



सड़क परिवहन  
एवं राजमार्ग मंत्रालय  
MINISTRY OF  
ROAD TRANSPORT  
AND HIGHWAYS



AMITY  
UNIVERSITY  
— NOIDA (DELHI NCR) —

## Concept Note

# National Conference on Climate Adaptive Resilient Highways (CARH) 2025

## Promoting Adaptation for Climate and Disaster Resilience of National Highways

**Day: Thursday- Friday**

**Date: 25<sup>th</sup> -26<sup>th</sup> September 2025**

**Venue: Amity University, Noida Campus**

**Organised by  
National Institute of Disaster Management  
Ministry of Home Affairs, GoI**

*in collaboration with*  
**Ministry of Road Transport and Highways, GoI  
&  
Amity University, Noida**

**Consortium Partners**



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## 1. INTRODUCTION

National highway infrastructure systems are critical lifelines that facilitate economic growth, regional connectivity and social development. However, climate change and disaster risks, ranging from extreme weather events to geophysical hazards, pose significant threats to their sustainability and operational reliability. The increasing frequency and intensity of floods, landslides, storms, heatwaves and intense short duration rainfall underscore the urgent need to integrate adaptation into the planning, design, construction and maintenance of highway systems. Addressing these challenges requires innovative adaptation strategies that ensure both climate change and disaster risk resilience in highways infrastructure.

Recent years have witnessed devastating impacts on national highways due to climate extremes. Catastrophic floods wash away major highway segments, disrupting transportation network and economic activities. Landslides triggered by heavy rainfall usually block critical road corridors, leading to prolonged delays and increased maintenance costs. Rising temperatures accelerates pavement deterioration, reducing the lifespan of highways infrastructure and necessitating frequent repairs. Additionally, coastal highways are increasingly vulnerable to sea-level rise and storm surges, which threaten connectivity in low-lying regions. Without proactive adaptation measures, these disruptions will continue to impose significant economic and social costs, further exacerbating vulnerabilities in disaster-prone regions.

Building resilience of National Highways requires a whole of government approach to bring the change at policy level. However, the adoption of sustainable measures can only be processed with the enhanced scientific knowledge and use of technology through the networking of the academic institutions, public-private entities and even communities. Documentation of recent developments and good practices will help in the knowledge exchange and foster a culture of imbibing the best practices as per region specific suitability.

As a part of the project entitled “Development of National Highways Climate Adaptation Policy and Guidelines (HighCAP)”, NIDM has taken the opportunity to facilitate knowledge sharing through development of compendium of good practices in several key areas including designing, construction, maintenance and reconstruction of highway infrastructure. This ultimate goal of project is to develop climate change adaptation policy and guidelines for the integration of climate adaptation into planning, building and maintenance of National Highways. Hence, to achieve this objective, NIDM has planned to compile the good practices and recent research through call for papers which will be showcased in National Conference on Climate Adaptive Resilient Highways (CARH) 2025 having theme “Promoting Adaptation for Climate and Disaster Resilience of National Highways”.



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## 2. AIM

The aim of the conference is to foster a deeper understanding of adaptation strategies for national highway infrastructure systems in the face of climate and disaster risks. The conference, seeks to compile a volume of good practices that showcases innovative approaches, technologies, and policy interventions that enhance the resilience of national highways infrastructure. The published work will provide a valuable resource for policymakers, engineers, researchers, and stakeholders involved in sustainable highways development. The objective is to document successful case studies, strategies, research and methodologies that contribute to sustainable highways development while mitigating disaster risks and adaptation to climate change.

## 3. CALL FOR PAPERS

**CARH 2025** under the project HighCAP, will be compiling the best practices and recent developments covering different thematic areas relevant to climate adaptive highways infrastructure through call for papers. **This call for papers will be advertised on the NIDM website as well as different platforms for wider reach.**

All interested research scholars, researchers, scientists, engineers, practitioners, policy makers, disaster management professionals and other relevant stakeholders, can **submit an abstract on or before 20<sup>th</sup> August 2025**. On intimation of acceptance from NIDM, the author(s) shall be required to **submit a full-length paper latest by 5<sup>th</sup> September 2025**. The presenting authors of the selected full length papers will be invited to **participate and make oral or poster presentation at National Conference- CARH 2025 to be held on 25<sup>th</sup> – 26<sup>th</sup> September 2025 at Amity University, Noida campus.**

**Best full paper submission will be given a reward of cash prize worth Rs. 5000/- under each theme.**

## 4. TARGET GROUP

This call is open to all researchers, policymakers, engineers, scientists, planners, disaster risk managers, and professionals from government agencies, academic institutions, and private sector entities.



