

Concept Note and Programme

International Workshop on Quality Road Infrastructure Development

Future of Quality Road Infrastructure: Envisioning Introduction of Advanced Technologies for Developing Sustainable and Resilient Road Networks under the Era of Climate Change and Aging

4-6 March 2025

United Nations University, Tokyo, Japan

1. Background

Global transport infrastructure, particularly road and highway networks, is facing immense challenges due to the impacts of global warming, rising sea levels, and extreme weather events. The increasing frequency and severity of climate-related incidents—such as floods, storms, and extreme temperatures—are causing substantial damage to these networks. This disruption not only hinders economic activities but also threatens the environment and communities. According to the State of the Global Climate report, 2023 has been a record-breaking year for global temperatures, ocean heat, and rising sea levels¹. This year alone has seen 399 natural disasters, resulting in 86,473 fatalities, affecting 93.1 million people, and causing approximately US\$ 202.7 billion in economic losses². Moreover, many road networks were built decades ago and are now unprepared to meet modern transportation demands or cope with today's environmental challenges in the face of climate change. These aging infrastructures are increasingly vulnerable to the effects of climate change, leading to further deterioration, rising maintenance needs, and escalating renewal costs. As natural disasters grow in intensity and frequency, the need for climate change mitigation and adaptation measures has become an urgent global priority.

Asia and the Pacific are home to 60 per cent of the global population, with around 4.7 billion people residing in the region, and by 2050, this number is projected to reach 5.2 billion.³ The rapid population growth is driving a significant increase in demand for transportation infrastructure and services. For instance, domestic passenger transport in Asia is projected to rise to approximately 22 trillion passenger-kilometers by 2030, while domestic freight transport

¹ <https://wmo.int/news/media-centre/climate-change-indicators-reached-record-levels-2023-wmo>

² <https://reliefweb.int/report/world/2023-disasters-numbers#:~:text=In%202023%2C1%20the%20Emergency,amounted%20to%20US%24202.7%20billion.>

³ https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/undesa_pd_2024_escap-report-population-development-17.pdf

is expected to grow even faster, reaching around 36 trillion ton-kilometers by 2030⁴. Furthermore, a notable surge in demand for transportation infrastructure and services is also evident in developing countries across other parts of the globe. For instance, with Africa's population anticipated to reach 2.5 billion by 2050 and its economic output projected to triple by 2040, demand for transport is subsequently estimated to rise by as much as eight times by 2040. The necessity to expand and modernize the transportation infrastructure has become increasingly critical⁵. As a result, air pollution and greenhouse gas emissions from the transportation sector are set to increase substantially under a business-as-usual scenario.

Decarbonizing transportation is, therefore, essential to meeting the goals of the Paris Agreement and mitigating climate change impacts. Achieving these objectives will require the adoption of advanced digital technologies, innovative high-quality materials, and nature-based low-carbon mobility solutions, alongside the development of resilient transport infrastructure. High-quality infrastructure and climate-resilient designs can play a critical role in reducing emissions and adapting to changing conditions, promoting sustainable economic growth and environmental protection. It is necessary to develop transport systems that are not only disaster-resistant but also supportive of climate change mitigation and adaptation.

In this context, integrating advanced technologies and developing high-quality road infrastructure are essential for creating sustainable and resilient networks capable of withstanding the impacts of climate change. By leveraging innovative materials, digital tools, and smart engineering particularly, nature-positive green roads and bioengineering practices, we can design infrastructure that enhances durability, adaptability, and supports sustained economic activity, while advancing the global achievement of Sustainable Development Goals (SDGs). Therefore, this international workshop on quality road infrastructure development aims to explore how cutting-edge technologies and high-quality resilient road infrastructure networks can be harnessed to create adaptable infrastructure that aligns with long-term sustainability goals, especially in the context of global climate change and aging infrastructure.

2. Workshop Objectives

The primary objective of the international workshop is to provide senior government officials, who are part of the organization's decision-making authority, with the opportunity to broaden and deepen their knowledge about the latest technological advancements that enhance the sustainability and resilience of road infrastructure. It will focus on capacity building, skills development, technology transfer, and policy frameworks essential for integrating advanced technologies into current and future road projects. The workshop will showcase best practices, case studies, and examples of smart infrastructure, resilient materials, and green technologies used to mitigate climate impacts and address aging infrastructure challenges. Additionally, it provides a platform for stakeholders to collaborate, share knowledge, and discuss the adoption of these innovations, fostering a more sustainable and resilient future in road transportation. Through dialogue and capacity building, the workshop aims to empower participants to implement solutions that strengthen road networks while supporting broader sustainability goals. The additional objectives of the workshop are:

