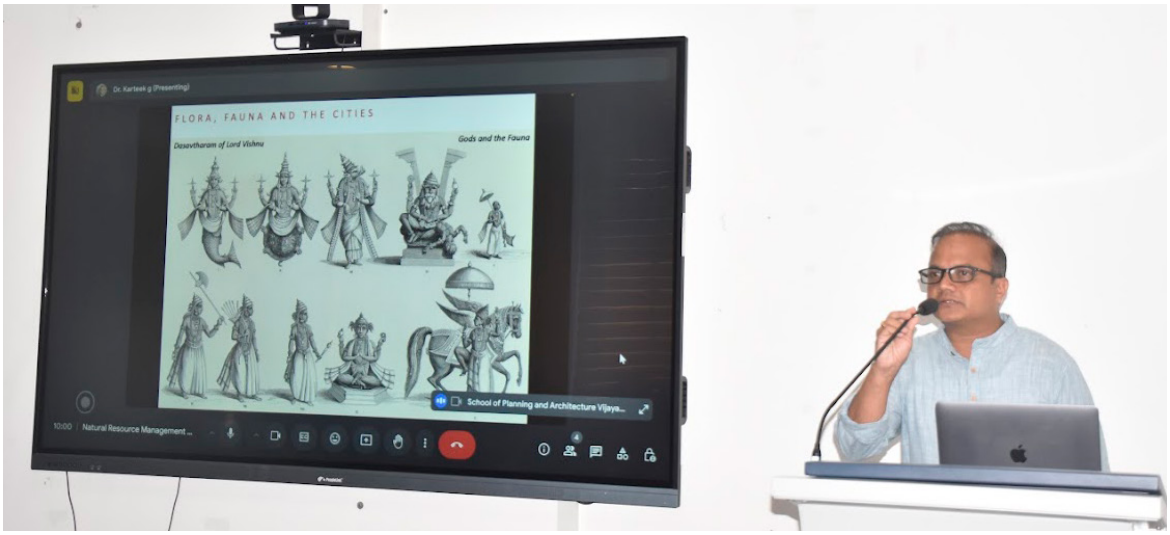


Figure 8: Session on Climate adaptation through Urban Design by Dr. G Karteek on Day 2

The session on Climate Adaptation Through Urban Design by Dr. G. Karteek focused on integrating sustainable strategies in urban planning to address climate change. It highlighted the role of natural resource management in mitigating and adapting to climate challenges.

Key topics covered included the ecological footprint of cities, emphasizing how urban density correlates with greenhouse gas emissions and energy consumption. The session contrasted sprawling cities with compact urban forms, showcasing international examples like Hong Kong, Venice, and Paris.

Special attention was given to climate-responsive urban design, particularly in hot and arid zones. Case studies of Mehrangarh Fort, Jaisalmer, and Brahmapuri settlements illustrated traditional architectural adaptations such as narrow streets, shaded public spaces, and optimized building fenestration for thermal comfort. The discussion extended to walkability and sustainability, citing examples from Jaipur, Hyderabad, and Rome.

The session concluded with the concept of regenerative cities, stressing the need for integrated transport, mixed-use urban forms, and efficient land use. The Cyberabad case study was presented as a model for sustainable urban expansion.

Session 2: Sustainable Water Management for Climate Change Mitigation

Expert name: Dr. Srinivas Daketi (Professor - Department of Architecture, SPAV)

Figure 9: Expert lecture on ustainable Water Management for Climate Change Mitigation by Dr. Srinivas Daketi on Day 2

This session focused on the interrelationship between climate change and water resources, highlighting the urgent need for sustainable water management to mitigate climate impacts. Dr. Srinivas Daketi emphasized the importance of protecting ecosystems, reducing emissions, and implementing adaptation strategies.

The session covered global challenges such as water scarcity, pollution, rising sea levels, and extreme weather events that affect water availability. Various case studies were discussed, including Singapore's NEWater initiative, Rajasthan's Johad revival, and the Netherlands' Room for the River program, demonstrating innovative approaches to sustainable water management.

Participants gained insights into rainwater harvesting, wastewater recycling, and integrated water resource management (IWRM) as crucial strategies for resilience. The session also stressed the role of stakeholders, including policymakers, urban planners, and communities, in ensuring water security for future generations.

Session 3: Integrating NRM with Urban & Regional development Planning

Expert name: Dr. Prashanti Rao (Assistant Professor - Department of Architecture, SPAV)

This session provided an in-depth understanding of Natural Resource Management (NRM) as a pillar of sustainability and its integration with urban and regional planning. Dr. Prashanti Rao outlined key concepts, including sustainable land use, water resource management, green infrastructure, and biodiversity conservation. The session explored global and Indian case studies, such as Singapore's ABC Waters Programme, Curitiba's Green City Model, and India's Smart Cities Mission, demonstrating best practices in resource-efficient urban planning. The role of policy frameworks, governance mechanisms, and participatory planning was highlighted, emphasizing the need for multi-stakeholder collaboration in implementing NRM strategies.

Participants also engaged in discussions on emerging challenges such as rapid urbanization, climate vulnerabilities, and waste management and explored innovative solutions like eco-friendly zoning, climate-resilient infrastructure, and circular economy models. The session concluded with a roadmap for future urban planning practices that prioritize environmental sustainability, economic viability, and social inclusion.

Session 4: Climate Resilient Urban Planning

Expert name: : Dr. Ayon K. Tarafdar (Professor - Department of Planning, SPAV)

This session focused on integrating climate-conscious strategies into spatial planning and urban design to enhance resilience. Dr. Ayon K. Tarafdar explained how urban planning must incorporate climate considerations, such as extreme heat, flooding, and ecosystem degradation, into the master planning process. The session explored the disconnect between existing urban planning frameworks and environmental sustainability, highlighting that most city master plans do not incorporate climate data as a core input for decision-making.

The discussion covered heat vulnerability mapping, adaptive infrastructure planning, and nature-based solutions as key tools to mitigate climate risks. Case studies from Delhi, Bangalore, and Chennai were used to illustrate how heat stress and urbanization patterns impact liveability and public health.

The session concluded with a discussion on policy frameworks, the role of governance, and the necessity of integrating green and blue infrastructure into planning strategies. Participants were encouraged to consider climate resilience as a fundamental aspect of urban development and planning practices.

