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POSTER ABSTRACT

GIS ANALYSIS OF GEOHAZARDS IN NORTHERN RANGE WATERSHEDS RELATIVE TO SUITABILITY CRITERIA FOR BUILT DEVELOPMENT, TRINIDAD

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Sustainable planning and development of natural resources require simultaneously a comprehensive perspective, in both time and space, on a local problem in order to counter adverse impacts of both incremental and cumulative land use change. Geographic Information Systems (GIS) enables analysis of change and cumulative impact from multiple perspectives of both the natural and social environment. We demonstrate the utility of GIS and the minimum data requirements for assessing the natural environment, its physical setting and natural resources, and the impact of changes in land use, principally urbanization, on sustainability of natural resources and relative susceptibility to natural hazards.

GIS is used to assess the maximum extent of development and its potential impact on natural hazards and resources in the Northern Range, Trinidad, if proposed suitability criteria for built development are applied uniformly and consistently. With minimal initial data, a variety of GIS analyses are used to illustrate its utility for sustainable planning and development. The initial data included a digital elevation model (DEM) and land use, geology, and soils coverages. Slope and hydrology models were derived from the DEM and used to delineate watersheds and physical characteristics of the watersheds and land use were quantified using zonal statistics. These data can be readily manipulated into lumped-parameter hydrologic models for assessment of relative changes in runoff and flooding potential resulting from land use change. Map algebra and overlay analysis is rapid and can be done in real time as land use suitability criteria are being evaluated as well as to assess application of and adherence to suitability criteria. These approaches are demonstrated for the Northern Range with respect to the impact of built development on landslide and flood potential. A geoprocessing model, based on soils, slope, and flow parameters, is presented for evaluating the impact of built development on runoff, flood potential, and water resources. We use it to illustrate the uneven impact that standard criteria can have on highly-variable mountainous environments. Our work supports the application of watersheds as the basic planning unit.