



Dam Break Modelling Development

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Queensland Tailings Group

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Overview

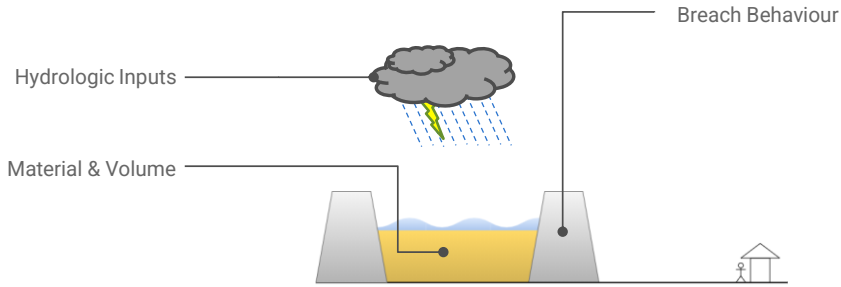
- Key Methodology:
 - How we used to do the work
 - How we do the work now
 - How we want to do the work
- Recognition of uncertainty within inputs and outputs
- Communication of uncertainty to client and beyond

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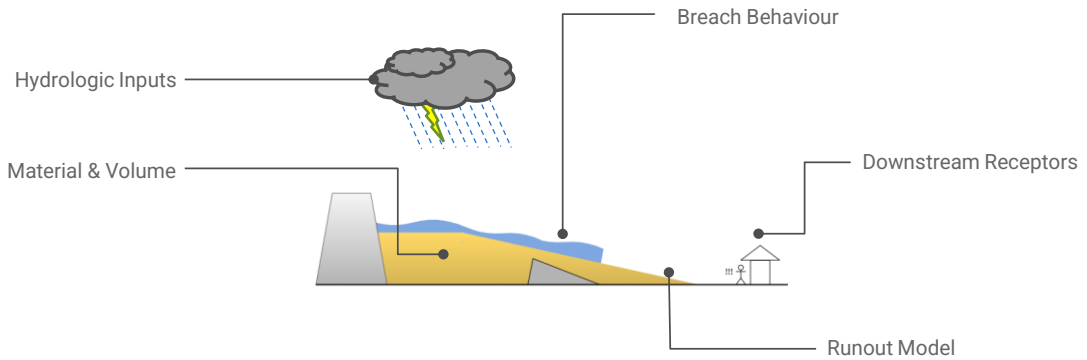
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Overview