Figure 10: Expert lecture on Climate Resilient Urban Planning by Dr. Ayon K. Tarafdar on Day 2

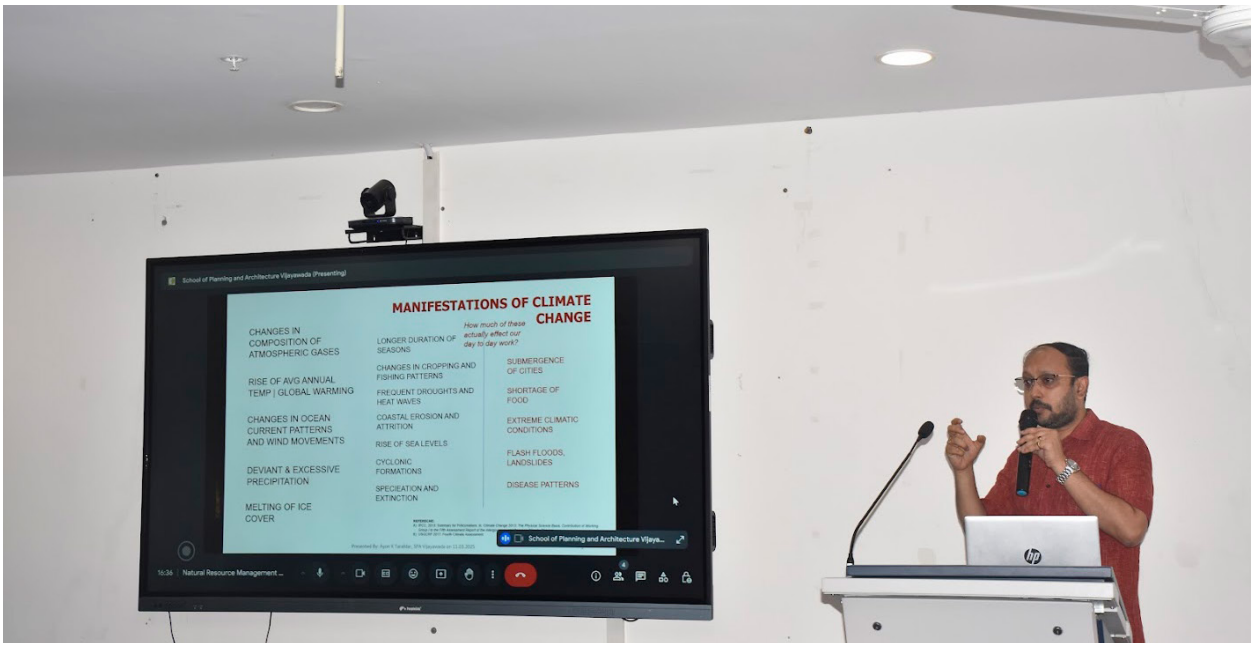


Figure 11: Lecture deliverd by Dr. Ayon K. Tarafdar on Day 2

Day 3

Session 1: Indian Traditional Knowledge Systems

Expert name: Dr. Srinivas Daketi (Professor - Department of Architecture, SPAV)

This session explored the importance of traditional knowledge systems in natural resource management and climate resilience. Dr. Srinivas Daketi highlighted how Indian traditional practices have contributed to sustainable water management, biodiversity conservation, and disaster mitigation. The discussion covered stepwells, tankas, and the zing system as traditional water harvesting methods that ensured water security in arid and semi-arid regions. Examples such as the Bansilalpet Stepwell restoration in Hyderabad demonstrated the relevance of reviving these systems for modern water management.

Figure 12: Introduction of Indian Traditional Knowledge Systems by Dr. Srinivas Daketion Day 3

The session also emphasized sacred groves, shifting cultivation (Jhum), and Joint Forest Management (JFM) as key strategies for forest and biodiversity conservation. Case studies from the Western Ghats and Nilgiris restoration efforts showcased successful ecological rehabilitation models. Additionally, agroforestry practices and mangrove conservation (e.g., Sundarbans and Mahanadi Delta) were discussed as vital techniques for ensuring climate resilience. Indigenous disaster management systems, such as bamboo housing in Northeast India, floating agriculture in Kerala's Kuttanad region, and cyclone shelters in Odisha, were presented as effective traditional strategies for mitigating climate-related disasters. The session concluded with discussions on vernacular and sustainable architecture, reinforcing the need to integrate traditional wisdom with modern practices for environmental sustainability.

Session 2: Biodiversity Conservation - A Case Study

Expert name: Mr. Rajneesh Sareen (Programme Director-Sustainable Habitat Programme Centre for Science and Environment)

This session focused on the critical role of biodiversity conservation in climate change mitigation and adaptation. Mr. Rajneesh Sareen highlighted how urbanization and linear infrastructure projects have led to habitat fragmentation, deforestation, and biodiversity loss. The session emphasized the importance of forests as carbon sinks, providing ecosystem services such as soil erosion prevention, water retention, air quality improvement, and climate regulation.

Case studies from Gurgaon, Bengaluru, Visakhapatnam, and Vijayawada were analysed using Google Earth assessments to showcase how urban expansion has impacted local biodiversity. The discussion also covered environmental impact assessments (EIA), legal frameworks, and mitigation strategies to protect biodiversity. Various survey methodologies like transect surveys, culvert monitoring, and nocturnal surveys were discussed to track biodiversity and assess habitat health.

It further explored biodiversity management plans including wildlife corridors, animal underpasses, signage systems, and lighting pollution control to minimize human-wildlife conflicts. Participants also gained insights into afforestation programs, carbon sequestration through forestry initiatives, and livelihood generation through forest conservation efforts. The session concluded with discussions on India's Nationally Determined Contributions (NDCs) and forest-based climate solutions to enhance biodiversity conservation.

