Abstract

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Optimizing Disaster Recovery Strategies Using Agent-Based Simulation

Mitigation, preparedness, response, and recovery represent the four-phase methodology for emergency management. However, disaster recovery is considered the least understood aspect in the emergency management science and practice. Achieving a sustainable disaster recovery requires the participation of different stakeholders within the host community through the post-disaster planning and implementation phases. Despite the increasing rate and magnitude of natural hazards in the last decades, it is noted the lack of literature for holistic sustainable disaster recovery models that captures the associated stakeholders’ decisions and actions. To this end, this paper presents an agent-based model to study the disaster recovery strategies of the different associated stakeholders. The model demonstrates two main types of agents (1) the residents of the impacted region along with their strategies for mitigating financial impacts and maximizing individual welfare, and (2) the government—state and regional—along with their strategies to mitigate the disasters impacts and to increase the host communities’ resilience to hazardous events. The authors used a comprehensive social vulnerability index to better guide the investment efforts at the various levels. Ultimately, the agent-based simulation model helps in better understanding the interrelationship between the different stakeholders, and consequently determining the optimum combination of disaster recovery strategies. The model is applied on three coastal counties in Mississippi to adopt more holistic sustainable disaster recovery processes after hurricane Katrina.