USING RISKSCAPE TO MEASURE THE IMPACT OF FLOOD UNCERTAINTY ON DECISION-MAKING

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The Flooding Problem

Global economic damage 1971 - 2021.

115 billion USD
(Augustein et al., 2022)

Loss from Auckland Anniversary weekend floods in 2022

600 million NZD

Loss from Cyclone Gabriel floods in 2023

3.5 billion NZD
(Auckland Council)

Source: rnz.co.nz

Source: www.theourist.com

Based on models done for New Zealand climate change is likely to

Increase Flood Events (NIWA)
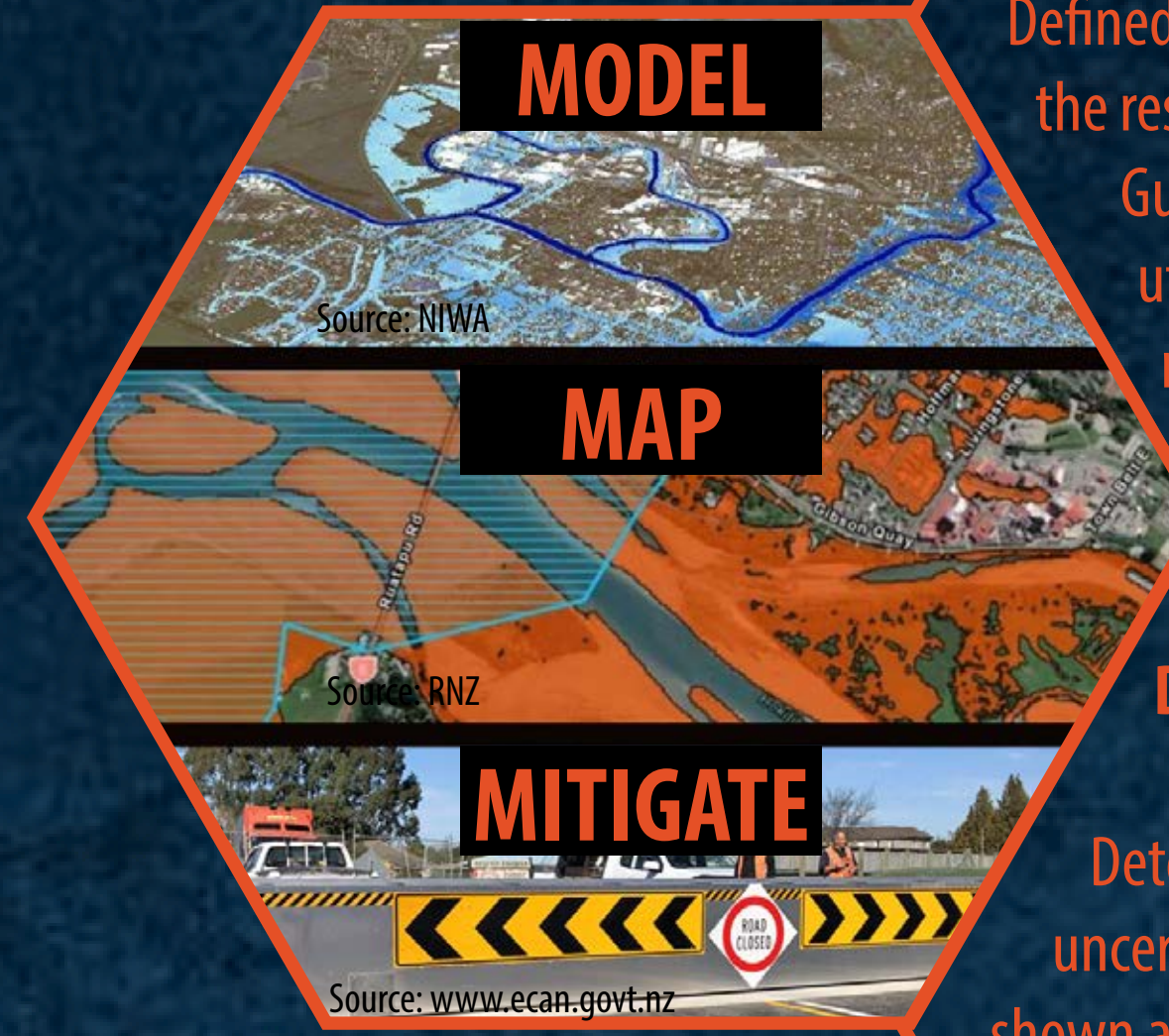
Projected extreme rainfall patterns for NZ in 2090

