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The impacts of collaborative software development between eResearch and the Australian Rivers Institute

The Building Catchment Resilience Project

Building Catchment RESILIENCE

Griffith UNIVERSITY
Australian Rivers Institute

Griffith UNIVERSITY · The Ian Potter Foundation · Queensland Government · PORT of BRISBANE Here for the future · seqwater WATER FOR LIFE

QUT Queensland University of Technology · Queensland Urban Utilities · Lockyer Valley Regional Council · Healthy land & water · WATER TECHNOLOGY

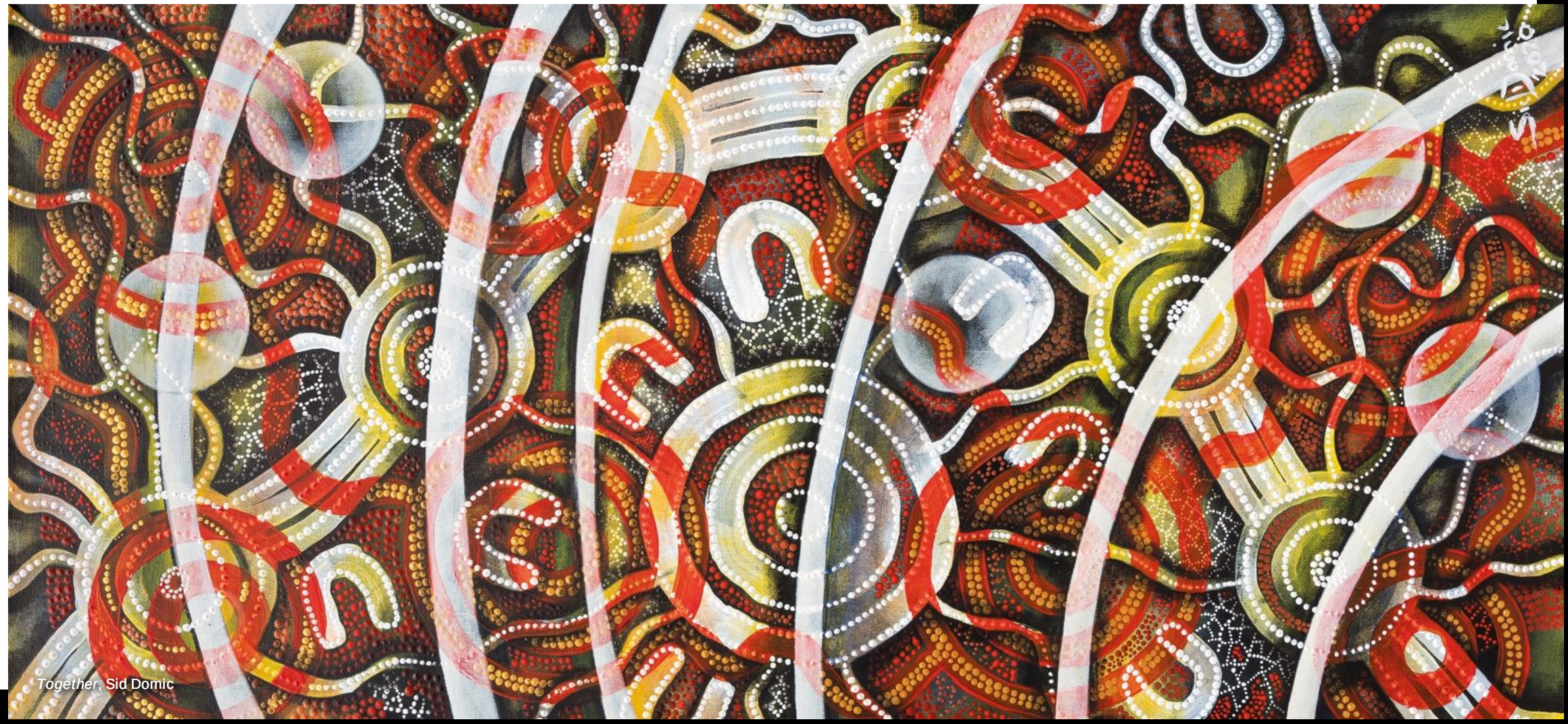
Queensland Australia

Make it matter

GRIFFITH UNIVERSITY

ACKNOWLEDGEMENT OF COUNTRY

Griffith University acknowledges the people who are the Traditional Custodians of the land. We pay respect to the Elders, past and present, and extend that respect to all Aboriginal and Torres Strait Islander peoples.