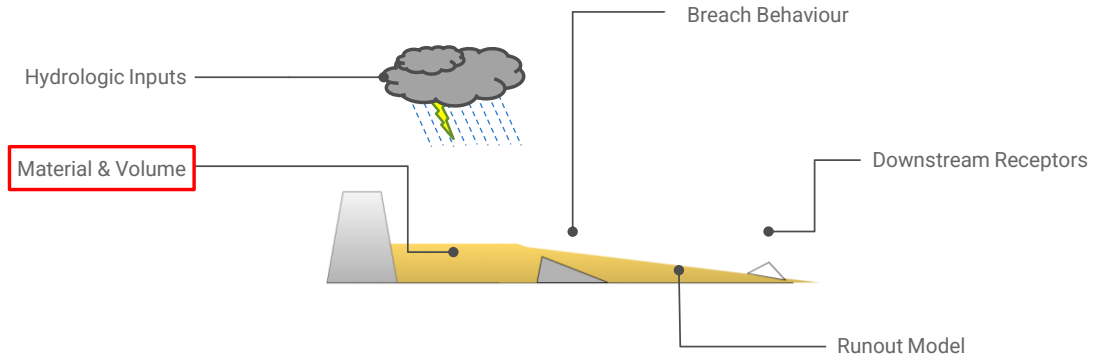


Overview

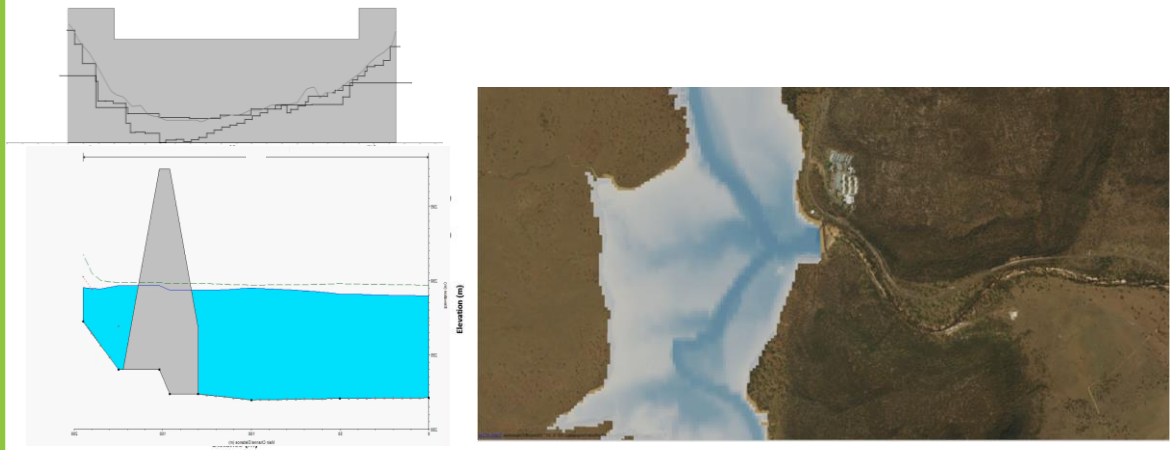




Overview

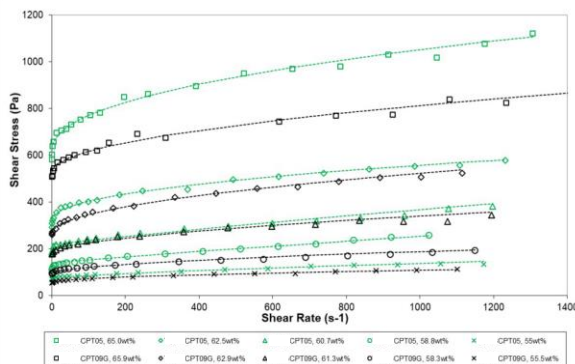
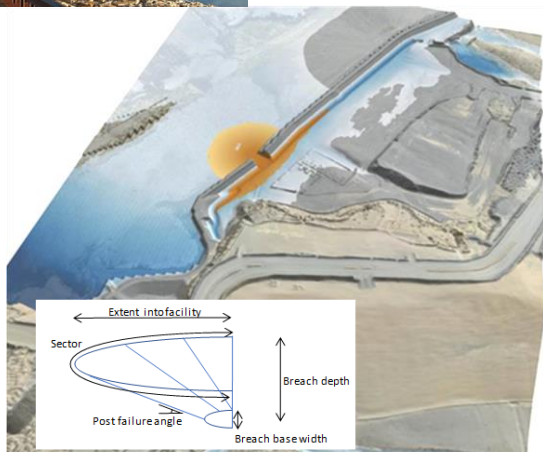