99-pctl Precip: RCP8.5 , 2090 change
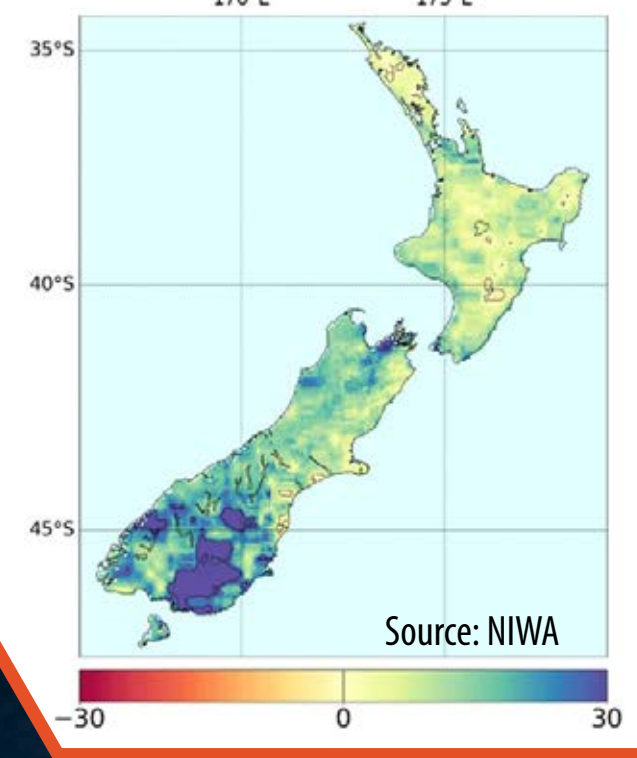
Source: NIWA

Flood Model Uncertainty

Defined as a lack of sureness or confidence in the result of the model (Mishra and Datta-Gupta, 2018). Decision makers can utilise uncertainty estimates and representations to inform their response.

MODEL

Source: NIWA

MAP

Source: RNZ

MITIGATE

Source: www.ecan.govt.nz

Deterministic VS Stochastic Maps

Deterministic maps do not represent uncertainty well so mapped hazards are shown as firm boundaries of predicted hazard extents. Stochastic maps can provide map outputs indicating uncertainty by a range of the likelihood of the hazard.

DETERMINISTIC

STOCHASTIC

Research Aims

1. Examine the representations of flood model uncertainty

2. Determine the impact (if any) that uncertainty representation has in influencing decisions

Ask Questions
Submit Feedback
More information
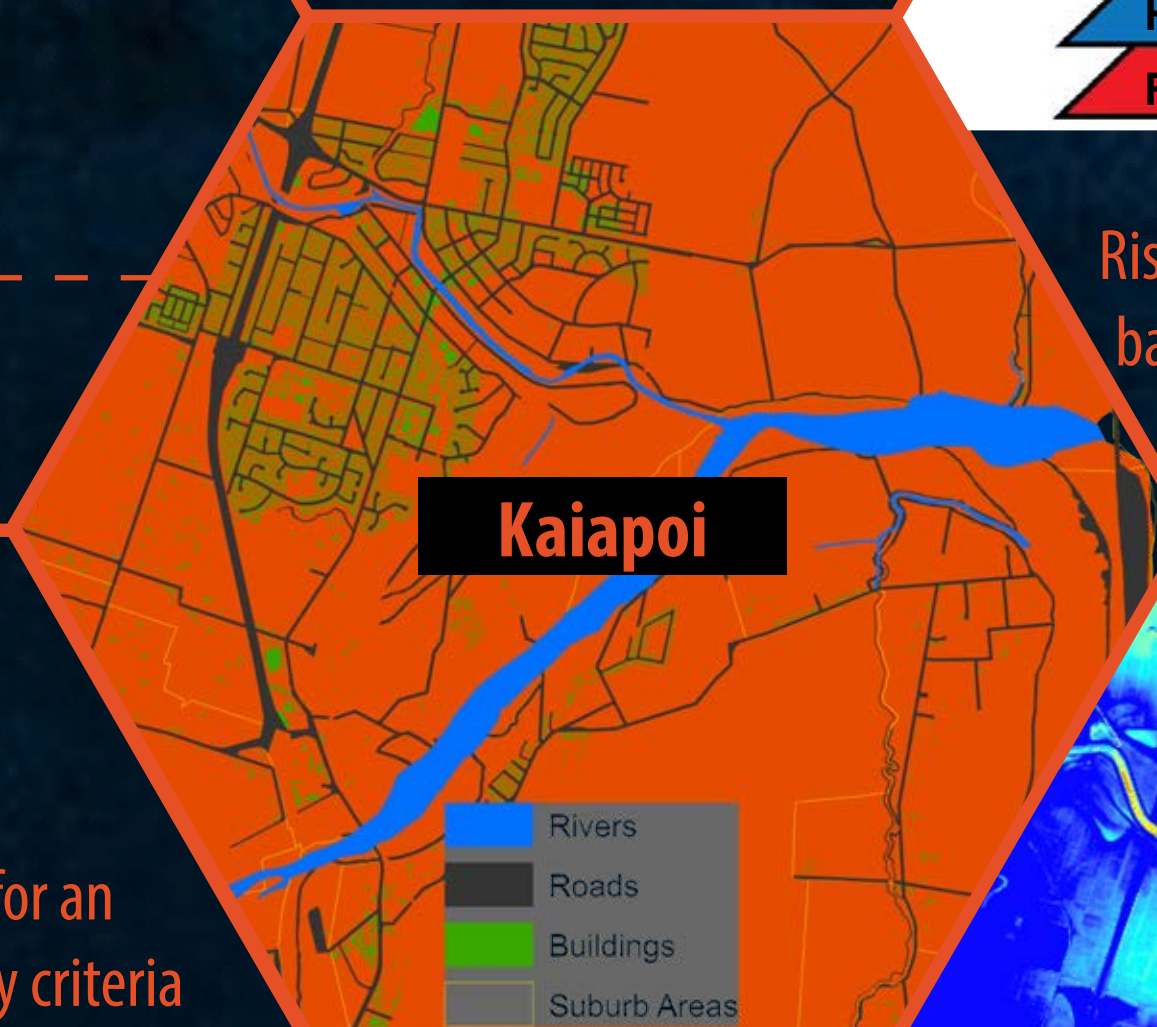
Representing Uncertainty