⁴ https://asiantransportoutlook.com/documents/11/Asian_Transport_2030_Outlook_Nov_2022.pdf

⁵ <https://www.afdb.org/en/news-and-events/press-releases/shaping-africas-transport-landscape-african-development-bank-host-transport-forum-abidjan-tackle-continental-challenges-74185>

- To enhance knowledge on climate change mitigation and adaptation measures in the road sector, with a focus on disaster prevention and mitigation;
- To deepen understanding of advanced technologies in road infrastructure, including low-carbon materials, decarbonization technologies, and structure durability;
- To broaden knowledge on road maintenance and management strategies, such as inspections and aging management technologies, and
- To provide a platform for policymakers, planners, engineers, and government officials to exchange insights, experiences, and best practices on using advanced technologies to build high-quality, resilient, and sustainable road networks.

3. Co-organizers:

The workshop is co-organized by the United Nations Centre for Regional Development of Division for Sustainable Development Goals/ United Nations Department of Economic and Social Affairs (UNCRD-DSDG/UN DESA) and the Ministry of Land, Infrastructure, Transport and Tourism, the Government of Japan.

4. Participants:

The targeted participants include national government officials from different Asia and the Pacific countries. It is expected that the workshop will be attended by approximately 50 participants, including policymakers, planners, senior officials, experts, and resource persons, and representatives from the partner and supporting organizations.

5. Venue: United Nations University, 5 Chome-53-70 Jingumae, Shibuya City, Tokyo 150-8925

6. Language: English

7. Contact for Further Information:

Dr. Ganesh Raj Joshi, Ms. Nana Inaguma-Urakami, and Mr. Shigenori Arai
 United Nations Centre for Regional Development (UNCRD)
 Nagono 1-47-1 Nakamura-ku, Nagoya 450-0001, JAPAN
 Tel: +81-52 561 9377; Fax: +81-52 561 9374
 E-mail: joshi@uncrd.or.jp; nurakami@uncrd.or.jp; arais@uncrd.or.jp

Program Agenda

Timing	Sessions
<u>Day 1 (Tuesday 4 March 2024)</u>	
08:30 – 9:00	Registration
9:00 – 9:45	Opening Session
09:00 – 9:15 (15 minutes)	<p>Opening Remarks</p> <ul style="list-style-type: none"> - Welcome Remark – by Mr. Shigeo Murata, the Head of UNCRD, and Ms. Astra Bonini, Chief, Integrated Policy Analysis Branch, Division for Sustainable Development Goals, UN Department of Economic and Social Affairs (DSDG/UN DESA) – video address (5 min) - Opening Remark– by Mr. Masayoshi Hirose, Vice Minister for Engineering Affairs, Ministry of Land, Infrastructure, Transport and Tourism (MLIT), the Government of Japan (5 min) - Photo Session
9:15 – 9:45 (30 minutes)	<p>Keynote Speech</p> <p>Quality Road for Spatial Organization and Citizen’s Sufficiency – by Prof. Yoshitsugu Hayashi, Distinguished Professor, Tokai Gakuen University, Japan</p>
9:45 – 10:00	Tea /Coffee break
10:00 – 13:45	Session 1: Special Session for Policy Makers and Planners
10:00 – 11:50 (110 minutes)	<p><i>This session will discuss key issues and challenges for climate resilient road infrastructure development in Asia and the Pacific and beyond. Participating in high-level government delegates will deliver brief country presentations.</i></p> <ul style="list-style-type: none"> - Introduction of the participants (Each participant will have the opportunity to introduce themselves.) (25 min.) - Key issues and challenges for climate resilient road infrastructure development in Asia and the Pacific and beyond – by Dr. Kazushige Endo, Director of CORINS/TECRIS Center, Japan Construction Information Center (10min.) - Presentation by participating countries (65 min.) Group 1: Bangladesh, Cambodia, Fiji, Kenya, Lao PDR and Malaysia, approx.10 min. each