Material & Volume

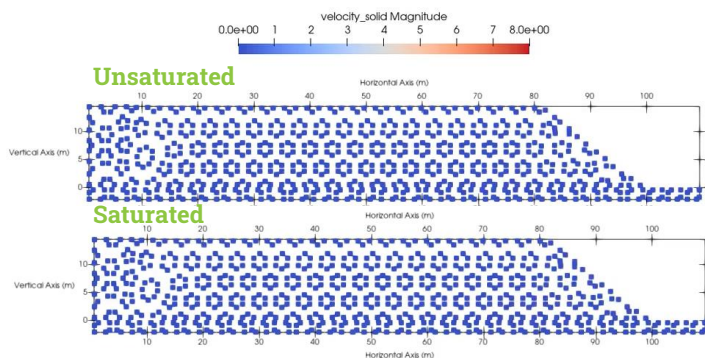




Material & Volume



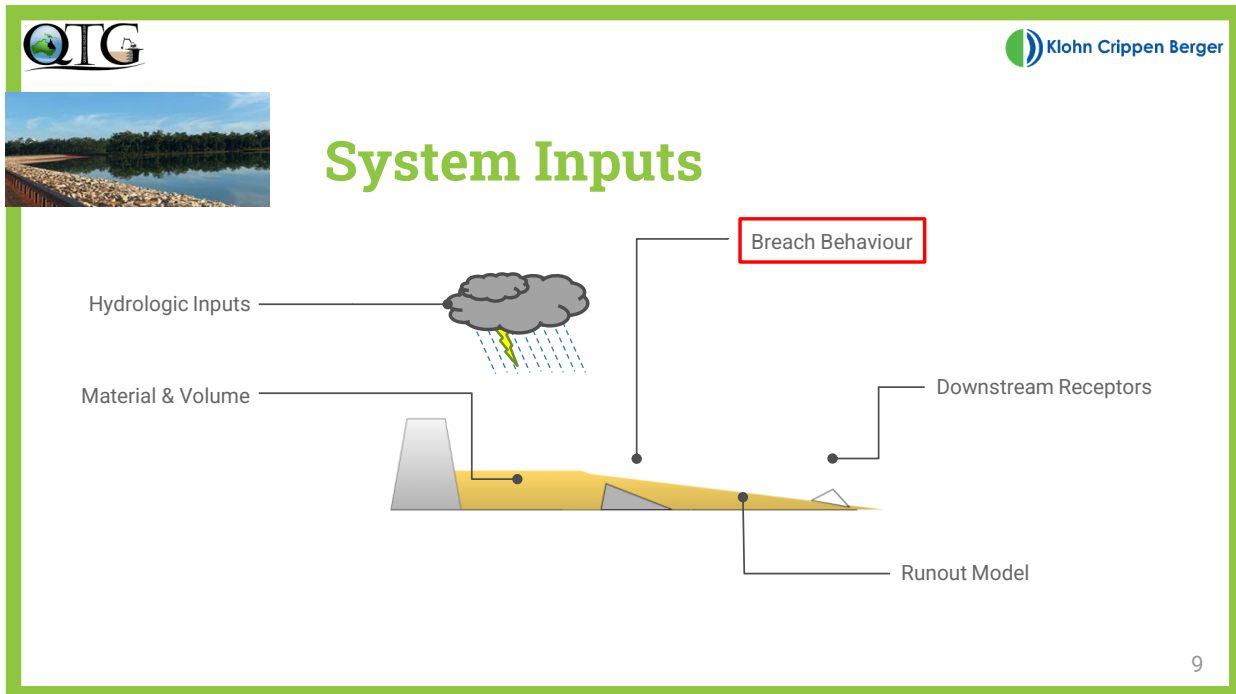
Material & Volume



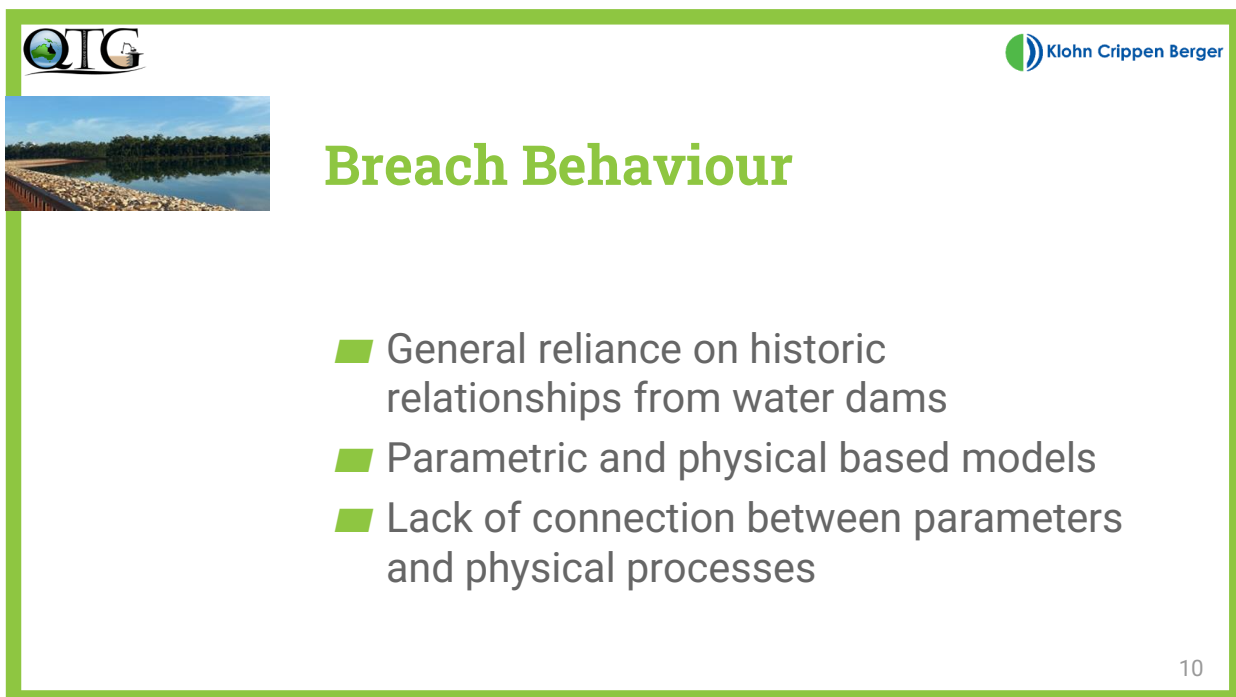
MPM model based on geotechnical parameters, provides the following guidance to the hydraulic model:

- Post-failure slope
- Particle velocity at the breach
- Failure duration / mass over time
- Solids concentration

t = 0.000000



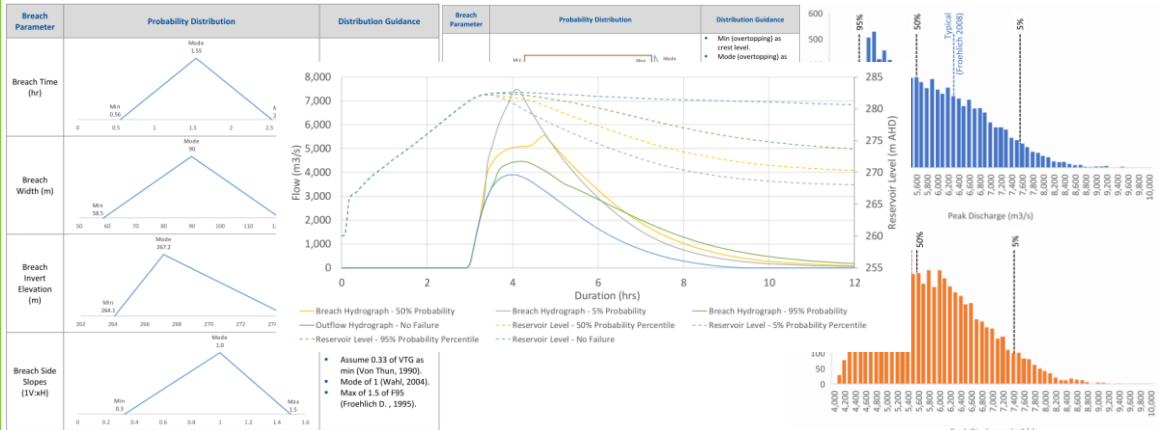
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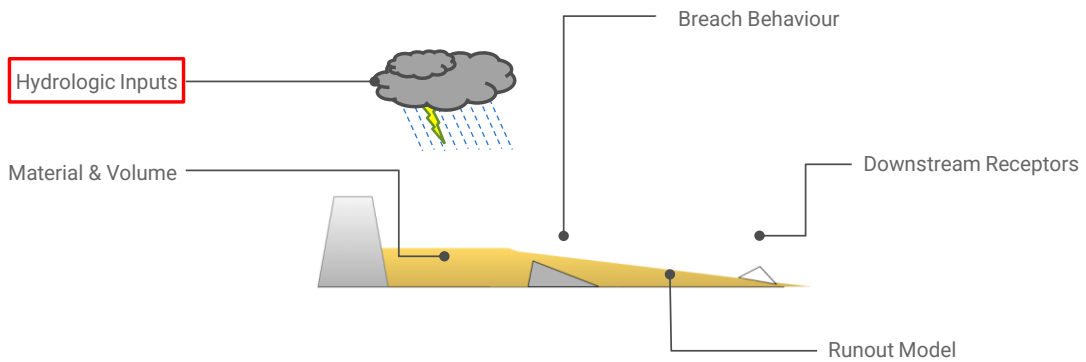
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Breach Behaviour