Flood maps will be generated in RiskScape, an open-source spatial data processing application developed by NIWA and GNS to analyse multi-hazard risk.

RISKSCAPE

Assets (e.g. Buildings) — Uncertainty +
Hazard Layers — Uncertainty +
Functions — Uncertainty
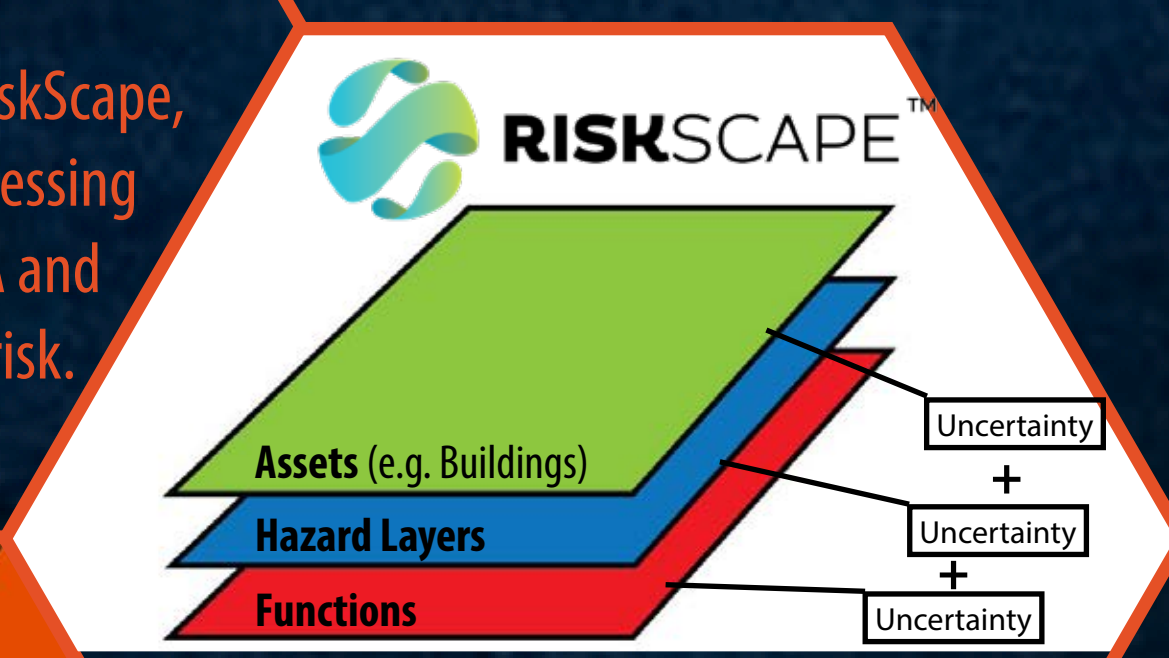
RiskScape calculates asset exposure based on hazard layers to produce risk maps.