Timing	Sessions
	Question and answer (5 min.)
11:50 – 13:05	Lunch break
13:05 – 14:15 (70 minutes)	<p>- Presentation by participating countries cont.... (65 min.) Group 2: Nepal, Philippines, Thailand and Türkiye approx.10 min. each</p> <p>Question and answer (5 min.)</p>
14:15 – 15:30 (75 minutes)	<p>Round Table Discussion <i>This session will explore innovative policies, strategic planning, and advanced design solutions to develop sustainable and resilient road networks. Addressing the dual challenges of climate change and aging infrastructure, the session will highlight forward-thinking approaches to ensure road networks are environmentally friendly, inclusive, and capable of withstanding future climate and disaster impacts and transport demands.</i></p> <p>- Round Table 1: Cambodia, Fiji, and Kenya</p> <p>- Round Table 2: Kyrgyzstan, Lao PDR, and Türkiye</p> <p>- Round Table 3: Malaysia, Nepal, and Thailand</p> <p>- Round Table 4: Bangladesh, Philippines, and Türkiye</p> <p>Discussion questions (45 min.)</p> <p>Moderator: Prof. Charlie Hargroves, Associate Professor, Curtin University Sustainability Policy Institute, Australia</p> <ol style="list-style-type: none"> 1) <i>What innovative policy measures can accelerate the creation of be climate-resilient and sustainable road networks that prioritize human and environmental needs?</i> 2) <i>How can strategic planning integrate climate risk and evolving and mobility/freight demands in the context of aging road infrastructure in participating countries?</i> 3) <i>What advanced materials and inclusive design innovations can ensure road networks are durable, sustainable, and aligned with sustainable development (SDGs) and climate goals (Paris Agreement)?</i> 4) <i>How can emerging technologies, nature-based solutions and cross- and multi-sector collaboration and partnerships transform road infrastructure to be more climate- and disaster-resilient?</i> <p>Group presentation 7 min each (30 min.)</p>

Timing	Sessions
	Expected outcomes: Actionable policy recommendations, innovative design solutions, adoption of advanced technologies and nature-based solutions to enhance road durability, strengthened and sustainability.
15:30 – 16:00	Tea /Coffee break
16:00 – 17:30	Session 2: Funding and financing opportunities for climate resilience – green road infrastructure development in Asia
16:00 – 17:30 (90 minutes)	<p><i>This session will discuss about the funding and financing opportunities for climate resilience – green road infrastructure development for Asian developing countries, including LDCs, LLDCs and SIDS</i></p> <p>Presentation 1: Greening Roadways: The Role of ADB’s Green Roads Toolkit in Building Sustainable Infrastructure in Asia and the Pacific - Dr. Michael Anyala, Senior Transport Specialist, Asian Development Bank (ADB) (20min.)</p> <p>Presentation 2: Assam SASEC Corridor Connectivity Improvement Project (ASCCIP) - Mr. Hiroshi Fukushima, Transport Specialist, ADB (10min.)</p> <p>Presentation 3: JICA’s Cooperation for Quality Road Infrastructure - Mr. Kazuki Yamada, Deputy Director, Team1, Transportation Group, Infrastructure Management Department, Japan International Cooperation Agency (JICA) (20 min.)</p> <p>Open Country Discussion: (40 min.)</p>
17:30 – 20:00	Networking Reception: Hosted by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Government of Japan

- End of Day 1 -

Timing	Sessions
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Day 2 (Wednesday 5 March 2024)

8:45 – 10:45 (120 minutes)	Session 3: Advanced Technology Introduction for Road Pavement
	<p><i>This session focuses on advanced road technologies currently used in Japan, including asphalt pavement recycling technologies, low-carbon materials, decarbonization technologies, and durability improvement technologies.</i></p> <p>Representatives of Japan Road Contractors Association (JRCA)</p> <p>Presentation 1: Aiming at the life performance and enhanced technology of recycling asphalt pavement in Japan (10 min.) Question and answer (10 min.)</p> <p>Presentation 2: Environmentally - Friendly Pavement Technology (10 min.) Question and answer (10 min.)</p> <p>Presentation 3: Development and Implementation of Pavement Materials Towards Decarbonized Society (10 min.) Question and answer (10 min.)</p> <p>Presentation 4: Development of Water Activated Cold Mix Asphalt (10 min.) Question and answer (10 min.)</p> <p>Presentation 5: Introduction of New Technologies for Multifunctionality and Durability in Pavements (10 min.) Question and answer (10 min.)</p> <p>Presentation 6: Technical Transfer of Stabilizer Construction Method (10 min.) Question and answer (10 min.)</p>
10:45– 11:00	<i>Tea /Coffee break</i>
11:00 – 12:30 (90 minutes)	Session 4: Advanced Technology Introduction for Concrete Structure
	<p><i>This session focuses on two bridges: the Kouchigawa Bridge (tentative name) and the Nakatsugawa Bridge. The Kouchigawa Bridge, designed with careful consideration for landscape, environment, and preservation, features extensive use of steel-concrete composite structures. The Nakatsugawa Bridge, an extradosed bridge utilizing "Butterfly Webs," is designed to withstand major seismic activity while</i></p>