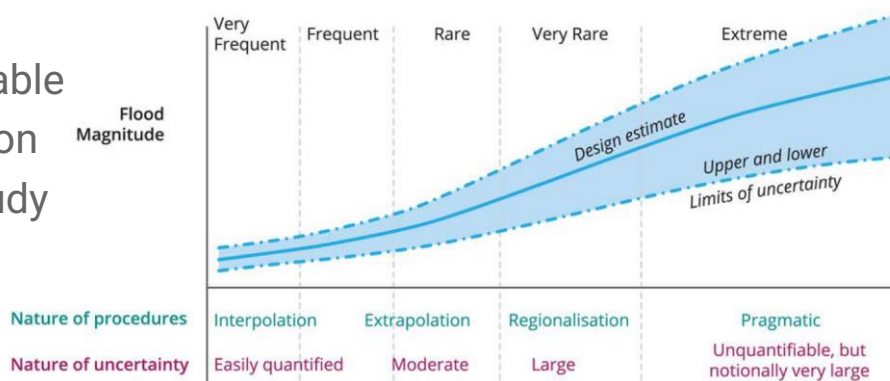
System Inputs





Hydrologic Inputs

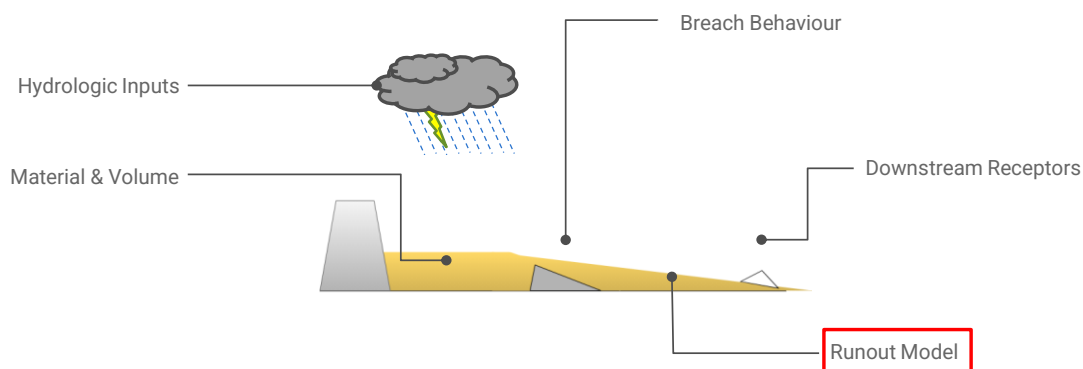
- Highly variable
- Extrapolation
- Primary study input



Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) Australian Rainfall and Runoff: A Guide to Flood Estimation, 13
© Commonwealth of Australia (Geoscience Australia), 2019

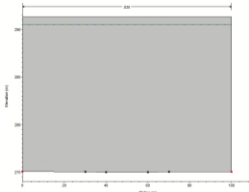


System Inputs

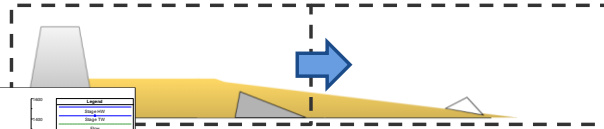




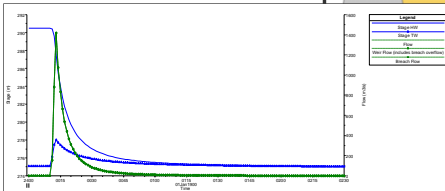
Runout Model



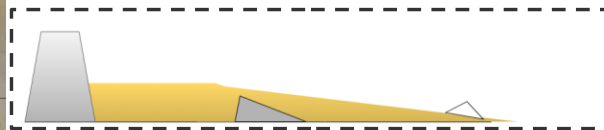
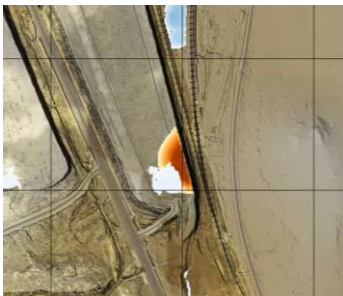
1d model
(stage-storage curve, 1d breach, outflow hydrograph)



2d model
(terrain)



Runout Model



2d model
(terrain)