Kaiapoi

Rivers
Roads
Buildings
Suburb Areas

Max Depth Value
High : 3.71897
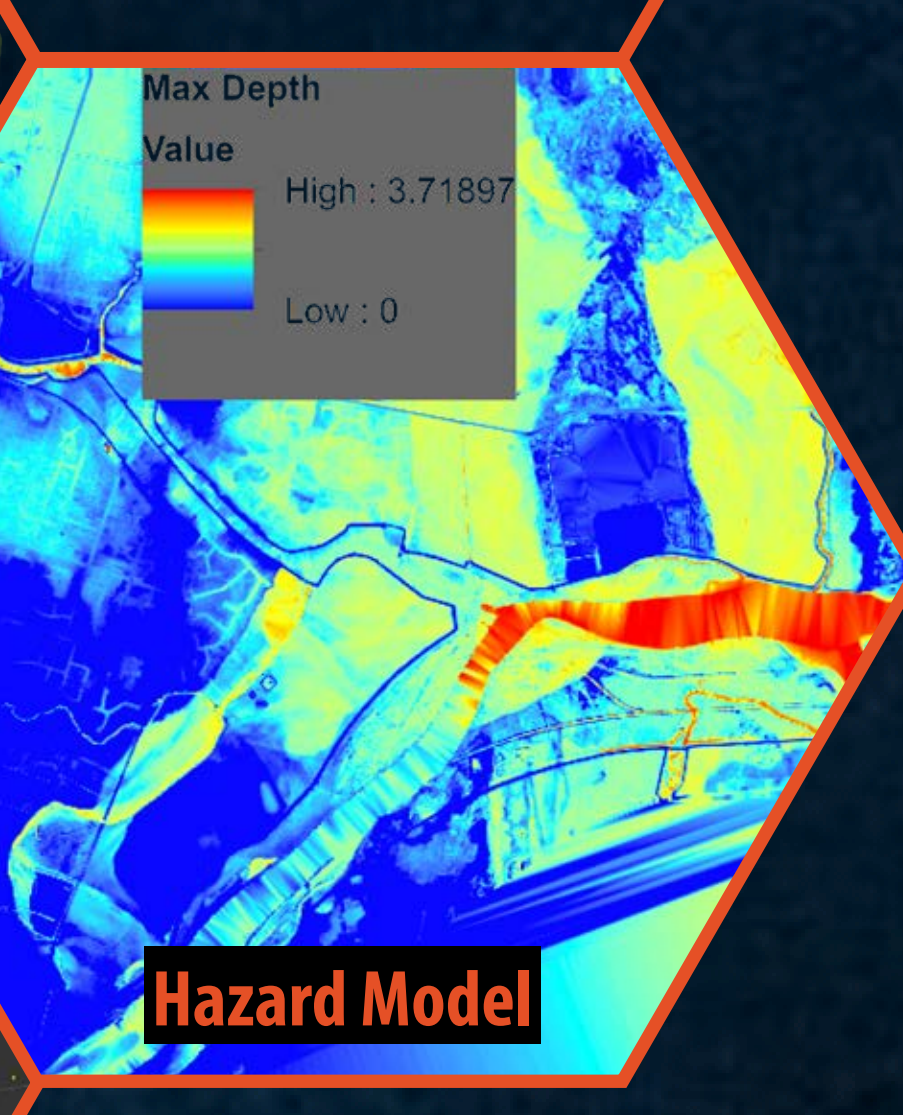Low : 0

Hazard Model

Case Study

The Kaiapoi area was selected for an initial analysis as it met several key criteria including urban development, a well developed river network and most importantly, a history of flood events in the past that could be used to validate model outputs.

Legend
Roads
Rivers
Building Impact hazard
Zero impact
0 - 0.3m
0.3 - 0.8m
0.8 - 1.25m
1.25 - 3.12m

Risk Output

Future Work

Aim to integrate socioeconomic datasets including on vulnerability and population density to estimate unceirainty in flood exposure alongside local partners.

Measuring Impact

Using risk outputs a user study would be conducted to compare the difference in stakeholder response for deterministic and stochastic model representations of historical and predicted events.

References

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Augustein, P. et al. (2022) 'The Blue Paper - Drought Risks, Resilience and Restoration', in The Intergovernmental Working Group on Drought. COP15, Bonn, Germany: UNCCD. Available at: https://www.unccd.int/sites/default/files/2022-08/The_Blue_Paper.pdf.

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