Figure 13: Lecture deliverd by Mr. Rajneesh Sareen Day 3

Session 3: The Role of Architects, Planners, and Engineers in Addressing Climate Change Impacts

Expert name: Dr. Prasanth Vardhan (Associate Professor - Department of Planning, SPAV)

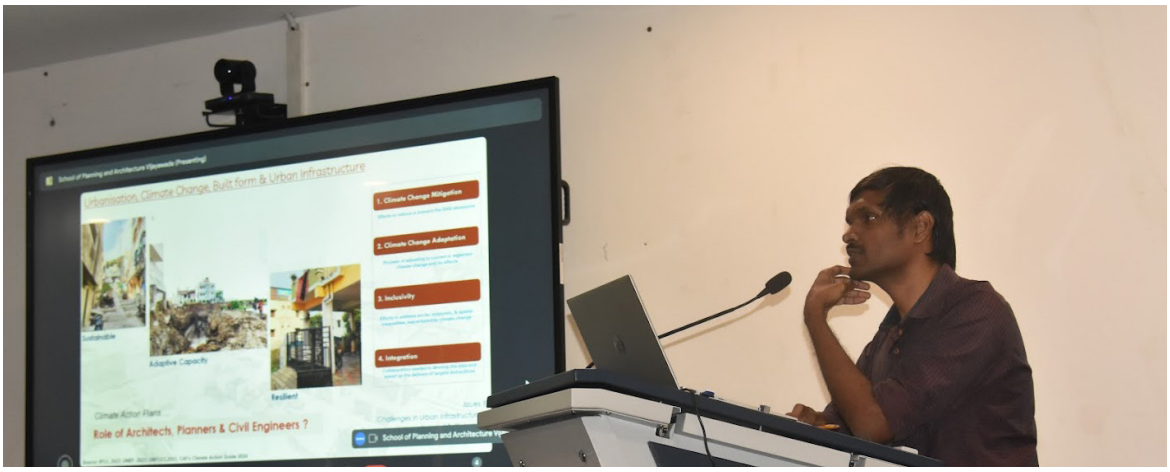


Figure 14: Expert lecture on The Role of Architects, Planners, and Engineers in Addressing Climate Change Impacts by Dr. Prasanth Vardhan Day 3

This session highlighted the significant impact of urbanization and the built environment on climate change and explored the role of architects, planners, and engineers in mitigating its effects. Dr. Prasanth Vardhan presented data on the construction sector's carbon footprint, noting that buildings accounted for 37% of global CO_2 emissions in 2022. The discussion emphasized the urgent need for sustainable urban planning, resilient infrastructure, and energy-efficient design to achieve climate goals.

It also covered climate action plans, green building principles, and adaptive design strategies that can help reduce emissions and enhance urban sustainability. Case studies such as Bosco Verticale in Milan, Benjakitti Forest Park in Bangkok, and Cheonggyecheon Stream restoration in Seoul were used to illustrate successful climate-responsive urban interventions.

Participants explored policy barriers, governance challenges, and financing mechanisms that impact climate-oriented urban development. The session concluded with discussions on early-phase carbon assessment tools like CARE, EPIC, and EC3, which assist in evaluating the carbon impact of construction projects and promoting low-carbon building solutions.

Session 4: Climate Resilient Cities – Adaptive and Mitigative Approaches for a Warming Habitat

Expert name: Mr. Rajneesh Sareen (Programme Director-Sustainable Habitat Programme Centre for Science and Environment)

This session provided insights into how cities can adapt to and mitigate the impacts of climate change through innovative urban planning and infrastructure strategies. Mr. Rajneesh Sareen discussed the growing vulnerability of urban areas due to increasing heat stress, water scarcity, and extreme weather events. He highlighted findings from the IPCC AR6 report, which projects that by 2070, 30% of the global poor population will live outside human thermal comfort levels.

The session analysed the contribution of buildings to India's greenhouse gas (GHG) emissions, stressing that cities are responsible for 75% of global emissions. Mr. Sareen emphasized the role of passive cooling strategies, blue-green infrastructure, and building envelope improvements in mitigating heat impacts. Participants were introduced to urban heat island mapping, climate-responsive zoning, and renewable energy integration as key strategies for sustainable urban development.

Case studies from Delhi, Jaipur, and Pune demonstrated the importance of shading strategies, reflective materials, and energy-efficient building envelopes in reducing urban heat. The session also discussed India's Net Zero commitments, advocating for policy interventions such as the Energy Conservation Building Code (ECBC), urban greening initiatives, and climate action planning at the municipal level. The session concluded with recommendations on integrating climate resilience into city master plans and fostering stakeholder collaboration for sustainable urban growth.

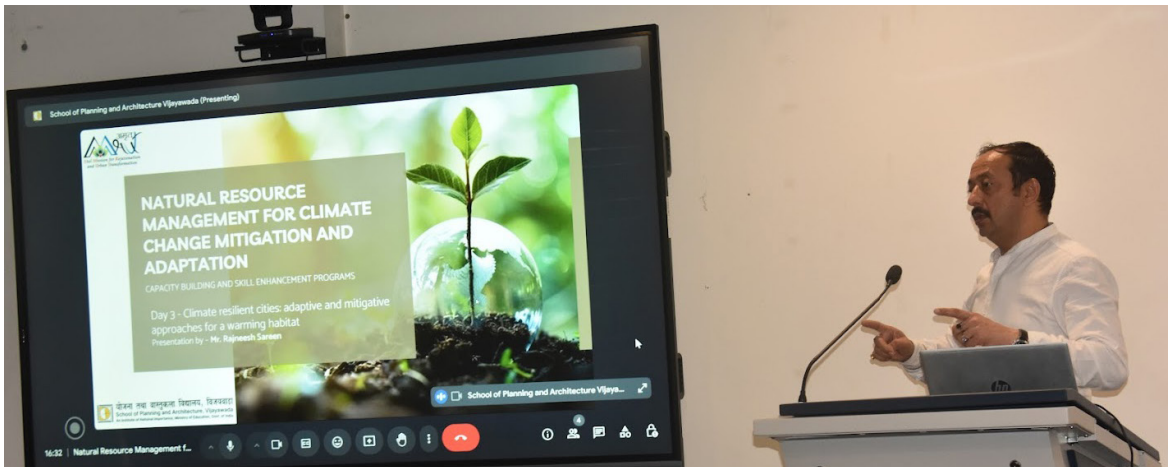


Figure 15: Session by Mr. Rajneesh Sareen Day 3

Day 4

Session 1: Sustainable Agriculture for Climate Change Mitigation

Expert name: Mr. Rajneesh Sareen (Programme Director-Sustainable Habitat Programme Centre for Science and Environment)

This session explored the critical relationship between climate change and agriculture, emphasizing how rising temperatures, erratic rainfall, and extreme weather events impact food production. Mr. Rajneesh Sareen highlighted findings from the IPCC AR6 report, which states that a 1.5°C temperature rise could render 8% of global cropland unsuitable for cultivation. The session discussed climate-resilient agriculture, including techniques like agroforestry, climate-adaptive cropping, and integrated farming systems to improve productivity and reduce carbon footprints.