Timing	Sessions
	<p><i>navigating the challenges of a fault fracture zone and considerations for surrounding structures.</i></p> <p>Representatives of Japan Prestressed Concrete Contractors Association</p> <p>Presentation 1: Design and Construction of Kouchigawa Bridge (30 min.) Question and answer (15 min.)</p> <p>Presentation 2: Conceptual Design of Extradosed Bridge Using Butterfly Webs over the Fault Fracture Zone (30 min.) Question and answer (15 min.)</p>
12:30 – 13:30	Lunch break
13:30 – 18:30 (5 hrs)	Technical Field Trip:
	<p><i>This technical excursion will include a visit to the Tokyo Outer Ring Road (Gaikan) Project, which aims to alleviate traffic congestion in the metropolitan area, improve environmental conditions, and establish a seamless transportation network. The excursion will feature an observation of the ongoing shield tunneling operations utilizing Japan's largest diameter shield machine, as well as a visit to the superstructure of a bridge under construction, providing a comprehensive view of the project's advanced engineering techniques.</i></p> <p>Inspection Site Oizumi Junction on the Tokyo Outer Ring Road (Gaikan) Project</p>

- End of Day 2 -

Timing	Sessions
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Day 3 (Thursday 6 March 2024)

9:00 – 10:30 (90 minutes)	Session 5: Advanced technology introduction for Steel Bridge
	<p><i>This session will discuss about Japanese steel bridge technology, which was developed to reflect Japan's land characteristics, weather conditions, and diverse needs, and has been utilized mainly in ODA projects, and can meet diverse needs worldwide.</i></p> <p>Representative of Japan Bridge Association Inc. Presentation: “Steel Bridge” Japanese Sophisticated Technology (60 min.) Question and answer (30 min.)</p>
10:30– 11:00	<i>Tea /Coffee break</i>
11:00 – 12:30 (90 minutes)	Session 6: Advanced expressway operation and maintenance
	<p><i>This session focuses on advanced expressway operation and maintenance, especially on facility maintenance, bridge inspection, bridge renewal and highway closure restriction before disasters, in the context of aging infrastructure and climate change adaptation measures.</i></p> <p>Representatives of Nippon Expressway Co., Ltd (Central, West and East) Presentation 1: Overview of O&M and Tunnel Facilities (25 min) Open Discussions 1 (15 min.)</p> <p>Presentation 2: Bridge Inspection and Bridge Deck Renewal Projects (15 min) Open Discussions 2 (10 min.)</p> <p>Presentation 3: Highway closure restriction before disasters with considering intensity and cumulative volume of rainfall (15 min) Open Discussions 3 (10 min.)</p>
12:30 – 13:45	<i>Lunch break</i>
13:45 – 14:45 (60 minutes)	Session 7: MLIT Special Session on Advanced technology and rules/regulations for the development of Sustainable and Resilient Road Network in Japan
	<p><i>In this session MLIT-Japan will present best cases and examples of governmental initiatives to introduce advanced technology for the development of Sustainable and Resilient Road Network in Japan</i></p> <p>Presentation: Advanced technology and rules/regulations for the development of Sustainable and Resilient Road Infrastructure in Japan – by Mr. Shinichiro Nagao, Director for International Affairs, Planning Division, Road Bureau, MLIT (40 min.)</p>

Timing	Sessions
	<p>Discussions (20 min.) Discussion questions:</p> <p>1) <i>How can we optimize our rules/regulations and technical standards to introduce the advanced technology for developing sustainable and resilient road networks under the era of climate change and aging?</i></p> <p>2) <i>How can we appropriately evaluate the cost-effectiveness of advanced technology for the realization of “Quality Road Infrastructure”?</i></p>
14:45 – 16:00 (75 minutes)	Wrap up / Closing
14:45 – 15:15	Evaluation of the Training Workshop - by participating countries
15:15 – 15:45	Certificate distribution
15:45 – 16:00	<p>Closing Remarks</p> <ul style="list-style-type: none"> - Representative of participating countries (5 min.) - Mr. Masamichi Hashimoto, Assistant Vice Minister of Engineering and Roads, MLIT (5 min.) - Mr. Shigeo Murata, the Head of UNCRD (5 min.)

- End of the Workshop-