

This poster, designed for the 45th Annual Natural Hazards Research and Application Workshop, will describe the Science Application for Risk Reduction (SAFRR) Scenario Evaluation project in progress. The four SAFRR scenarios—ShakeOut, ARkStorm, Tsunami Scenario, and HayWired—are complex natural hazards scenarios created by multi-disciplinary teams of scientists, academics, practitioners, and stakeholders. The scenarios are intended to create a clear and highly detailed view of potential damage from earthquakes, tsunamis, and winter storms, enabling science-based preparedness strategies and innovations. This evaluation seeks to explore the presence of these scenarios in the culture of preparedness and their contributions to how we view disaster risk reduction (DRR) today. To do this, the evaluation team developed a mixed- methods study that includes background research for each scenario, qualitative interviews, and data collection and analytics. Some preliminary findings show correlations between increased media mentions of a scenario whenever there is the corresponding hazard event, and that participating in scenario development encourages action and investment from stakeholders. The evaluation team is also creating a DRR scenario evaluation tool that combines theories from multiple disciplines to create a “best practice” set of categories that a DRR scenario needs to maximize effectiveness. This tool will be used to identify areas of success or gaps in efficacy in the SAFRR scenarios and could be used to aid scenario planning moving forward.

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Recommendations for a Resilient Path Forward for the Marine Transportation System

The Marine Transportation System (MTS) plays a critical role in United States (U.S.) commerce and security, facilitating the movement of over two billion tons of goods annually. As the infrastructure, technological, and management systems that support the MTS evolve, the best practices for the preservation of these functions throughout weather and climate disruptions must be kept current and collaborative. The MTS is particularly susceptible to the impacts of coastal storms such as the major hurricanes in 2017, 2018, and 2019. Furthermore, ports and the marine transportation system play a key role in the recovery of the surrounding region after disruption, facilitating the mobilization of response and recovery and the delivery of life-sustaining commodities for impacted communities. To foster collaboration and improve understanding around evolving storm season challenges, the U.S. Committee on the Marine Transportation System’s Resilience Integrated Action Team has served as a platform to gather relevant federal agencies to contribute impacts, best practices, and lessons learned. Participants in this effort included representatives from over 12 Federal agencies who had direct knowledge of their agency’s actions to assist in the response and recovery efforts following hurricanes. Agencies were tasked to identify challenges and successes they faced during storms and to identify and prioritize recommendations to minimize the impact from future storms and other disruptive events. This work outlines the findings across each storm season to determine if these challenges have been addressed and the best practices adopted, and to make recommendations to enhance the future resilience of the MTS.

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Exploring Ethics in the Lifecycle of Natural Hazards Open Data

Data and the systems that manage it are not neutral but, instead, are part of the process that affects research and practice. In the natural hazards field, open data is used to study and predict disasters, improve structural and social resilience, and make risk management decisions, increasingly using Artificial Intelligence (AI). Throughout the process, researchers face ethical dilemmas that may be embedded in, and communicated through data and into the results, including lack of transparency and biases. This poster introduces the methodology and preliminary results of a study conducted to identify ethical issues in the creation, analysis, storage, and distribution of open natural hazards data,

and their implications for responsible AI applications. The study involved quantitative analysis of social science and engineering datasets as well as interviews with a spectrum of organizations and agents that produce, manage, analyze and consume this data. Tensions between best practices and financial constraints, professional values and academic incentives, protection of privacy, and the availability of security solutions, among others, are emergent ethical themes. Mapped to the research lifecycle stages, the themes represent the values, the risks, the rewards, and the collaboration contexts of data practices. Results suggest that data producers, consumers, and organizations have some differing notions about ethical data management, and that more coordination would benefit the data eco-system. The goal of this project is to deliver a decision-making framework to guide ethical data practices. While focused on AI applications, the results can inform broader data management practices in the natural hazards space.

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Flipside of Environmental Impact Statements: Indexing Risks the Environment Poses to Projects

The Integrated Climate Resilience Index (ICRI) is used in a similar capacity as an Environmental Impact Statement, with the exception that the ICRI addresses the impact of the environment on the project and seeks to minimize failure or damage to existing or new developments or infrastructure due to future climates. ICRI integrates biophysical sensitivities with socio-economic factors to predict the holistic impacts on a project; for example, increased water use for agriculture during a drought, which affects water availability for mining, or disruptions on the supply chain due to road damage caused by extreme events. The ICRI represents an integrated and dynamic risk index. The higher the index, the greater the risk. As future climates change, the index is updated, allowing the index to be a living product, and providing changes in potential risks over the next century. Communities, businesses, decision-makers, and other stakeholders can do 'what-if scenarios' to explore how their actions may alter the index. ICRI can assist in the selection of new building sites or to modify building criteria to reduce risks or achieve acceptable risks. The ICRI helps to develop and monitor "tipping points," or the points where a risk moves from acceptable to unacceptable. By understanding the potential timing of these tipping points, it is possible to respond promptly, potentially avoiding system failures. The ICRI adapts to environmental changes and can be updated as climate or stakeholder needs evolve. For example, once the defined tipping points are reached, and acceptable risk shifts to unacceptable.

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Simulated Real-Time Training Tool and Exercises for Disaster Response

In Japan, we have various disasters in a given year. When residents experience a disaster in their communities, they often show paradoxical feelings that include thinking a disaster couldn't have happened to them. To improve this situation and educate residents of their true disaster risk, the authors have developed real-time training tools for exercises to check disaster response. This tool uses results of various disaster simulations. In the future, increases in extreme disasters due to global warming have been forecasted. This tool can help to explore the unknown climate environment of the future through web-based simulations.

In a pre-survey, this study verified effects by showing movies on weather related disasters using this tool, and had three trials for residents to consider their disaster responses. The results showed that this tool can work efficiently for simulating disaster cases to show how and when residents respond.