Figure 16: Introduction of Sustainable Agriculture for Climate Change Mitigation by Mr. Rajneesh Sareen Day 4

Key challenges such as soil degradation, water scarcity, increased pest attacks, and declining yields were analysed using case studies from West Bengal and other Indian regions. The discussion also covered vulnerability assessments, adaptive capacity, and mitigation strategies such as crop diversification, indigenous seed preservation, organic farming, and biofertilizer adoption.

Policy frameworks like the Pradhan Mantri Fasal Bima Yojana (PMFBY) and climate-resilient irrigation systems were also discussed as mechanisms to enhance farmers' resilience. The session concluded with a focus on scaling up adaptive agriculture strategies, promoting sustainable rural livelihoods, and aligning farming practices with India's long-term low-carbon development strategy.

Session 2: Sustainable Agriculture for Climate Change Mitigation

Expert name: Mr. Rajneesh Sareen (Programme Director-Sustainable Habitat Programme Centre for Science and Environment)

This session focused on reducing the environmental impact of the built environment through energy-efficient building design and green construction strategies. Mr. Rajneesh Sareen discussed how buildings contribute to 37% of global energy-related CO_2 emissions and explored strategies such as passive solar design, high-performance insulation, and optimized building orientation to reduce energy demand.

Case studies, including Indira Paryavaran Bhawan in New Delhi and Infosys Bangalore Net Zero initiatives, were presented to illustrate real-world applications of low-energy cooling systems, radiant cooling, and solar-integrated architecture. The session also emphasized urban heat island mitigation, green building certifications (LEED, GRIHA), and the role of smart grid technology in improving building performance. Participants gained insights into regulatory frameworks like the Energy Conservation Building Code (ECBC) and discussed policy interventions for mainstreaming sustainable construction in urban development.

Figure 17: Expert lecture on Sustainable Agriculture for Climate Change Mitigation by Mr. Rajneesh Sareen Day 4

Session 3: Funding and Partnership for NRM and Climate Change Projects

Expert name: Mr. Rajneesh Sareen (Programme Director-Sustainable Habitat Programme Centre for Science and Environment)

This session provided insights into the financial mechanisms and partnerships necessary for effective climate action and natural resource management (NRM). Mr. Rajneesh Sareen highlighted

the global climate finance landscape, noting that annual climate finance investments reached USD 1.46 trillion in 2022-23, with significant gaps in adaptation funding.

The session explored urban infrastructure financing, emphasizing that Indian cities require USD 55 billion annually, yet only USD 30 billion is currently invested, leaving a 45% funding gap. Participants learned about government-backed financing tools like AMRUT, Smart Cities Mission, and the Urban Infrastructure Development Fund (UIDF), as well as private sector participation through Public-Private Partnerships (PPPs), carbon credits, and green bonds.

The discussion also covered municipal bonds, climate adaptation funds, and risk insurance mechanisms as strategies to enhance investment in climate resilience projects. Case studies from Ghaziabad's green municipal bond issuance and Indore's solar energy project demonstrated innovative funding approaches. The session concluded with recommendations on strengthening policy frameworks, leveraging multilateral finance, and integrating financial planning into climate action strategies.

Figure 18: Session by Mr. Rajneesh Sareen Day 4

Session 4: Carbon Sequestration through Urban Planning and Agriculture

Expert name: Mr. Ajay Katuri (Urban Planner & Risk expert, New Delhi)

This session focused on the role of urban planning and agricultural practices in enhancing carbon sequestration to mitigate climate change. Mr. Ajay Katuri explained how carbon sequestration techniques can offset greenhouse gas (GHG) emissions, particularly in rapidly urbanizing

areas. The session highlighted key strategies, including afforestation, soil carbon storage, agroforestry, and biochar application, as effective measures for increasing carbon capture.

Urban planning solutions such as green roofs, vertical forests, and urban wetlands were explored as nature-based solutions to enhance carbon absorption and mitigate urban heat islands. Case studies from Singapore's urban forest policies and New York's Million Trees Project showcased how cities can integrate green infrastructure to improve environmental quality.

Participants also discussed the economic and policy frameworks supporting carbon sequestration, such as carbon credits, reforestation incentives, and regulatory mechanisms under the Paris Agreement. The session concluded with recommendations on scaling up carbon sequestration efforts through collaborative governance, financial support, and community-driven initiatives.

Figure 19: Introduction of Carbon Sequestration through Urban Planning and Agriculture by Mr. Ajay Katuri Day 4

Day 5

Session 1: Successful Climate Change Adaptation in Urban Areas

Expert name: Mr. Ajay Katuri (Urban Planner & Risk expert, New Delhi)

This session focused on strategies for climate change adaptation in urban areas, highlighting how cities can enhance resilience to extreme weather events and environmental stressors. Mr. Ajay Katuri discussed the vulnerability of urban populations to rising temperatures, flooding, and water scarcity, emphasizing the need for integrated urban planning and climate-responsive infrastructure.

Figure 20: Expert lecture on Successful Climate Change Adaptation in Urban Areas by Mr. Ajay Katuri Day 5

The session explored case studies from Karnataka, demonstrating how nature-based solutions, adaptive governance, and resilient urban design have helped mitigate climate risks. Participants were introduced to climate risk forecasting, carbon sink strategies, and sustainable mobility solutions as key adaptation mechanisms.

Additionally, discussions covered policy interventions, climate-responsive zoning regulations, and financial incentives that support urban adaptation efforts. The session concluded with recommendations on scaling up city-level climate resilience initiatives through stakeholder collaboration and long-term policy integration.

