

Global Risk Modeling

International risk modeling produces diverse information that transcends borders to help everyone reduce risk. Niyam's Risk Analytics team is proud to have helped regions around the globe adapt FEMA's Hazus Program risk modeling tools for their own risk assessment initiatives, including hurricane and tsunami modeling in U.S. Territories, earthquake modeling across the Mediterranean, and more.

Israel

Niyam's Hazus Team has partnered with researchers at the Geological Survey of Israel to adapt FEMA's Hazus earthquake and tsunami models for application in Israel. This multi-year partnership has resulted in a comprehensive, nationwide building-level **earthquake risk assessment** for several earthquake scenarios across Israel, as well as an innovative tsunami loss assessment for the high-risk Mediterranean neighborhood of Bat Galim. Both studies serve as critical tools to help Israel's civil protection authorities plan for post-disaster actions like building damage assessments, debris management, and sheltering. *Inset Photo: The Mediterranean neighborhood of Bat Galim, Israel*



Middle East

Niyam experts partnered with UNESCO and the U.S. Geological Survey to lead earthquake modeling workshops in Saudi Arabia, Egypt, and Portugal as part of the **Reducing Earthquake Losses in the Extended Mediterranean Region Programme**. Workshops were aimed at reviewing and customizing FEMA's Hazus earthquake methodology for application in each country by local disaster planning authorities. These efforts created partnerships that increased international coordination for risk modeling and risk reduction strategies across the region. *Inset Photo: Data Science Director Doug Bausch at the 2014 Arab Conference on Astronomy and Geophysics*



Puerto Rico

Niyam has helped FEMA expand Hazus modeling capabilities to include Puerto Rico and the U.S. Virgin Islands, where local construction practices produce engineering parameters that diverge significantly from those associated with mainland structures. In 2020, our team is supporting the development of wind vulnerability data for buildings across Puerto Rico using imagery, machine learning methods, and damage information from Hurricane Maria. This effort will allow Puerto Rico to plan for future storms using more accurate model estimates for building damages, shelter requirements, and economic loss. *Inset Photo: Puerto Rican home with corrugated roofing, a common construction material in the U.S. Territories*



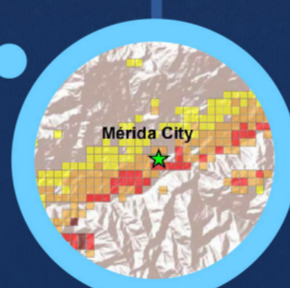
U.S. Virgin Islands

In 2017, Niyam completed development of the Hazus Tsunami model, one of the world's first open tsunami loss models leveraging a nationwide structure inventory produced by the U.S. Army Corps of Engineers and an innovative casualty model developed by the U.S. Geological Society. Our team completed a case study for the U.S. Virgin Islands using **NOAA's 2018 tsunami simulation** to model impacts across St. Croix from a worst-case near-source tsunami scenario. Results indicated building losses exceeding \$600 million and demonstrated the importance of community preparedness in preventing tsunami casualties: increasing preparedness parameters from "Poor" to "Good" drove a 70% reduction in loss of life. *Inset Graphic: NOAA Mw 7.8 Tsunami Simulation, St. Croix, USVI*



Venezuela

Niyam has helped researchers adapt FEMA's **Hazus earthquake model** for use in Venezuela to better understand potential impacts from large earthquakes in Merida State. International risk modeling projects using open, U.S.-centric tools like Hazus require customization of data inputs like ground shaking, liquefaction, and building characteristics to reflect local conditions. *Inset Graphic: Analysis grid of residential loss ratio in Merida State for very rare scenario M7.7*



Ghana

Niyam's Data Science Director led a team of risk analysts to develop and conduct a training workshop for Ghana's National Disaster Management Organization (NADMO) aimed at increasing Ghana's capacity for spatial risk modeling. Our expertise helped drive new disaster data collection efforts and expanded capabilities for more dynamic risk mapping, as recommended in a **United Nations report** on disaster management in Ghana. *Inset Photo: Data Science Director Doug Bausch leads a 2013 United Africa Command /NADM workshop*



China

Following the catastrophic 2008 Sichuan Earthquake, the Asia-Pacific Economic Cooperation (APEC) organized the international **Workshop on Large-Scale Disaster Recovery** in APEC, where eight countries exchanged best practices for disaster response, recovery, and mitigation. Niyam's Data Science Director participated in the Workshop, where he presented lessons learned from the U.S. Northridge Earthquake and opportunities for identifying cost effective mitigation strategies through risk modeling. *Inset Photo: Data Science Director Doug Bausch at APEC's Workshop on Large-Scale Disaster Recovery*

