जल शक्ति मंत्रालय
जल संसाधन, नदी विकास और गंगा संरक्षण विभाग
भारत सरकार
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA

ICOLD-CIGB 2024, NEW DELHI

विद्युत मंत्रालय
MINISTRY OF POWER

92ND ANNUAL MEETING & INTERNATIONAL SYMPOSIUM

ON DAMS FOR PEOPLE, WATER, ENVIRONMENT AND DEVELOPMENT

29TH SEP - 03RD OCT 2024 | NEW DELHI, INDIA

Risk Identification and Mitigation through Surveillance and Monitoring

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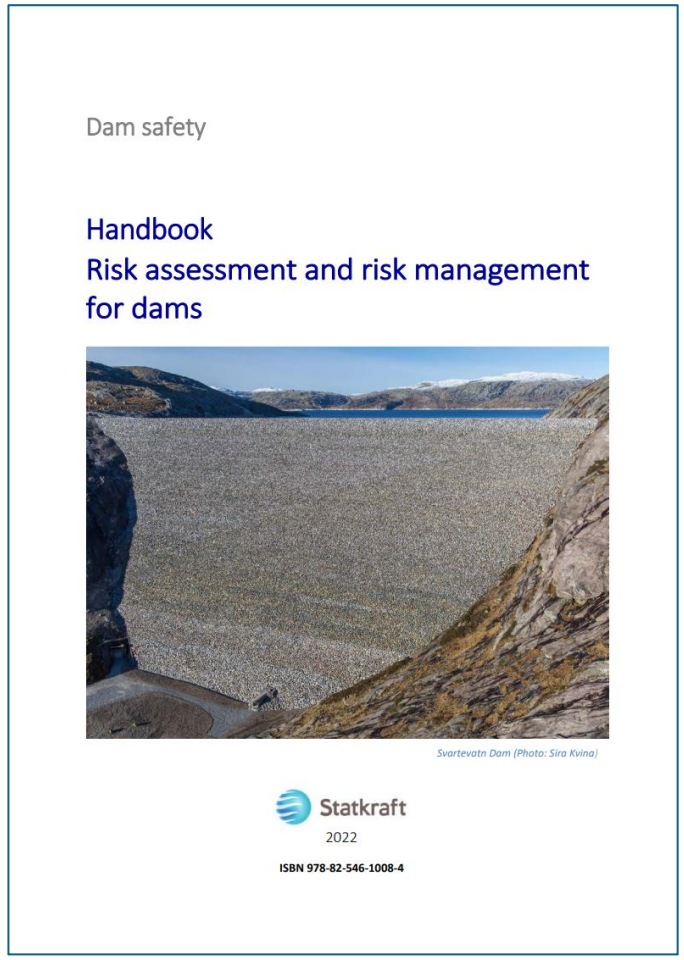
Risk Informed Decision Making



Dam Safety Risk Assessment Workshop, Tirana 2021

1. Site visit and inspection of dam
2. Overview of observations and earlier events
3. Brainstorming and screening of triggers and failure modes
5. Construction of event trees and estimates of probabilities
6. Calculation of probabilities for each scenario
7. Iteration of some or all event trees
8. Calculation of total failure probability of dam
9. Evaluation of failure probabilities obtained and consequences

