A roadmap for making critical infrastructure safer as natural disasters increase

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According to the European Union, it costs around €20 billion to repair

and maintain transport infrastructure as a direct result of natural hazards. The American Society of Civil Engineers believes neglecting to maintain transport infrastructure could have dire economic consequences, including a loss of 2.5 million jobs and $7 trillion in business sales by 2025—figures which could rise by 16 percent as a result of climate change.

In a paper published by the journal *Science of Total Environment*, experts from the University of Surrey together with partners from Greece and China look at how structural health and functionality monitoring (SHFM) data—widely used in traffic management systems—can influence infrastructure decision making and management. The team focuses on the key role SHFM data plays when structures in our traffic network fall prey to natural disasters.

The international team also investigate current best practices for ensuring transport infrastructure is as resilient as possible, both before and after hazards have occurred. They looked at designing, monitoring and enhancing accurate and fast evaluations of the key aspects in infrastructure resilience: response, absorption, recovery and adaptation.

The team concluded that using SHFM together with emerging digital technologies such as AI will be vital for increasing the resilience of transport networks, as these allow much faster repair and recovery. Cutting-edge technology could also be used to create accurate registries of information on the exposure of bridges, tunnels and other infrastructure assets.

Dr. Dimitra Achillopoulou, lead author and Marie Curie Research Fellow from the University of Surrey, said: "Climate change is the biggest challenge of our lifetime and we have to face it head-on. We need to ask how critical infrastructure such as our roads and bridges (many of which are decaying) will fare during critical hazards or when

they are overloaded. Do we have the systems and processes in place to warn, act and react effectively? Our study finds that we need to move towards a digital-first future to help accurately assess and safeguard our transport networks. This will mean embracing the coming AI and 5G digital revolutions, as these technologies represent a great leap forward in the sophisticated assessment of a wide range of data."

More information: Dimitra V. Achillopoulou et al. Monitoring of transport infrastructure exposed to multiple hazards: a roadmap for building resilience, *Science of The Total Environment* (2020). DOI: 10.1016/j.scitotenv.2020.141001

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