Seminar - Building Resilient Futures: Nature-Based Solutions and Multi-Hazard Risk Management

Organised by: Centre for Engineering and Architectural Sustainability (CEAS)

School of Engineering & the Built Environment

Date: 19 September 2025
Time (GMT): 12:00 – 13:30
Venue: MAR012, Marconi Building, Chelmsford, ARU, Essex, UK
Teams link: it will be shared after registration.
Registration link: https://www.eventbrite.co.uk/e/seminar-building-resilient-futures-tickets-1652232374509?aff=oddtdtcreator

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Talk 1 – Nature-Based Solutions for Climate-Resilient Infrastructure

Dr. Mohamed Eldessouki is an accomplished researcher, academic, and entrepreneur specialising in digital innovation and smart materials. He is the Founder and Director of the Digital Innovation Centre – operating in the UK and the Czech Republic – and the Coordinator of NATURE-DEMO. He served as an Associate Professor at both the Technical University of Liberec (Czech Republic) and Mansoura University (Egypt). Dr. Eldessouki has +20 years of R&D experience in Academia and in Industry, and he was an Ambassador for the European smart manufacturing ecosystem (I4MS) and contributed to creating strategies for reforming the current European industries and establishing factories of the future (FoF) across Europe.

Dr. Eldessouki holds a PhD in Polymer and Fibre Engineering from Auburn University (USA), where he also earned two Master's degrees in Chemical Engineering and Polymer and Fibre Engineering. His research focuses on digital and sustainable solutions. His areas of expertise include materials-informatics, artificial intelligence, smart and functional materials, multi-scale modelling, computer vision, and sustainability assessment.

As climate disruptions intensify, Europe's infrastructure resilience is crucial for economic flows, human well-being, and social stability. NATURE-DEMO revolutionises infrastructure by integrating nature-based solutions (NbS) to protect infrastructure against climate threats. It engages infrastructure owners, scientists, and public authorities across critical sectors like transport and energy.

NATURE-DEMO shifts decision management from reactive to proactive, designing resilient systems through four actions: Create, Validate, Scale, and Sustain. NATURE-DEMO Creates an advanced digital decision support platform that integrates climate projections, asset exposure, NbS catalogue portfolios, and advanced simulations to optimise the efficiency of selected NbS implementations to enhance resilience and deliver co-benefits. NATURE-DEMO Validates its methodology with real-world demonstrations of optimised NbS across 5 sites in the Alpine Biogeographic region. Successful NbS will then be Scaled as replicators in +4 other sites in the Alpine and other Biogeographic regions. NATURE-DEMO will Sustain its solutions beyond its timeframe by focusing on exploitation pathways that include tailored guidelines that disseminate NbS knowledge across infrastructure professions, a Task-Force available to provide technical expertise, and a financial observatory for NbS funds.

By pioneering a scalable, digitally-enabled and validated framework for implementing NbS, NATURE-DEMO will help realise the EU's vision for a climate-resilient and sustainable economy optimised for the realities and demands of the 21st century - a vision for posterity.

Talk 2 - Multi-hazard and Risk-informed System for Enhanced Local and Regional Disaster Risk Management

Dr. Mariantonietta Morga - Senior lecturer in Civil Engineering
Mariantonietta has a background in Environmental and Civil Engineering, and her research expertise includes structural engineering, seismic engineering, resilience of critical infrastructures to natural hazards, disaster management, contingency planning and land planning. She adopts computational and qualitative methods in her research. She holds a master's degree in Engineering for the Environment and the Territory and a PhD in Sciences of the Civil and Environmental Engineering – Structures from the Technical University of Bari (Italy). She worked as a consultant and scientist before joining Anglia Ruskin University. She has relevant experience in European research projects, having worked on five different projects and served as Task and Work Package leader. She served as a reviewer of several scientific journals and for project proposals submitted to national and international funding schemes.

MEDiate has decision-support system (DSS) for disaster risk management by considering multiple interacting natural hazards and cascading impacts using a novel resilient-informed and service-oriented approach that accounts for forecasted modifications in the hazard (e.g. climate change), vulnerability/resilience (e.g., aging structures and populations) and exposure (e.g. population decrease/increase). The DSS is a service-orientated web tool and accompanying disaster risk management framework, providing end-users (local authorities, businesses, etc) with the ability to build accurate scenarios to model the potential physical, economic and social impacts of their mitigation and adaptation risk management actions. The development of the tool is based on a co-creation and co-evaluation process involving four European testbeds prone to different multi-hazard scenarios: Oslo in Norway, Essex in the UK, Nice in France and Mulathing-Austurbru in Iceland.

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