Probability	Verbal description
~0.0 – 0.5% (mean: 0.1%)	**Virtually impossible,** due to known physical conditions or process that can be described and specified with almost complete confidence
0.5 – 2% (mean: 1%)	**Very unlikely,** although the possibility cannot be ruled out on the basis of physical or other reasons
2 – 33% (mean: 10%)	**Unlikely,** but it could happen
33 – 67% (mean: 50%)	**As likely as not (unknown)** with no reason to believe that one possibility is more or less likely than the other
67 – 98% (mean: 90%)	**Likely,** but it may not happen
98 – 99.5% (mean: 99%)	**Very likely,** but not completely certain
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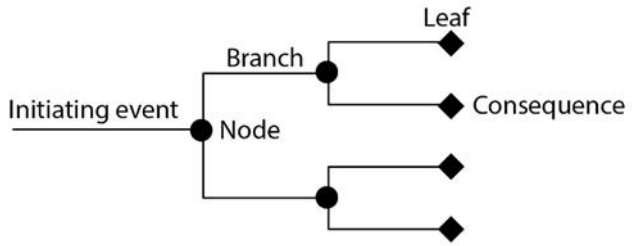
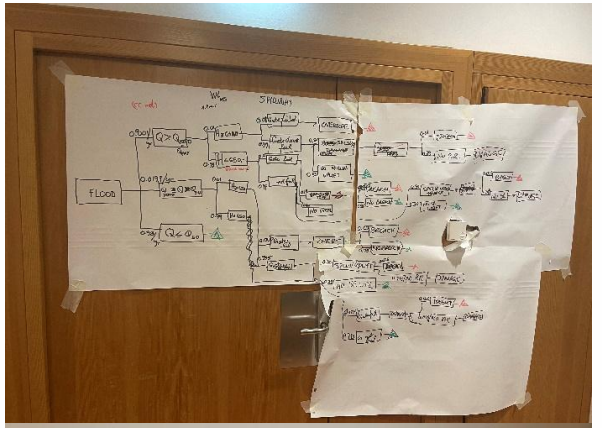
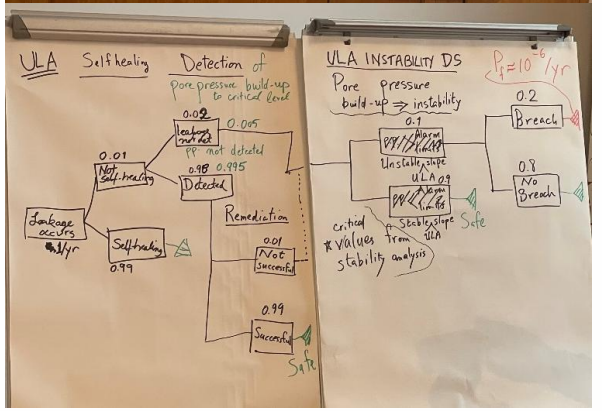
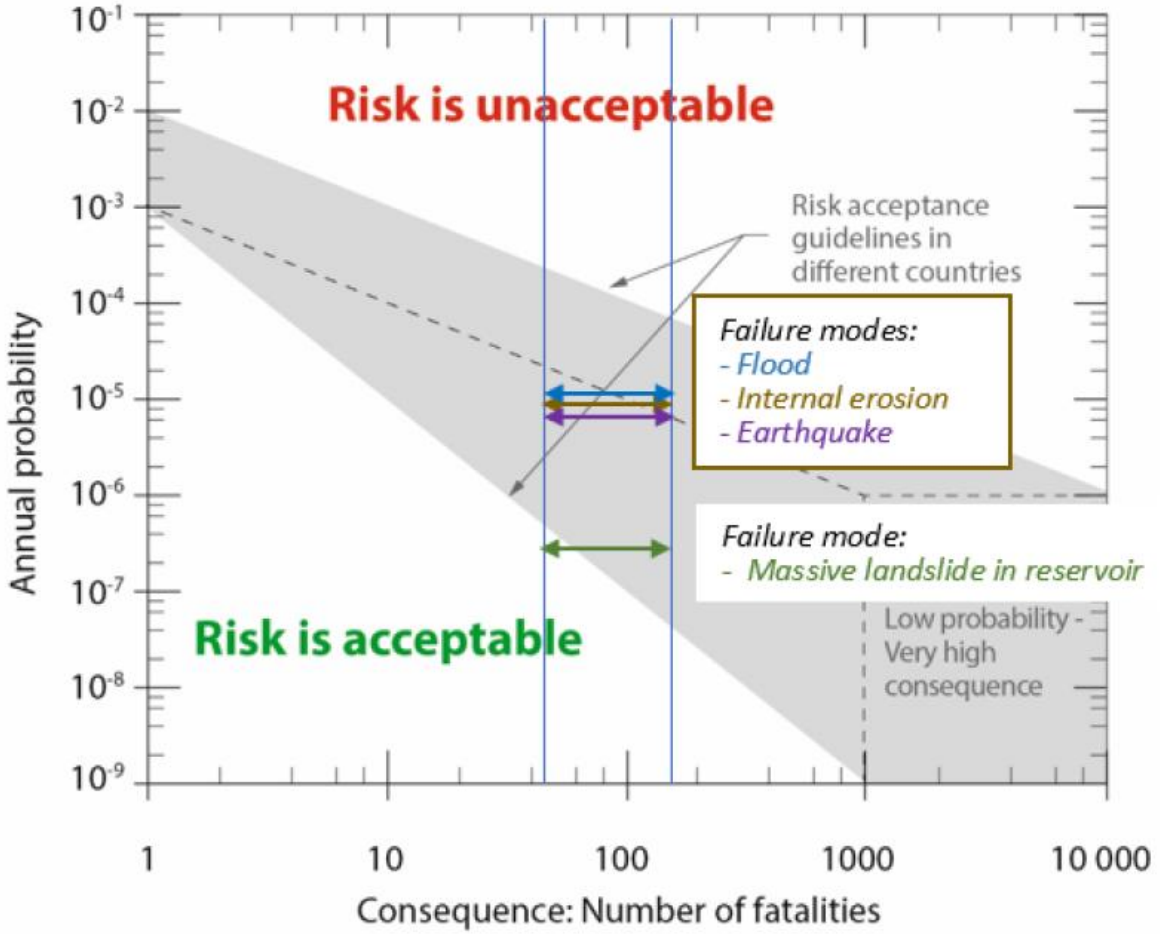