Session 2: Eco friendly/Green Building Materials for Climate Resilience

Expert name: Dr. Nagaraju Kaja (Assistant Professor - Department of Architecture, SPAV)

This session focused on the role of building materials on climate change mitigation and adaptation. Dr. Nagaraju Kaja started the session with impacts of the building construction on environment. He defined what is Climate Resilience and why it is important for the conservation of the environment. highlighted how urbanization and linear infrastructure projects have led to habitat fragmentation, deforestation, and biodiversity loss. The session emphasized the importance of forests as carbon sinks, providing ecosystem services such as soil erosion prevention, water retention, air quality improvement, and climate regulation.

He elaborated about the major drivers causing environmental degradation and the role of urban centres. This covered the zero-carbon building with various examples of building materials which can reduce their foot print on energy compared to conventional materials. Construction materials like cement, steel, glass etc were analysed for their energy consumption during various stages of their processing and ways to reduce it to make them sustainable.

Figure 21: Introduction of Eco friendly/Green Building Materials for Climate Resilience by Dr.Nagaraju Kaja Day 5

Then the presentation focussed on Green building materials with examples. Case studies of various Green Buildings were discussed to explain what startegies and materials were used to reduce carbon footprint. Further it explored various ways of de carbonization by presenting principles of de carbonization, de carbonization strategies for buildings. It stressed how important it is to included embodied energy in Energy codes.

Session 3: Technologies for Natural Resource Management

Expert name: Mr. Ajay Katuri (Urban Planner & Risk expert, New Delhi)

This session explored the role of technology in natural resource management (NRM) for climate adaptation and mitigation. Mr. Ajay Katuri discussed Geographic Information Systems (GIS), Remote Sensing (RS), and Artificial Intelligence (AI) as key tools for monitoring and managing natural resources.

The session introduced GIS as a spatial analysis tool that integrates satellite data, spatial mapping, and predictive modelling to support decision-making in NRM. Case studies demonstrated applications of GIS in forest conservation, watershed management, and disaster risk reduction.

Participants also learned about Remote Sensing (RS) applications, including monitoring land use changes, tracking deforestation, and assessing climate vulnerabilities. The discussion covered open-source and proprietary software, such as Google Earth Engine and R-based mapping tools,

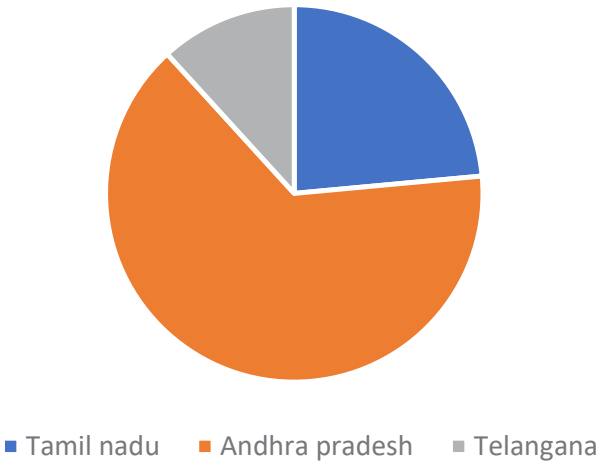
Figure 22: Session by Mr. Ajay KaturiDay 5

highlighting their accessibility for climate and environmental research. The session concluded with insights into technology-driven governance, data-driven policymaking, and the future of digital transformation in NRM.

Participant's Profile

S. No.	Participant Name	Participant Number	Participant Type	Participant Designation	State
1	SUJATHA S	CBP_24_03_01	Faculty	Asst. Professor	Tamil Nadu
2	VENKATA KRUSHNARAO PALAKURI	CBP_24_03_02	Architect	Principal Architect	Andhra Pradesh
3	AR. B.VARSHA	CBP_24_03_03	Private Job	Asst. Professor	Tamil Nadu
4	VIMITHA PRASANNA J	CBP_24_03_04	Private Job	Asst. Professor	Tamil Nadu
5	AR V SHANMUKA TEJA	CBP_24_03_07	Ph.D Scholar	Researcher	Andhra Pradesh
6	P SRI SITA RAMA LAKSHMI	CBP_24_03_08	Ph.D Scholar	Assoc. Professor	Tamil Nadu
7	GOKUL KAILASH A	CBP_24_03_09	Ph.D Scholar	Researcher	Andhra Pradesh
8	SNEHA S.REDDY	CBP_24_03_11	Ph.D Scholar	Asst. professor	Telangana
9	SABBAVARAPU VENKATA RAMANI	CBP_24_03_12	Student	Student	Andhra Pradesh
10	I YESWANTH KUMAR	CBP_24_03_13	Student	Student	Andhra Pradesh
11	KOMMUKURI SAMUEL PAUL	CBP_24_03_14	Student	Student	Andhra Pradesh
12	BRAMHAM MAGULRUI	CBP_24_03_15	Student	Student	Andhra Pradesh
13	DHANI REDDY SHRAVANYA	CBP_24_03_16	Government	Asst. Professor	Andhra Pradesh
14	PATRA BHAGYA SREE	CBP_24_03_17	Student	Student	Andhra Pradesh
15	SIDDAREDDY GARI HARIKA	CBP_24_03_18	Student	Student	Andhra Pradesh
16	MIDDE SUSHMITHA	CBP_24_03_19	Student	Student	Andhra Pradesh

17	PEDDAPASUPALA FAKRUDDIN	CBP_24_03_20	Student	Student	Andhra Pradesh
18	BHUPATHI CHARITHA	CBP_24_03_21	Student	Student	Andhra Pradesh
19	KOMAL GILDA	CBP_24_03_22	Faculty	Asst. Professor	Andhra Pradesh
20	T.SWAPNA	CBP_24_03_23	Faculty	Faculty	Andhra Pradesh
21	TANYA PAUL	CBP_24_03_24	Ph.D Scholar	Researcher	Andhra Pradesh
22	T. JHANSI	CBP_24_03_25	Student	Asst. professor	Andhra Pradesh
23	MOTURU SURYA RATNA SRINIVAS	CBP_24_03_26	Ph.D Scholar	Researcher	Andhra Pradesh
24	MANALI BASU	CBP_24_03_27	Student	Researcher	Andhra Pradesh
25	Dr.ANUSHA CHANDRA PEYYALA	CBP_24_03_28	Faculty	Asst. professor	Andhra Pradesh
26	ENUGANTI KEERTHI	CBP_24_03_29	student	student	Andhra Pradesh
Registered but Could Not Attend Fully					
S. No.	Participant Name	Participant Number	Participant Type	Participant Designation	State
1	LAKSHMI HARIKUMAR	CBP_24_03_05	9979776035	Architect	Telangana
2	SNEHA SRENIVASAN	CBP_24_03_06	Ph.D Scholar	Researcher	Andhra Pradesh
3	SREESHA S BHAT	CBP_24_03_10	Private Job	Architect	Karnataka



