



UNHaRMED: Accounting for society's influence on future disaster risk and how to develop proactive risk management strategies through integrated, dynamic risk assessments

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Disasters are a complex interaction of natural hazards, increasing in their frequency and intensity because of human influence, societal development and our vulnerabilities. Further, tomorrow's risks are a function of the decisions humans make today, the location of future developments and how we construct them. As such there is significant scope to understand the drivers of risk and better reduce the impacts from a systematic and holistic understanding of disaster risk. To enable this a decision support system, UNHaRMED (Unified Natural Hazard Risk Mitigation Exploratory Decision support system) has been developed through a collaborative approach including policy makers from multiple government departments, researchers and software developers.

UNHaRMED aims to enable planners and policy makers to understand current and future risks, what is driving the emergence of new risks and develop risk reduction strategies for the changing threats of multiple natural hazards in a systematic, transparent and consistent manner. The paper will present an overview of the software, including the interactions between external drivers of economic and population trends, influencing the exposure components of disaster risk through land use and building stock models, the hazard models including flooding (riverine and coastal), earthquake, and bushfire, and vulnerability functions to allow for damage calculations. Emphasis will be placed on the interactions between socio-economic developments and hazards, and how cellular automata land use models are used to develop dynamic exposure layers considering top-down factors such as zoning policies along with the complexity of human behaviour on how cities and regions develop.

These human behaviours have a significant influence on risk development with time, and by considering regional change through assessing land use change, a greater understanding of its influence and therefore how to change future risk is enabled. The land use modelling considers economic and population requirements for land as well as access to infrastructure networks, the suitability (soil type, slope etc.) of land for development, zoning policies restricting or encouraging development along with the relationships between different economic actors which sees regions develop in different patterns. The addition of a building stock model to show future assets associated with land use change provides a dynamic exposure layer but also the ability to consider strategic and proactive risk reduction actions such as zoning changes and provision of infrastructure to change development patterns, uptake of building code changes and provision of subsidies for retro-fitting of existing assets.

Results from UNHaRMED will be used to highlight, the role and need for portfolios of risk reduction options, both 'hard' and 'soft' solutions, considering multiple objectives in risk reduction planning and the importance of considering multiple hazards when planning for long-term (20-30 years) development of regions. It is hoped that the further application of UNHaRMED will not only support government planners better plan for future risks but enable a collaborative approach between public and private entities including developers, insurance and finance companies by highlighting respective roles and influence in a transparent manner.