NIYAM IT™

Global Risk Modeling and Disaster Response

Helping regions across the globe prepare for natural disasters and reduce community risk

Risk Modeling

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

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 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.

The Mediterranean neighborhood of Bat Galim in Israel is considered high-risk for tsunami loss. Photo: Eran Frucht, Geological Survey of 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 seismically active Mediterranean.

Data Science Director Doug Bausch demonstrates the use of Hazus for risk modeling in Egypt at the 2014 Arab Conference on Astronomy and Geophysics.

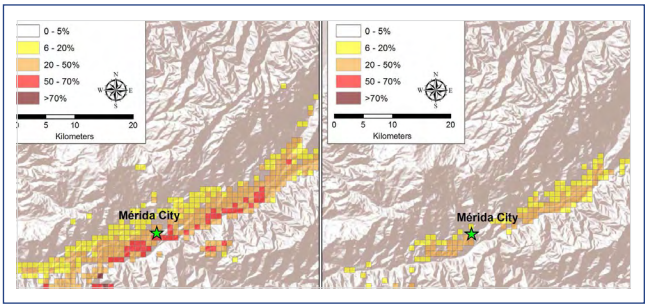
Puerto Rico

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.

Construction materials common in Puerto Rico, such as corrugated metal roofs, must be accounted for in model databases for accurate loss estimation. Photo: Strategic Alliance for Risk Reduction (FEMA contractor)

Venezuela

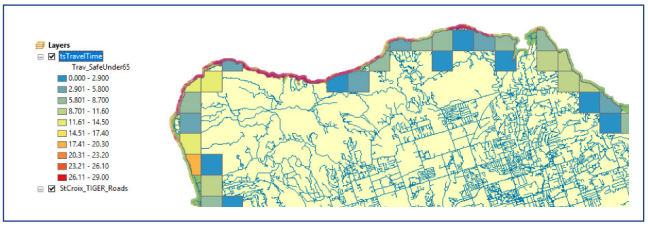
Niyam has helped researchers adapt FEMA's Hazus earthquake model for use in Venezuela to better understand potential impacts from large earthquakes in Merida State. International risk modeling projects using open, U.S.-centric tools like Hazus require customization of data inputs like ground shaking, liquefaction, and building characteristics to reflect local conditions.



Global exposure data from Oak Ridge National Laboratory and customized ground shaking data from the U.S. Geological Survey allowed researchers to model dollar loses due to residential and non-residential building damages in two Venezuelan earthquake scenarios.

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.



Evacuation time to safety for a USVI tsunami can be reduced by increasing community preparedness.

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.

Doug Bausch, Niyam's Data Science Director, discusses risk modeling and disaster recovery best practices with international participants at APEC's Workshop on Large-Scale Disaster Recovery.

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.

Doug Bausch, Niyam's Data Science Director, led a team of FEMA risk analysts to provide risk mapping training at a 2013 workshop hosted in Accra by the United Africa Command and NADMO.

Response Modeling

Niyam collaborates with FEMA to provide authoritative impact estimates for major U.S. disasters using FEMA's Hazus loss modeling tools. Modeled impacts include building damages, shelter requirements, economic losses, and debris totals - information that helps decision makers allocate response resources and prepare for recovery activities. We work with FEMA to distribute this information across the emergency management community within hours of reported ground shaking. Our experts have provided FEMA with impact estimates for every major landfalling hurricane in the past decade, and model estimates from our Risk Analytics Team were used by state and federal emergency authorities in four recent U.S. earthquakes.

As post-disaster damage assessments become increasingly challenging in the face of the global COVID-19 pandemic, Niyam's virtual impact modeling has offered a safe and accurate alternative for information gathering in the chaotic days following a disaster. In fact, FEMA recently cited risk modeling as an important tool for Hurricane Season 2020.

Authors and Contributors

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Why Niyam?

Since our founding in 2007, Niyam has developed an impressive record of successful outcomes, earning our status as the go-to provider of innovative IT solutions. Today, Niyam sits at the vanguard of the industry, delivering state-of-the-art, mission-critical technologies to federal agencies and the public marketplace. Our solutions are proven to accelerate collaboration, increase efficiency, and consistently provide rapid, breakthrough results – all while remaining conscious of shifting timelines and budgets.

Our Technology Partners

Learn More

For more information, or to learn about our full range of Risk Analytics capabilities, contact us at 703-429-2450 or email info@niyamit.com.