Participant's Response

The participant feedback was collected through Google Forms, which was circulated via email by 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 regions, emphasizing its effectiveness in knowledge dissemination and practical application. Most participants rated the curriculum as "Well-Designed" or "Very Well-Designed", indicating that the content was comprehensive and structured to fit the training duration. The quality of lectures was highly appreciated, with the majority rating them "Very Good" or "Excellent", reflecting the clarity, depth, and expertise of the speakers.

The training materials were also highly valued, with responses ranging from "Very Good" to "Excellent". Many participants found the program directly applicable to their professional fields, especially in areas related to climate resilience, natural resource management, and sustainable urban development.

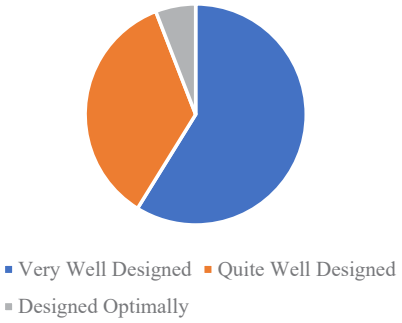
Participants particularly appreciated the interactive sessions and case study discussions, which provided real-world insights into urban and regional planning, water management, and biodiversity conservation. Many expressed interests in further exploring advanced topics such as climate finance mechanisms, nature-based solutions, and carbon sequestration strategies.

The majority of attendees reported having gained new insights and practical knowledge, demonstrating the program's success in capacity building and skill enhancement. Almost all participants expressed willingness to recommend the training to their peers, highlighting the program's relevance and impact. Some participants suggested points for hands-on exercises and extended discussions on specific case studies for an even more immersive learning experience.

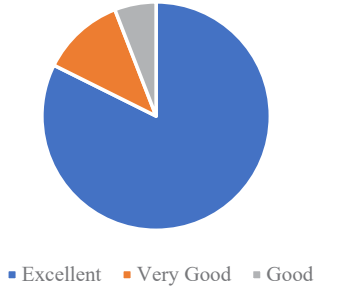
Overall, the training was well-received, offering a balanced blend of theoretical knowledge and practical applications. Participants found it valuable for their professional growth and expressed eagerness for more advanced training sessions in the future.

Participant's Feedback

Q.1.Usefulness of Curriculum Design

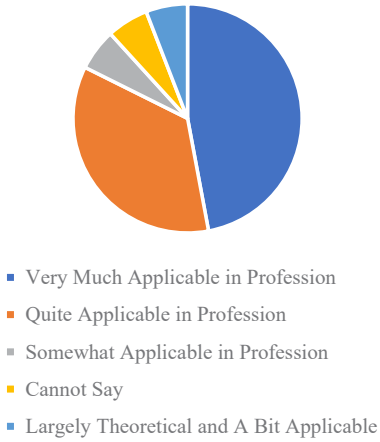


Q2. How did you find the quality of lectures?

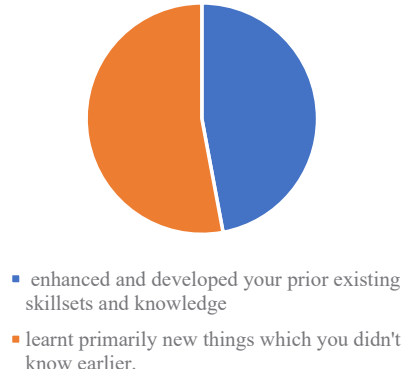


Q3. How did you find the quality of study materials distributed?

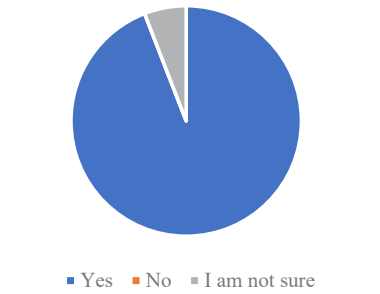
Q4. What do you think of the practical applicability of the training programme?



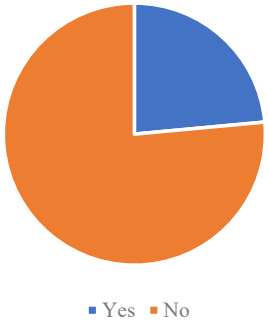
Q5. Through this programme you...



Q6. Do you think you would recommend someone to take this training, if offered in future?



Q7. Do you think there is anything that can be improved ?



Q8. Which part of the programme did you like the best?

Q9. Which part of the programme do you think you are interested to know more and work more on ?

Valedictory Session

The valedictory session marked the successful conclusion of the five-day Capacity Building Program (CBP) and was initiated by Ar. Siddesh (Trainer). The session was chaired by Prof. Dr. Ramesh Srikonda (Director, SPA Vijayawada), Prof. Dr. Ayon K. Tarafdar (Head, CUPCB), and Dr. Nagaraju Kaja (Principal Trainer).

The session commenced with a brief address by Prof. Dr. Ramesh Srikonda, emphasizing the key takeaways from the program and the importance of continued efforts in climate change mitigation and adaptation. Prof. Dr. Ayon K. Tarafdar also shared his insights on the program's impact and future scope.

Following this, all experts who contributed to the training sessions were felicitated by the Director with mementos in recognition of their valuable contributions. Participants were also honoured with certificates and mementos for their active engagement in the program.

The session concluded with closing remarks by Dr. Nagaraju Kaja (Principal Trainer), highlighting the significance of knowledge dissemination and collaborative action in natural resource management.

