A Geospatial Framework for Risk Profiling of Natural Hazard Disasters (NHD) at Local Geographical Unit.

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SUMMARY

Globally, natural hazards turn into disasters, resulting in severe losses of lives, infrastructure, and property. The USA has sustained 403 weather and climate disasters since 1980, the total cost of these 403 events exceeds $2.915 trillion [1]. Natural Hazard Disasters (NHD) cost Australia $38 billion per year [2] and this is rising due to the increases in severity and frequency of extreme weather events caused by climate change [3]. Accurate models of the occurrence and spread of disasters can prevent the loss of lives and properties [4], [5]. However, risk profiling of NHD at a local geographical level is a forward-thinking geospatial ecosystem framework that can guide decision-makers and be an enabler to the general public. This framework can be instrumental as a decision support system for established as well as emerging economies. This presentation will cover the NHD framework along with information on the population, place, or system's exposure, sensitivity, and resilience to given hazards. Although risk profiling of a geographical territory can use diverse public data, it is challenging to integrate all the data such as multisource satellite imagery, climatic records, hydrological data, and crowd-sourced information relating to a geographical location. This challenge limits the effectiveness of current risk profiling methods. Additionally, effective risk profiling of the geographical analysis unit relies on precise uncertainty quantification. Yet, current methods to quantify uncertainties and sensitivities must be improved [6], [7] to ensure a robust geospatial framework. This plenary talk delves into profiling the risk of NHD considering the microclimate of the geographical areas including spatial, temporal, social, and economic data. The framework will use Statistical Areas (SA), with a spatial analysis unit at the SA2 level. Defined by the Australian Bureau of Statistics, SA2s are medium-sized general-purpose areas, representing communities that interact together socially and economically. The framework highlights the importance of location intelligence in the digital era and its capability to educate multiple stakeholders in disaster scenarios. References: [1] NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters, 2025.

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