Runout Model

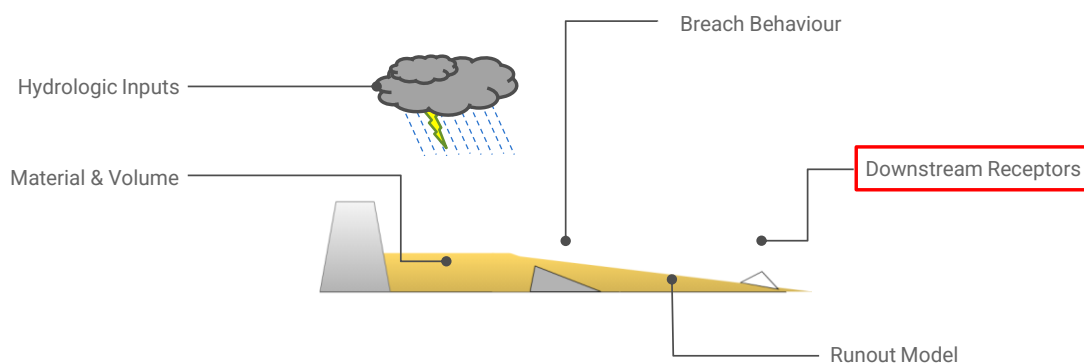
- Still develop a best estimate of the deterministic result
- Assess parameter uncertainty and model various combinations
- Demonstrate the variation in results

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System Inputs



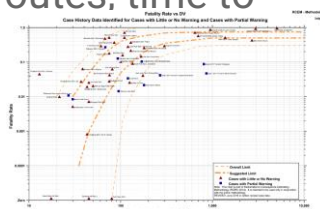
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Downstream Receptors

- Traditionally a simplified assessment
- No allowance for behaviour, capability, natural variation, egress routes, time to respond etc.
- We can do better