Figure 23: Memento distribution by the Director, SPAV to the Experts

Figure 24: Certificate and memento distribution to the trainees

Figure 25: Group Photo with Director-SPAV, Registrar-SPAV, Head ACUPCB, Experts, and Trainers Together on CBP-1

AMRUT Centre of Urban Planning for Capacity Building

A- CUPCB-SPAV

Brouchure

About SPAV

School of Planning and Architecture, Vijayawada, (in short SPAV), was established on July 7, 2008 by the Ministry of Education (MoE), Government of India, as an autonomous institution. SPAV is a premier Centrally Funded Technical Institution (CFTI) directly under the MoE, for excellence in the fields of Planning and Architecture. The experienced faculty and guest lectures by eminent visiting faculty and industry experts from all over the country, the quality of education imparted and its focus on research puts SPAV in the league of leading institutes in the country.

Registration Details

Register Here

Registration Deadline : 09 March, 2025 5.00 P.M.

For registration, fees, more details visit

https://acupcb.spav.ac.in/capacity-building/cbp_24_03/

Programme Coordinators

Dr. Nagaraju Kaja
(Principal Trainer)

Dr. Srinivas Daketi
(Principal Co-Trainer)

Ar. Siddesh Mundle
(Trainer)

Patrons

Prof. Dr. Ramesh Srikonda
Director, SPA Vijayawada

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

Organized by: acupcb.spav.ac.in

For further details, contact:
Dr. Nagaraju Kaja : **nagaraju.kaja@spav.ac.in**
Mobile Number : +91-9676404855

Natural Resource Management for Climate Change Mitigation and Adaptation

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

About The Program

This Program underscores the critical significance of climate change as a global concern, emphasizing its profound implications for ecosystems, biodiversity, and natural resource management. Human-induced activities, particularly the release of greenhouse gases, are identified as the primary drivers of climate change, resulting in temperature variations, altered precipitation patterns, and increased frequency of extreme weather events. To address these challenges, this capacity building programme advocates for a dual approach—mitigation and adaptation.

Mitigation involves curbing greenhouse gas emissions, while adaptation focuses on building resilience to cope with inevitable impacts. The subsequent discussion delves into the extensive spectrum of natural resource management, encompassing activities like fishery, forestry, agriculture, water management, and biodiversity preservation. The narrative underscores the importance of integrating effective mitigation and adaptation measures within the context of natural resource management for long-term sustainable development.

This programme emphasizes the interconnectedness of ecosystems, climate, and human activities, stressing the imperative of a holistic approach to address the multifaceted impacts of climate change on natural resources. Further provides insights into the responses which demonstrate management commitment and sustained actions towards mitigation to climate change.

Program Structure

DAY 1

Introduction to Climate change

- Introduction to Climate Change
- Basic Understanding of Key Concepts
- Global, National and Sub-national level Challenges

DAY 2

Climate change Impacts on Natural Resources & eco systems

- Climate Change Impacts on different sectors
- Climate Change Vs Water/Agriculture/Livestock/ Forests Sectors
- Economics of Climate Change and Climate Finance

DAY 3

Strategies for climate change adaptation and mitigation

- Climate change Adaptation and Resilience
- Approaches and tools for integrated natural resources management
- Projects & Policy Scenario in Climate Change Adaptation & Mitigation

DAY 4

Responses for Climate change Resilience; case studies

- Efforts and options for Climate Change Mitigation and Adaptation
- Green building concepts & Renewable Energy related initiatives
- Conservation of Natural Resources & Management

DAY 5

Traditional wisdom for Natural Resource Management and a way forward

- Climate Change in the Indian Context
- Indian traditional Knowledge systems
- Nature-based solutions for sustainable resource management

Programe Relevance

This training programmes is aimed at enhancing the capacities of working professionals and mid-career urbanists, this is relevant to ULB's

- To understand the range of environmental and climate change and associated risks being faced by the cities under current and future carbon scenarios.
- To understand the range of environmental and climate change and associated risks being faced by the cities under current and future carbon scenarios.
- For improved awareness among local municipal officials and other stakeholders of the city and for the capacity building.
- To Identify opportunities and recent strategies for mitigating and managing effects of Climate change.
- To gain actionable insights in managing Natural resources by climate related issues.

Poster

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

NATURAL RESOURCE MANAGEMENT FOR CLIMATE CHANGE MITIGATION AND ADAPTATION

- Day 1. Introduction to Climate change
- Day 2. Climate change Impacts on Natural Resources and eco systems
- Day 3. Strategies for climate change adaptation and mitigation
- Day 4. Responses for Climate change Resilience; case studies
- Day 5. Traditional wisdom for Natural Resource Management and a way forward

10- 14 MARCH 2025

ABOUT THE PROGRAM

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CAPACITY BUILDING AND SKILL ENHANCEMENT PROGRAMS

Organized by: AMRUT Centre of Urban Planning for Capacity Building, SPAV

Coordinated by

Dr. Nagaraju Kaja
Principal Trainer

Dr. Srinivas Daketi
Principal Co- Trainer

Ar. Siddesh Mundle
Trainer

Patrons

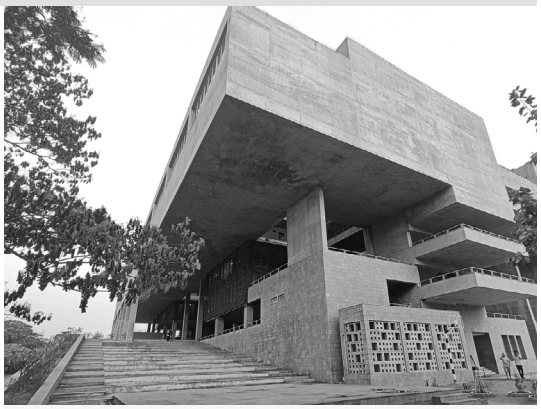
Prof. Dr. Ramesh Srikonda
Director, SPA Vijayawada

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

Registration Open Now

For registration, fees, more details visit
https://acupcb.spav.ac.in/capacity-building/cbp_24_03/

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



Dr. Nagaraju Kaja Mobile No : (9676404855)
nagaraju.kaja@spav.ac.in
Dr. Srinivas Daketi Mobile No : (9849885555)
Srinivas.d@spav.ac.in