Results from Event Tree Analyses



Trigger	Annual Failure Probability
Earthquake	8.6×10^{-6}
Flood	1.1×10^{-5}
Internal Erosion	8.0×10^{-6}
Landslide in Reservoir	2.3×10^{-7}

ETA Results for Moglice Dam

Update of the Dam Safety Program in Albania

- Moglice dam is now into the fifth year of operation
- The initial phase of operations post impoundment was complete
- Opportunity to revisit how the dam safety program was delivered
  - Structure of local team
  - Monitoring Instrumentation
  - Frequency of Measurements/Inspections

Event Tree Analysis for Risk Informed Decisions

Probability	Verbal description
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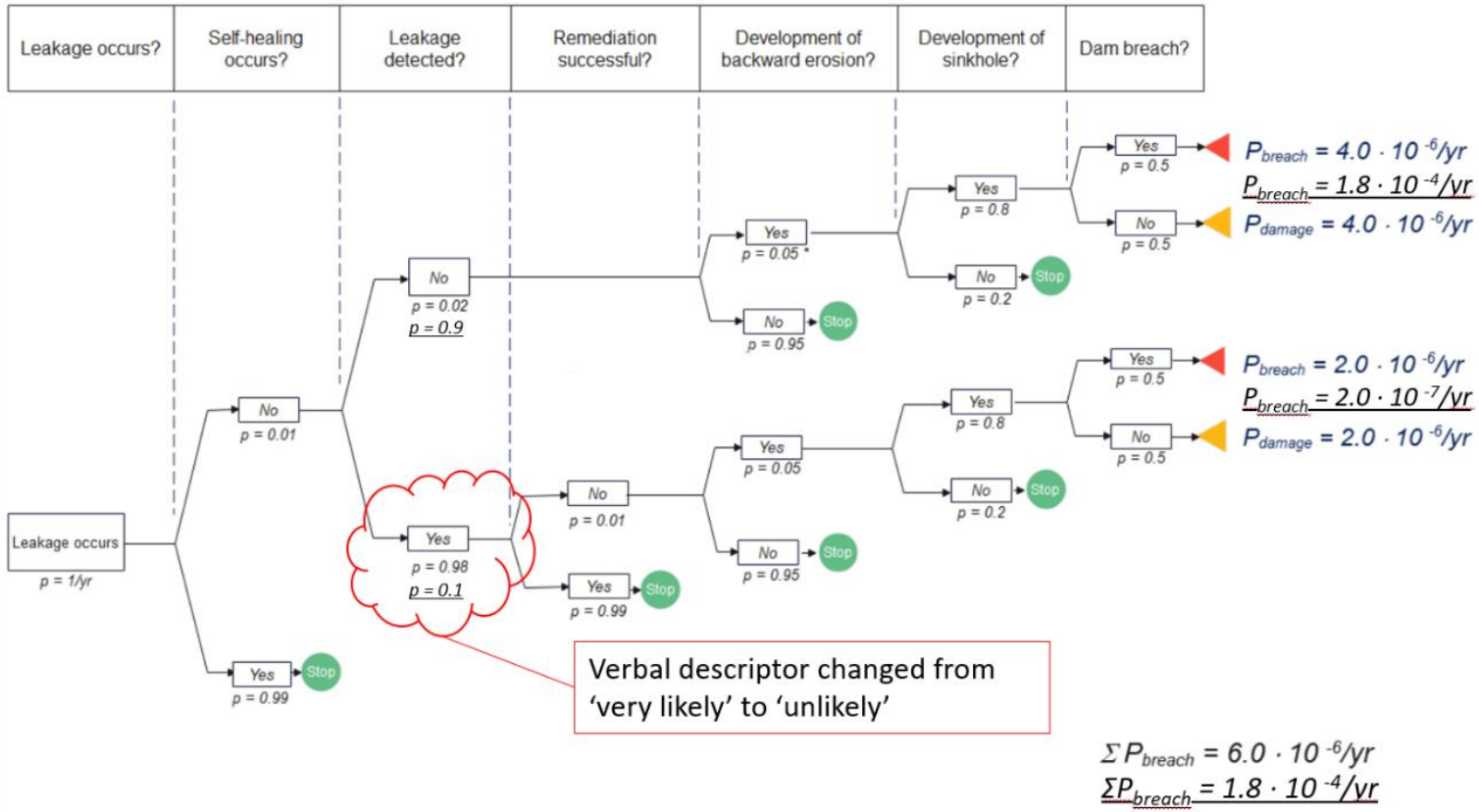

Conclusion

- Clear benefit to both management and O&M teams in compiling a comprehensive quantitative risk assessment for dam safety.
- At a local level, when delivering the surveillance and monitoring program a quantitative risk assessment provides useful information especially when resourcing the dam safety team and developing the inspection and measurement schedules.
- Risk assessments are live documents than can form part of the comprehensive dams and reservoirs documentation.

THANK YOU