INFRASTRUCTURE FLOOD RISK

Extreme flooding represents a primary hazard for dams and other critical infrastructure throughout the world. The economic-, environmental-, and life-loss consequences of dam failures are tremendous. Understanding the probabilities of extreme floods, the consequences of dam failures, and the uncertainties associated with each helps decision makers prioritize infrastructure investments and maintain safe dams for the benefit of society.

RTI International’s experts have extensive experience supporting risk-informed decision-making. As recognized leaders in advanced methods for probabilistic flood hazard analyses, we perform analyses, develop industry guidelines, and develop software to understand the probabilities of extreme floods. Our hydrometeorologists have performed industry-leading precipitation-frequency analyses and assessed the impacts of climate change on extreme storm inputs. We have combined stochastic modeling with site-specific hydraulics studies to understand flood hazards in and around building complexes for nuclear storage facilities. Our Dam Failure Consequences team characterizes the life loss, direct economic damages and economic ripple effects, and environmental impacts using hydraulic modeling, flood mapping, consequence, and economic tools.
FEATURING PROJECT

TVA Downstream Consequences Evaluation to Support Dam Safety Risk Assessment

Client: Tennessee Valley Authority (TVA)
Country: United States
Sector: Floods
Related Services: River Basin Operations

RTI has conducted downstream consequences evaluations for more than 20 large dams in the TVA system to support TVA dam safety risk analysis. We coordinate development of consequences scenarios with key potential failure modes identified by TVA. The analysis included unsteady one- and two-dimensional Hydrologic Engineering Center River Analysis System modeling to simulate dam breaches—incorporating reservoir operations for the dam of interest and downstream dams, along with cascading breaches for use in the subsequent LifeSim consequences model. RTI and TVA work with emergency managers to properly parameterize warning dissemination and population mobilization inputs for the LifeSim consequences model. Our team's experience working with these inputs and associated datasets accounts for key uncertainties in the estimation process. The resulting life loss and direct economic consequences represent key inputs in the TVA semi-quantitative risk analyses that are conducted to understand risk drivers and prioritize investments in capital improvements at each dam.

ADDITIONAL RISK ASSESSMENT SERVICES

- Probable Maximum Precipitation/Probable Maximum Flood and inflow design flood studies
- Probabilistic flood hazard analyses for critical infrastructure
- Climate change impacts analyses
- Precipitation frequency analyses
- Development of Emergency Action Plan flood maps
- Continuous and discrete stochastic weather generation

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