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EFFECTS OF LONG-TERM SEA-LEVEL RISE AND TROPICAL STORMS ON COASTAL COMMUNITIES: AN INTERDISCIPLINARY INTEGRATED ASSESSEMENT

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Coastal cities and natural ecosystems are faced with a changing level of environmental threats. Accelerated sea-level rise and increased topical storm strength will plague coastal areas in the coming century. This study examines the impacts of these environmental threats on coastal communities and how policy interventions change outcomes.

Studies of households have shown a poor perception of natural disaster risks and potential disaster severity, typically overreacting to a recent disaster event but under-preparing and under-insuring after periods of quiet. Many estimates of disaster response and their economic impacts haven't taken household perceptions into consideration. Additionally, coastal manager decisions impact the effectiveness of threat response. Many coastal managers lack an understanding of climatic risk may sub-optimally plan coastal protections and/or zoning. The decisions of households and coastal managers affect the community dynamics of population migration and capital infrastructure. These dynamics are included in the research, highlighting important connections between climate change and economic growth.

The results show communities facing elevated exposure because of a low understanding of climatic risks. Coastal managers may increase long-term exposure by protecting coastal regions from long-term sea-level rise. Coastal defenses lead to a false sense of safety, increasing economic development in the short-term but causing large economic losses and population displacement in the long-term, especially after a tropical storm.

The research utilizes a dynamic feedback model that includes both human development (e.g., economic and population changes, levee construction, insurance) and natural ecosystem response. Modules of the model include stochastic storms, endogenous population and macroeconomics, sea-level rise, wetland migration, and coastal engineering. The model is a tool to help discuss important long-term issues and to highlight areas of policy intervention.

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