CIVIL & ENVIRONMENTAL ENGINEERING GRAD STUDENT SEMINAR

Flood Vulnerability and Critical Infrastructure Resilience: From Hazard Mapping to Emergency Planning

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12:30 PM
COE A322



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ABSTRACT: Flooding is among the most frequent and destructive natural hazards worldwide, causing significant economic losses, disrupting critical infrastructure, and threatening human health and safety. As climate change increases the frequency and severity of extreme weather events, improving flood risk management and infrastructure resilience becomes increasingly important. Therefore, it is essential to identify vulnerable areas, assess potential disruptions, and develop effective emergency response strategies. The lecture focuses on assessing flood vulnerability and the resilience of critical infrastructure, particularly transport networks, using spatial analysis and digital modelling tools. The research combines flood hazard mapping, Geographic Information Systems (GIS), transport modelling, and spatial vulnerability indicators to examine how flooding affects infrastructure functionality, transport accessibility, and population mobility. Particular attention is paid to identifying vulnerable road network elements, modelling changes in traffic flows, and evaluating evacuation possibilities under different flood scenarios. The analyses demonstrate that flooding can significantly reduce transport accessibility and that routes considered optimal under normal conditions may become ineffective during flood events. The findings highlight the importance of integrating flood vulnerability assessment with transport network analysis and evacuation planning to support more effective disaster risk management and strengthen community resilience.

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