Training Manual

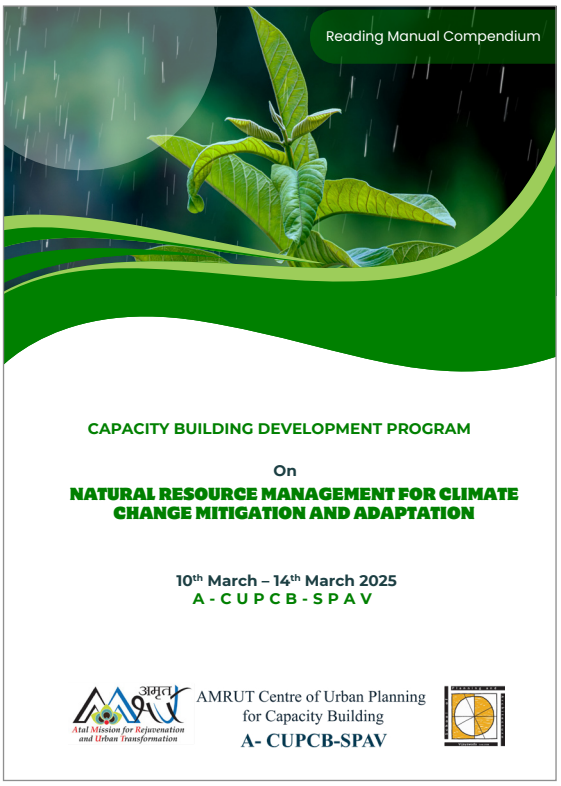


Table of Content

DAY 01
Session :1

Introduction to Climate change and its impact on Global and National level

1) Understanding the Basics of Natural Resource Management (NRM)

a)What are Natural resources –

Natural resource management involves management of natural resources such as land, water, soil, plants and animals. Natural resource management mainly focuses on how it will affect the quality of life for both present and future generations. Natural resources are mainly divided into two categories renewable resources and non-renewable resources. Renewable resources include elements such as water, solar energy, wind energy, biomass and geothermal energy. Whereas non-renewable resources include fossil fuels (coal, oil, natural gas) and minerals (metals, ores). (Epstein, 2025)

Non-renewable resources –
Natural resources that are present in a limited quantity are called as non-renewable resources. They cannot be renewed over a period of time. Non-renewable resources are not environmentally friendly. Example. Coal, Zinc, Petroleum etc.

Renewable resources –
Natural resources which are present in abundant qualities and are less likely to be depleted are called as renewable resources. These resources, even if depleted, can be renewed in a given time period and are available abundantly. Renewable resources are environmental friendly. Example, sunlight, water, sand, etc. (testbook.com, 2025)

b)Importance of Natural resource management –

Main focus of NRM is to understand how humans interact and depend on natural resources for living. It also studies how actions taken by humans play essential role to manage and conserve natural resources. NRM regulates a vast array of activities that makes use of natural resources such as land use, water management, etc. planning to optimal use of natural resources sustainably for present and future is one of the objectives of natural resource management. (vedantu.com)

DAY 04
Session :3

Funding and Partnership for NRM and Climate Change Projects

Effective implementation of mitigation and adaptation measures to reduce the impact of climate change requires robust funding strategies to enhance resource mobilization. This necessitates a comprehensive assessment of financial needs and the identification of appropriate instruments for resource allocation and investment.
A focused policy on climate finance is therefore needed. The United Nations Framework Convention on Climate Change (UNFCCC) defines the scope of climate finance to include local, national and transnational financing—drawn from public, private and alternative sources of financing—to support significant investments for mitigation and adaptation actions.
Moreover, the common framework for State Action Plan for Climate Change (SAPCC) provided by the Ministry of Environment and Forests (MoEFCC) mentions that the state government's budget for sectoral activity and measures needs to mainstream climate change indicators. The financial budget should be leveraged from the existing budget and enable convergence of all schemes. The SAPCC should also bring out the likely funding from the state's own resources over and above the ongoing schemes.

Therefore, it would be useful to estimate the total funding needs for mitigation and adaptation measures, funds available to the state from different sources, the extent of deficit to be bridged and the proposals to bridge the deficit. Even though a large number of sectoral funding mechanisms and funding strategies have evolved in the state and national level that have bearing on the mitigation and adaptation potential of the sectors, there is no practice of separately accounting for them to estimate the actual fund flow for climate change purposes. This requires a deliberate methodology while ensuring deep alignment of fund flows between different sectors to maximize the co-benefits. Therefore, the effort is made to identify and map the sources of domestic funding and the interface with international funding that can be leveraged and scaled up to meet the ambitious transition goals.

The Department of Economic Affairs (DEA) has estimated that India requires an estimated USD 206 billion (2015–2030) for climate adaptation in key sectors, with total climate action costs reaching USD 2.5 trillion. A significant financing gap exists, projected at USD 752.99 billion in 2020 and USD 1,140.66 billion by 2030. As of 2020, India secured Rs 29.064 trillion for adaptation and mitigation, primarily from domestic sources (43.1% commercial banks, 24% foreign portfolio investments, and 16.7% budget allocations). The remaining 15% comes from private investments, multilateral funds, and green bonds, highlighting the critical role of domestic financing in climate action.
This presentation explores the global and national landscape of climate finance, emphasizing the financial needs for urban infrastructure to adapt to climate change impacts. It highlights the growing demand for resilient urban development, assessing the required investment for sustainable infrastructure. The discussion includes an overview of various financial channels available for urban infrastructure, detailing key funding mechanisms, policy frameworks, and innovative financing solutions. Additionally, it examines diverse sources and instruments of urban climate finance, such as public and private investments, multilateral funds, green bonds, and public-private partnerships, ensuring a comprehensive understanding of strategies to bridge the climate finance gap in urban areas.

CBP on Natural Resources Management For Change Mitigation And Adaptation organised by A-CUPCB-SPAV – Training Outcome Report

TRAINING OUTCOME

REPORT

Capacity Building Programme

On

NATURAL RESOURCE MANAGEMENT FOR CLIMATE CHANGE MITIGATION AND ADAPTATION

10th March – 14th March 2025

A - C U P C B - S P A V

Atal Mission for Rejuvenation and Urban Transformation

AMRUT Centre of Urban Planning for Capacity Building

A- CUPCB-SPAV

School of Planning and Architecture Vijayawada