LIDAR-Based Framework for Integrating Local-specific Vulnerability Conditions in Deriving Perturbations to the Dynamic Inoperability Input-Output Model

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The prevalent adverse impacts of disastrous events intensified by the alarming threats of climate change have underscored the urgency to develop new strategies to enhance preparedness and resilience within an economy. Consequently, more reliable models to estimate the associated direct and indirect economic losses resulting from these disruptive events have been formulated. However, recent techniques and technologies that may be potentially capable of increasing the precision of these risk estimates have not yet been fully integrated into existing disaster loss estimation models. Further, though the prioritization of key sectors in resilience enhancement planning requires a holistic approach from the regional and national levels, the degree of vulnerability varies based on local-specific conditions. Hence, this research explores the relative novelty of the use of flood hazard maps in economic input-output analysis. It proposes a framework to integrate the spatial dimension in evaluating the associated macroeconomic losses from local-specific vulnerability conditions. The research will demonstrate the framework through an adaptation of the Light Detection and Ranging or LIDAR-based 3D flood hazard map data developed by the Philippine government agencies in collaboration with various research institutions to derive perturbations to the Dynamic Inoperability Input-output Model. The research will investigate the impact on regional economic losses and recovery behavior from having a heterogeneous sector distribution across identified local areas of high vulnerability. The resulting methodology will have flexibility and scalability over flood hazard maps of different return periods and other hazard maps for other regions and disasters.