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## 5. THEMES AND SCOPE

Contributors are invited to submit papers addressing the following themes:

### **THEME 1. Climate Change Impacts on National Highways**

- Climate change scenario and efficacy of national highway infrastructure
- Methodologies for climate impact projections
- Impact of climate change on operation, maintenance and safety of highways
- Impacts of extreme weather events on pavements
- Extreme temperature resistant pavements and materials (ranging sub-freezing to exceeding 50° C)

### **THEME 2. Multi-Hazard Risk Assessment and Management for Resilient National Highway Systems**

- Assessment of physical, socio-economic and systemic vulnerability of highway corridors
- Multi-hazard risk modelling and assessment of highways
- Methodologies for risk rating and assessment tools to cater impacts of flood, landslide, heat stress on highways
- Critical indicators to determine vulnerability of highways in connection with extreme climatic events
- Social Impact Assessments (SIA) of communities and commuters in the proximity of highways

### **THEME 3. Pathways for Climate Adaptive Disaster Resilient National Highways**

- Hybrid Adaptation approaches (structural and non- structural) predicated on projected climate change impacts on highways
- Use of green infrastructure tools and Nature based Solutions (NbS) for long term adaptive pathways
- Adaptation strategies to mitigate pavement degradation due to freeze thaw cycles in hilly regions
- Adaptive measures for highways in coastal and/or riverine environment
- Adaptation Strategies in Road Design, Construction, and Operation
- Innovative climate adaptation and disaster resilient road infrastructure related projects/schemes and case studies

### **THEME 4. Building Resilience against Impacts of Hydro-Meteorological/Extreme Weather Events on National Highways**

- Cyclone and storm surge-resistant coastal highways
- Drainage and storm water/runoff management during flash floods and storm surge
- Highway safety system for prevention of rainfall induced landslides
- Climate risk resilient pavements and its effective drainage system
- Mitigation strategies for highway embankment erosion

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## **THEME 5. Use of Technological interventions during Inception, Planning, Design, Construction, Monitoring, Maintenance and Management of National Highways**

- Resilient ICT, Infrastructure and Smart Road Monitoring and Evaluation Systems for Disaster-Prone Highway Corridors
- Data integration/framework for Early Warning Systems
- New technologies, smart sensors and robotic solutions for mapping, inspection, real time monitoring and retrofitting of highway infrastructure
- Use of UAVs, satellite imageries and AI/ML for vulnerability/hazard/risk/damage assessment
- Use of remote sensing and GIS for risk analysis and to reduce impacts of extreme climatic events on highways
- Enhancing pavement design, construction and maintenance strategies for climate adaptation using advance technologies.

## **THEME 6. Climate Adaptive and Disaster Resilient Highway Assets like Bridges, Culverts, Drainage system and Tunnels**

- Design & retrofitting of highway bridges/culverts for flood resilience
- Extreme temperature resistant highway bridge infrastructure
- Landslide, avalanche and erosion control measures near highway bridges and tunnels
- Tunnel engineering for protection from landslides, flood and avalanches
- Emergency support system for bridge and tunnel infrastructure

## **THEME 7. Suggestive options for improvements in Codes, Manuals, Standards, Guidelines and Practices for Climate Adaptive Disaster Resilient National Highways**

- Revision of IRC codes related to design of climate-resilient highways
- Gap assessment and modernization of highway codes/ standard guidelines to reflect evolving climate risks, including design standards and operational protocols
- Standard for slope stabilization and landslide mitigation measures
- Updated standards for road geometry, drainage, culvert, bridge and pavement designs