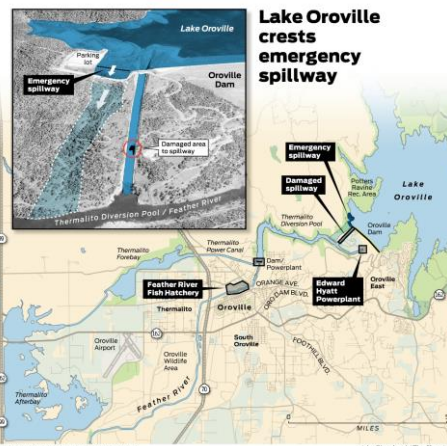


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Downstream Receptors



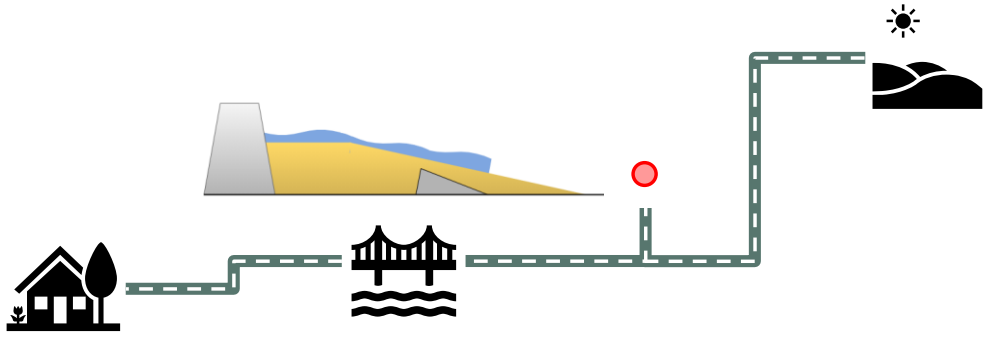
Chris Todd, The Clarion-Ledger

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Downstream Receptors

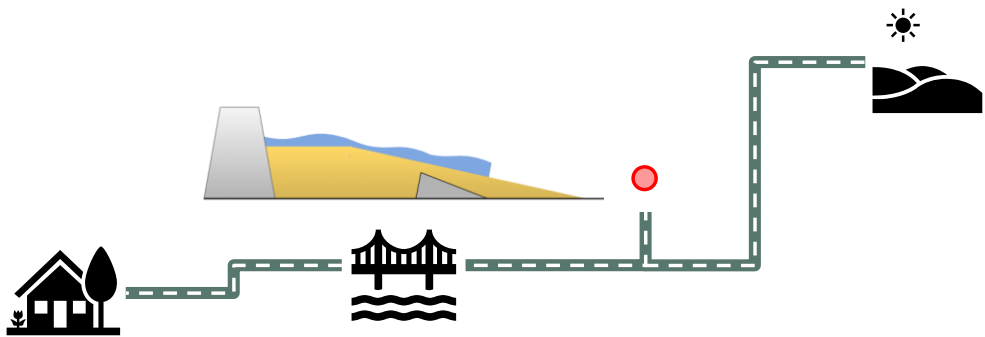


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Downstream Receptors

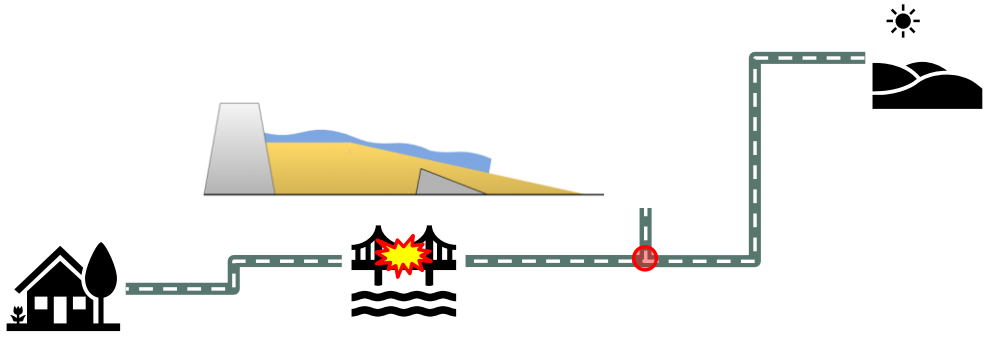


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Downstream Receptors

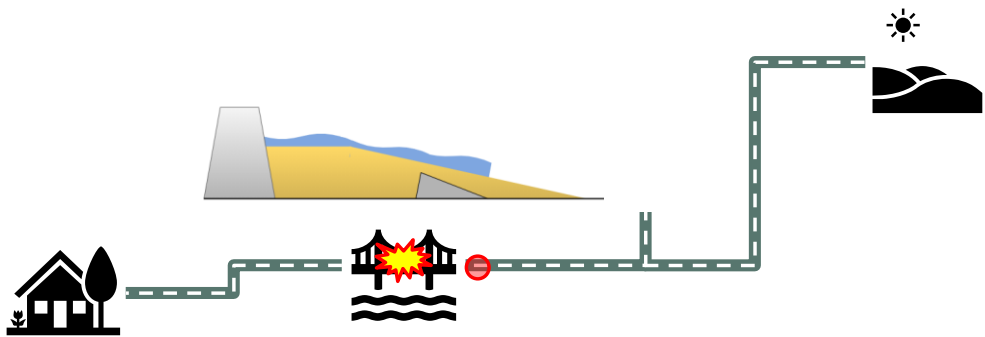


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Downstream Receptors

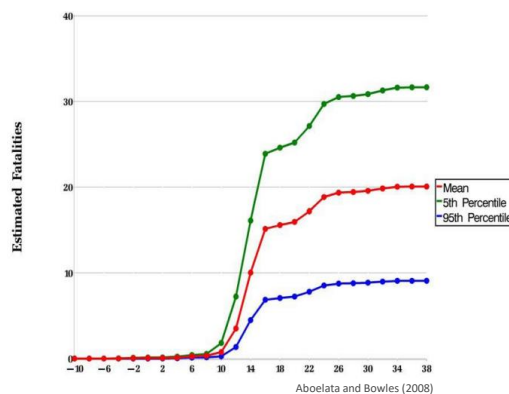
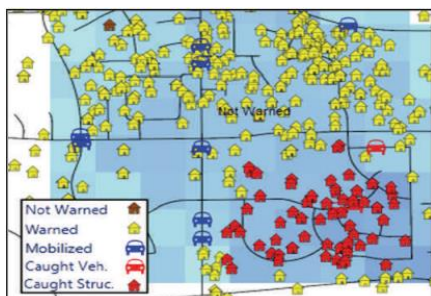


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Downstream Receptors



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Summary

- Data driven estimates
- Understand and communicate uncertainty
- Accurate deterministic results, with range of output confidence

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