Probabilistic Flood Hazard Analysis (PFHA)

April 23, 2020
Full Day Workshop
USSD Committee on Hydrology and Hydraulics

Teaching Moment

Upon completion of the workshop, the student should be able to summarize the theory behind PFHA models, list the required inputs and analyses, run a flow-based PFHA model, portray results, and communicate findings to a multi-discipline risk analysis team.

Workshop Description

Risk analysis for dams and levees requires a probabilistic flood hazard analysis (PFHA) to estimate the magnitude and likelihood for a range of floods. The resulting flood hazard curve is summarized by plots and tables of peak stage (or flow, volume, depth, duration) versus annual exceedance probability. PFHA requires a different knowledge base and skill set compared to the traditional approach of using a single design flood estimate, such as the Probable Maximum Flood (PMF). This workshop will provide an overview of methods and tools used to develop a flood hazard curve for use in a dam or levee risk analysis. The theory and fundamentals behind stochastic event flood models and Monte Carlo simulation will be presented. A modeling framework and required inputs will be provided for both flow and precipitation based PFHA models. Example applications, exercises, and case histories will provide participants with hands-on experience.

This workshop is part of USSD's ongoing training for risk informed decision making for dam safety.

Speakers

Bruce Barker, MGS Engineering Consultants
David Margo, U.S. Army Corps of Engineers
Keil Neff, U.S. Bureau of Reclamation
Nicole Novembre, Brava Engineering
Carolyn Pearson, U.S. Army Corps of Engineers
Haden Smith, U.S. Army Corps of Engineers
Amanda Stone, U.S. Bureau of Reclamation

Agenda

1. Welcome and Introductions (lecture)
2. Application of PFHA in dam and levee and safety (lecture)
3. Flow and precipitation based PFHA methods and models (lecture)
4. Overview of flow frequency analysis using Bulletin 17C (lecture)
5. PeakFQ (exercise)
6. Monte Carlo methods and their use in PFHA (lecture)
7. Monte Carlo (exercise)
8. Overview and demonstration of RMC-RFA software for flow based PFHA (demonstration)
9. Developing inputs for RMC-RFA (lecture)
10. RMC-RFA (exercise)Overview of stochastic flood event modeling (lecture)
11. PFHA case study (demonstration)

12. Calibrating, sensitivity testing, and trouble-shooting stochastic flood models (lecture)
13. Making the case and communicating results (lecture)
14. Q&A (panel discussion)