## **THEME 8. Cost Benefit Analysis of Climate Adaptive Disaster Resilient Options for National Highways**

- Cost Benefit Analysis (CBA) for selecting suitable adaptation measures for the vulnerable highway assets
- Lifecycle cost evaluation for adaptation investments
- Costing of green vs. grey infrastructure solution
- Public Private Partnerships (PPP) for resilient financing and implementing climate-resilient highway infrastructure
- Financial viability of climate-adaptive retrofitting measures
- Use of sustainable materials and practices in road maintenance



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## **THEME 9. Methodologies, Techniques, Technologies, Plans and Policies for Transport Emergency Management and Traffic Evacuation on National Highways, particularly focusing on Flood Events**

- Transport Emergency Management Plans (TEMP) and Traffic Evacuation Plans (TEP) for various climate hazards affecting highways
- Flood risk-based traffic diversion and rerouting plans
- Traffic evacuation and crisis management for accidents happened due to transportation of hazardous chemicals
- Toll Plaza management of highways during disaster, recovery and relief efforts for enhancing traffic management
- Design of evacuation corridors and critical transport links
- Assessments of traffic control, public transport, road behaviour and transportation during mass gatherings

## **THEME 10. Training and Capacity Development Tools/ Toolkits for Climate Adaptation and Disaster Resilience National Highway Infrastructure**

- Capacity building tools for practitioners to mainstream disaster resilient highway measures in their practices
- Strategies for integrating local knowledge, plausible needs, and response capabilities of community
- Socio-behavioural change communication (SBCC) to improve road disaster safety awareness, adaptation and mitigation measures along highways
- E-learning modules on climate adaptive and disaster resilient highways
- Curriculum development for highway engineers and planners

## **THEME 11. Governance, Policy and Guidelines for Climate Adaptive National Highways - Gaps and Opportunities**

- Effective stakeholder engagement for climate adaptation during the life cycle of highway assets
- Policy coherence across transport, climate, and disaster domains
- Interdependency of highway infrastructure on other systems
- SoP for institutional dependencies and robust coordination mechanisms among stakeholders
- Regulatory and policy frameworks for climate change adaptation in highways planning, construction, operation, and maintenance



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## 6. EVALUATION CRITERIA

Evaluation of the submitted entries of abstracts will be based on the relevance of the theme, innovation, impact and scalability of the submitted abstract through peer review. **The decision will be intimated through emails to corresponding authors.**

After acceptance of the abstract, the full paper should be submitted in the prescribed format given as sample format (pg.8). The review of full paper will also be done in the blind peer review mode after submission from selected abstracts. The received comments from the reviewer, will be shared with corresponding authors for necessary changes as per the format or from technical point of view. All the submitted papers will be checked for plagiarism. Papers will be accepted/published if the plagiarism level is  $\leq 10\%$ . Please make sure to minimise plagiarism as much as possible.

Published Book volume of good practices would be launched later and e-copies will be disseminated to the participants and included in NIDM website. The e-copies will be shared with officials from NIDM, MoRTH, World Bank, consortium partner institutes of HighCAP Project and other relevant stakeholders. The accepted full length papers which qualifies the review process, shall be published as **NIDM publication having ISBN/ISSN number.**

## 7. EXPECTED OUTCOMES

- Collection of research and case studies on good practices to be presented during CARH 2025 conference.
- Presented full length research papers will be published as NIDM publication having ISBN/ISSN number as a Compendium of Good Practices on Promoting Adaptation for Climate and Disaster Resilience of National Highways.
- Publication of the volume of good practices as comprehensive knowledge repository for wider dissemination.
- Enhanced collaboration and knowledge exchange between different stakeholders in the highways sector.
- Synthesis of policy recommendations and actionable strategies for climate-proofing national highways.
- Promote and support research and development towards disaster resilience and climate adaptation in highways sector.



## 8. SUBMISSION GUIDELINES AND TIMELINES

- Abstracts (200 words) should be submitted as per the given sample format.
- Full length papers (3,000-5,000 words excluding references) should be submitted as per the given sample format (pg.8). Papers accepted for presentation should be original in nature.
- Submissions must follow formatting guidelines and to be submitted in English.
- Entries will be taken for abstract/ full paper through email [carhconference2025@gmail.com](mailto:carhconference2025@gmail.com) and via registration link. Abstract and full paper should be submitted as e-mail attachment with **subject of email “CONTRIBUTION FOR CARH 2025”**. The Queries related to paper submission and CARH 2025 will be taken up through email [highcap.nidm@nidm.gov.in](mailto:highcap.nidm@nidm.gov.in) and through provided contact information at Pg 9.
- Each **entry should focus on one of the thematic areas** related to highway resilience.
- All papers would be subjected to blind peer review and selected papers will be published as NIDM publication having ISBN/ ISSN number.
- The content should reflect a detailed account of the successful case studies, use of innovative scientific measures in practice, key achievements through best practices, identification of gaps and challenges, need for sustainable solutions and lessons learned.

