# ABSTRACT

## THE DESIGN OF A GIS-BASED MODEL FOR INTEGRATING QUALITATIVE AND QUANTITATIVE PARAMETERS INTO COMMUNITY DISASTER RISK ASSESSMENT

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There exists no published methodology that integrates the analysis of hazards, vulnerability and risk at a local scale and in the Caribbean context. Furthermore, existing methodologies have the tendency to gather *a priori* indicators of vulnerability and do not explore how vulnerability indicators may vary in influence across a defined space. The research objectives aim to fill this gap: design a GIS Based Risk Assessment Model; apply and validate the model within the Caribbean context; and develop a plan for model implementation.

The model design stipulates the use of mixed-model approaches, local-scale applicability and relevance to all known hazards. The model design has the following parameters: construct a causal theory of vulnerability; break down the theory of vulnerability into known sub-dimensions; apply a spatially-variable weighting scheme for

combining measures of components; combine multi-hazard and vulnerability maps to produce the risk map.

The area selected for application of the model is the Drivers River Watershed Management Unit (DRWMU) in Portland, Jamaica. The results of model application show that earthquake, wind and landslide hazards dominate the northern section of the DRWMU, while for the southern section of the DRWMU flood, storm surge and wind hazards prevail. Most classical indicators of vulnerability, except economic ones, do not affect vulnerability for the study area. The direction and strength of importance of two indicators of vulnerability significantly vary across space. High to very high levels of disaster risk dominate the area south of Fair Prospect and moderate to high levels of risk occur in the Port Antonio–Williamsfield area.

Research findings suggest that an improved, locally-relevant risk assessment methodology is to be derived from contextualized studies on vulnerability and integrating localized analyses of vulnerability characteristics. The utility of this research lies in its ability to produce more accurate risk assessment outputs by considering local scale variability.

Keywords: Kerry-Ann Thompson; risk; vulnerability; hazard; disaster risk assessment methodology; Caribbean; grounded theory; geographically-weighted regression.