CIVIL AND ENVIRONMENTAL ENGINEERING

DIATI - Vulnerability of road networks to climate events: simulation of traffic flows and impact assessment

Funded By	Dipartimento DIATI
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Context of the research activity	Extreme events due to climate change, such as intense rainfall and floods, have consequences on road networks with clear repercussions on the accessibility of the territory. The research will focus on traffic simulation in road networks at different scales (urban and regional) to estimate impacts on the territory by adopting different modelling tools (based on network topology, traffic assignment techniques, microscopic and mesoscopic traffic simulation).
Objectives	DIATI has been confirmed as the “Department of Excellence” for 2023-2027 with a new project regarding climate transition, becoming the first department in Italy in Area 08. The project climate_transition@polito (ct_@polito) is an extension of the previous project climate_change@polito, which was also funded by the Ministry of Education, University and Research with the resources for the Departments of Excellence for the five years 2018-2022. The constant environmental and socioeconomic changes caused by climate change have pushed us towards the research of new solutions to mitigate and prevent the global impact of this phenomenon. ct@polito project’s resources will allow the upgrade of the initiatives developed by the previous project climate_change@polito increasing laboratories’ activity, strengthening the departmental IT infrastructure and putting in place an open science approach that will establish the creation of a public system designed to share data and create a living lab. The digital and technological strategies developed by ct@polito cover five macro-topics. This research is related to the topic “Mode of transport and low impact infrastructures: improving efficiency and decreasing the environmental impact in these sectors”. In this framework, the measurement of the resilience of the networks and the accessibility of the territory can be based on quantitative indicators estimated in simulated scenarios which offer the possibility of evaluating actions for risk mitigation. Among the national priority technological development trajectories defined in the SNSI, consistency is highlighted with that of point 5.5.6 Digital Agenda, Smart Communities, intelligent mobility systems and in particular "Intelligent

	urban mobility systems for logistics and people" and “Systems for the safety of the urban environment, environmental monitoring and the prevention of critical or risk events”. Furthermore, consistency with the scope of PNR 5.5 is also highlighted. CLIMATE, ENERGY, SUSTAINABLE MOBILITY - 5.5.1 Sustainable mobility; Article 2. Accessible, eco-compatible, intelligent and safe, resilient, efficient mobility infrastructures, which underlines "It is important to know and manage the risk due (...) to the effects assessed at the network level, ensuring its resilience concerning specific fragilities but also compared to network effects, considering seismic and extreme climate events".

Skills and competencies for the development of the activity	Traffic modelling in road networks Traffic assignment procedures and tools Accessibility analysis on road networks using GIS Microscopic and mesoscopic traffic simulation Data analysis and visualization