**Abstract Submission Last Date- 20<sup>th</sup> August 2025**

**Full Paper submission Last Date- 5<sup>th</sup> September 2025**

**CARH 2025 Conference Dates- 25<sup>th</sup>- 26<sup>th</sup> September 2025**





9. MANUSCRIPT GUIDELINESAND SAMPLE FORMAT

Title of the paper

First Author<sup>1</sup>[0000-1111-2222-3333] and Second Author<sup>2</sup>[1111-2222-3333-4444]

<sup>1</sup> Princeton University, Princeton NJ 08544, USA  
<sup>2</sup> Springer Heidelberg, Tiergartenstr. 17, 69121 Heidelberg, Germany

**Abstract** *The abstract should summarize the contents of the paper in short terms, i.e. in 200 words, 12 point size italics.*

**Keywords:** First Keyword, Second Keyword, Third Keyword (4-5 keywords)

1 Introduction

(Sections like Introduction, methodology, analysis, results, discussion, conclusion, acknowledgments and references should be given.) Paper length excluding references is 3000-5000 words. A4 pages including tables and illustrations

1.1 A Subsection Sample

Please note that the first paragraph of a section or subsection is not indented. The first paragraphs that follows a table, figure, equation etc. does not have an indent, either.  
Subsequent paragraphs, however, are indented.

**Sample Heading (Third Level).** Only two levels of headings should be numbered. Lower level headings remain unnumbered; they are formatted as run-in headings.

*Sample Heading (Forth Level).* The contribution should contain no more than four levels of headings. The following Table 1 gives a summary of all heading levels.

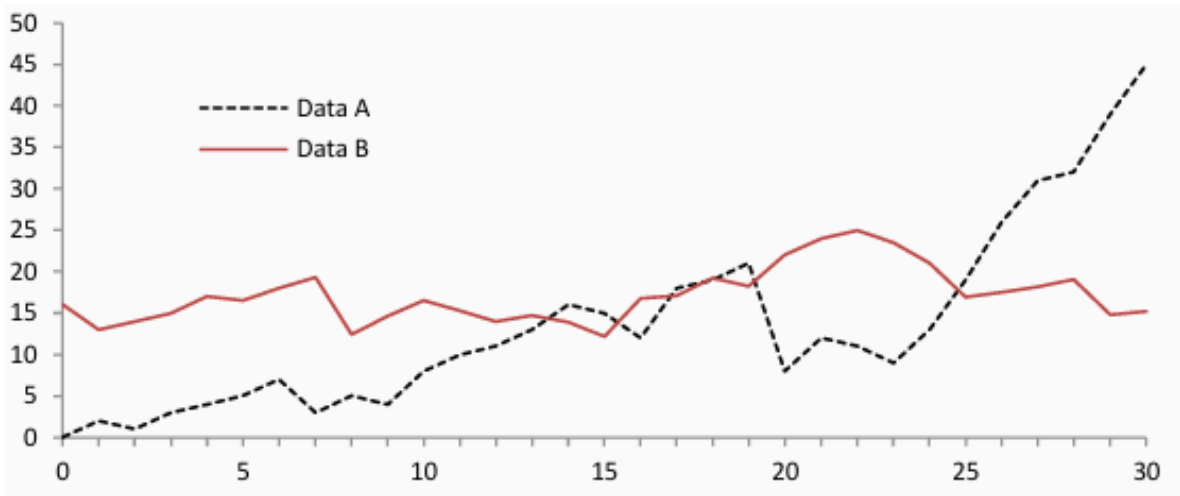
**Table 1.** Table captions should be placed above the tables. (All tables and illustrations (1.5 spaced with 1 inch margins and justified).

Heading level	Example	Font size and style
Title (centered)	<b>Lecture Notes</b>	14 point, bold- Times New Roman
1 <sup>st</sup> -level heading	<b>1 Introduction</b>	12 point, bold- Times New Roman
2 <sup>nd</sup> -level heading	<b>2.1 Printing Area</b>	10 point, bold- Times New Roman
3 <sup>rd</sup> -level heading	<b>Run-in Heading in Bold.</b> Text follows	10 point, bold- Times New Roman
4 <sup>th</sup> -level heading	<i>Lowest Level Heading.</i> Text follows	10 point, italic- Times New Roman

Displayed equations are centered and set on a separate line.

$$x + y = z \tag{1}$$

Please try to avoid rasterized images for line-art diagrams and schemas. Whenever possible, use vector graphics instead (see Fig. 1).



**Fig. 1.** Figures, maps and diagrams should be of good resolution (150 dpi or more), numbered consecutively. A figure caption is always placed below the illustration. Short captions are centered, while long ones are justified. The macro button chooses the correct format automatically.

For referencing and index citations should be as per American Psychological Association (APA) guidelines. Prefer the use of square brackets and consecutive numbers. Citations using labels or the author/year convention are also acceptable. The following bibliography provides a sample reference list with entries for journal articles [1], an LNCS chapter [2], a book [3], proceedings without editors [4], as well as a URL [5].

References

a.

Journal Articles: Scruton, R. (1996). The eclipse of listening. The New Criterion,15(30), 5-13.

b.

Article in a Magazine: Henry, W.A., III. (1990, April9). Making the grade in today’s schools. Time,135, 28-31.

c.

Book (Single and multiple Author(s)) McKibben, B. (1992). The age of missing information. New York: Random House. Larson, G. W., Ellis, D. C., & Rivers, P. C. (1984). Essentials of chemical dependency counseling. New York: Columbia University Press.

d.

Article or Chapter in an Edited Book Barlow, D. H., Chorpita, B. F., & Turovsky, J. (1996). Fear, panic, anxiety, and disorders of Emotion. In R.Dienstbier (Ed.), Nebraska Symposium on Motivation: Vol. 43. Perspectives on anxiety, panic, and fear (pp. 251-328). Lincoln: University of Nebraska Press.

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Conference Proceedings Schnase, J. L., & Cunnius, E. L. (Eds.). (1995). Proceedings from CSCL ‘95: The First International Conference on Computer Support for Collaborative Learning. Mahwah, NJ: Erlbaum.

f.

Individual document/report/web page authored by an organization and available on organization Web site, no publication date: Accreditation Commission for Programs in Hospitality Administration. (n.d.). Handbook of accreditation. Retrieved from <http://www.acphacahm.org/forms/acpha/acphahand-book04.pdf>





# 10. CONTACT INFORMATION

**For submission of abstract and full paper submission**

**Email:** [carhconference2025@gmail.com](mailto:carhconference2025@gmail.com)

**Registration Link** of corresponding author:

<https://docs.google.com/forms/d/e/1FAIpQLSe7lrUVuvatGT8-9jbRHxCRTHbqSlrs0fAXxgQvQDTafKITwQ/viewform>

**Venue Location:** <https://maps.app.goo.gl/nyMJD7Y167o3Z3jR6>

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**Amity University Noida:** <https://www.amity.edu/>



# National Institute of Disaster Management

*The National Institute of Disaster Management (NIDM) was constituted under an Act of Parliament with a vision to play the role of a premier institute for capacity development in India and the region. The efforts in this direction that began with the formation of the National Centre for Disaster Management (NCDM) in 1995. Gained impetus with its redesignation as the National Institute of Disaster Management (NIDM) for training and capacity development.*

*Under the Disaster Management Act 2005, NIDM has been assigned nodal responsibilities for human resource development, capacity building, training, research, documentation and policy advocacy in the field of disaster management. NIDM has performed a crucial role in bringing disaster risk reduction to the forefront of the national agenda. The Institute believes that disaster risk reduction is possible only through promotion of a "Culture of Prevention" involving all stakeholders.*



📍 **NIDM, Delhi**



📍 **NIDM, Vijayawada (South Campus)**

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