Together, Sid Domic

Effects of extreme weather events

Diffuse pollution threatens our waterways and water security.

Without an integrated approach, there are likely to be significant ongoing environmental, economic and social costs.

Solutions are found upstream,

for impacts experienced downstream

Improvement actions are clear…

Proposed on-ground actions to improve catchment resilience:

- Riparian and riverbank rehabilitation
    - including revegetation, constructed pylon fields, to increase channel roughness)
- Hillslope revegetation
    - including replanting,
    - improved grazing and
    - fire management
- Gully remediation
- Wetlands – reconnection; creation

The Problem Statement

How can decision makers effectively:

- Choose what actions to conduct and where?
- Optimise investment.
- Reach a decision-making consensus
- Build confidence in communities

Quantify costs/benefits, e.g.:

- Reduce flood impact
- Improve water quality (sediment, nitrogen)
- Improve stream health
- Carbon sequestration

Engage communities.

Explore Scenarios.

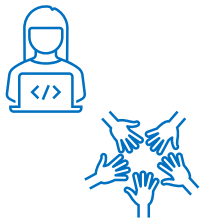
An Opportunity for Collaboration Between Elements

The project:

"Develop a multi-objective investment tool, to support consensus in considering the ideal actions for each geography to optimise investment in building catchment resilience in the Laidley Creek catchment."

- Enhance Data Sharing and Integration: to develop collaborative software that facilitates the sharing and integration of diverse data sources related to river ecosystems.

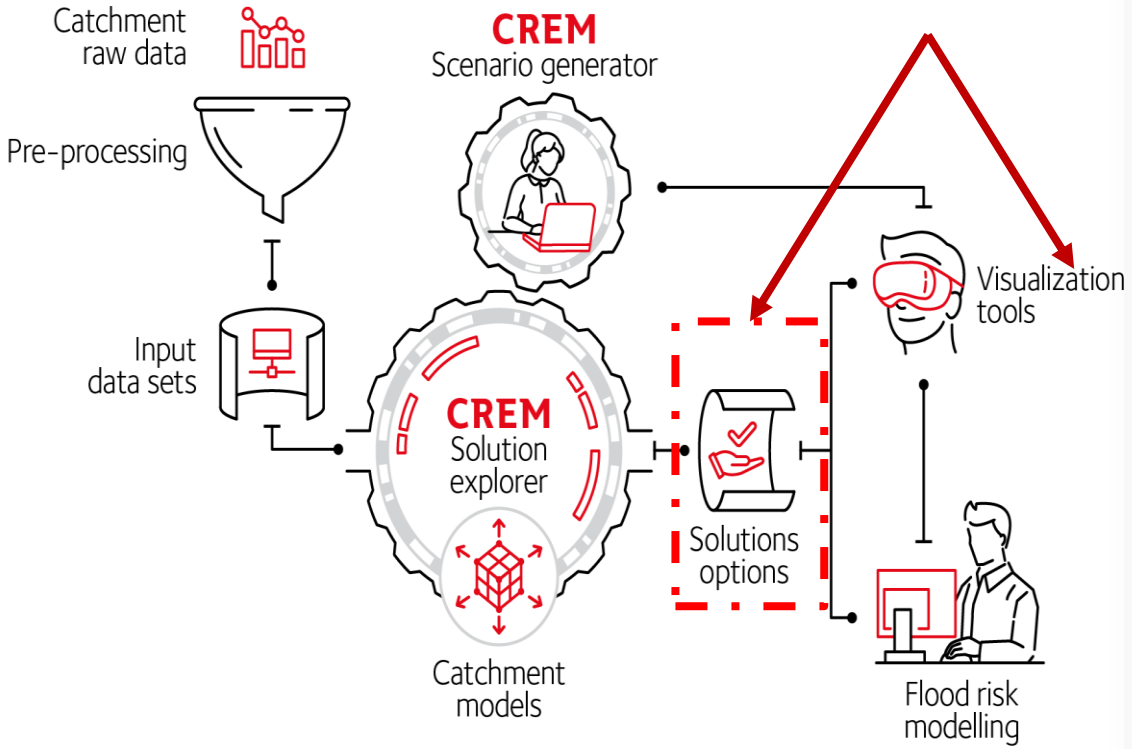
- Streamline Data Analysis and Visualization: to create software tools that simplify data analysis and visualization.

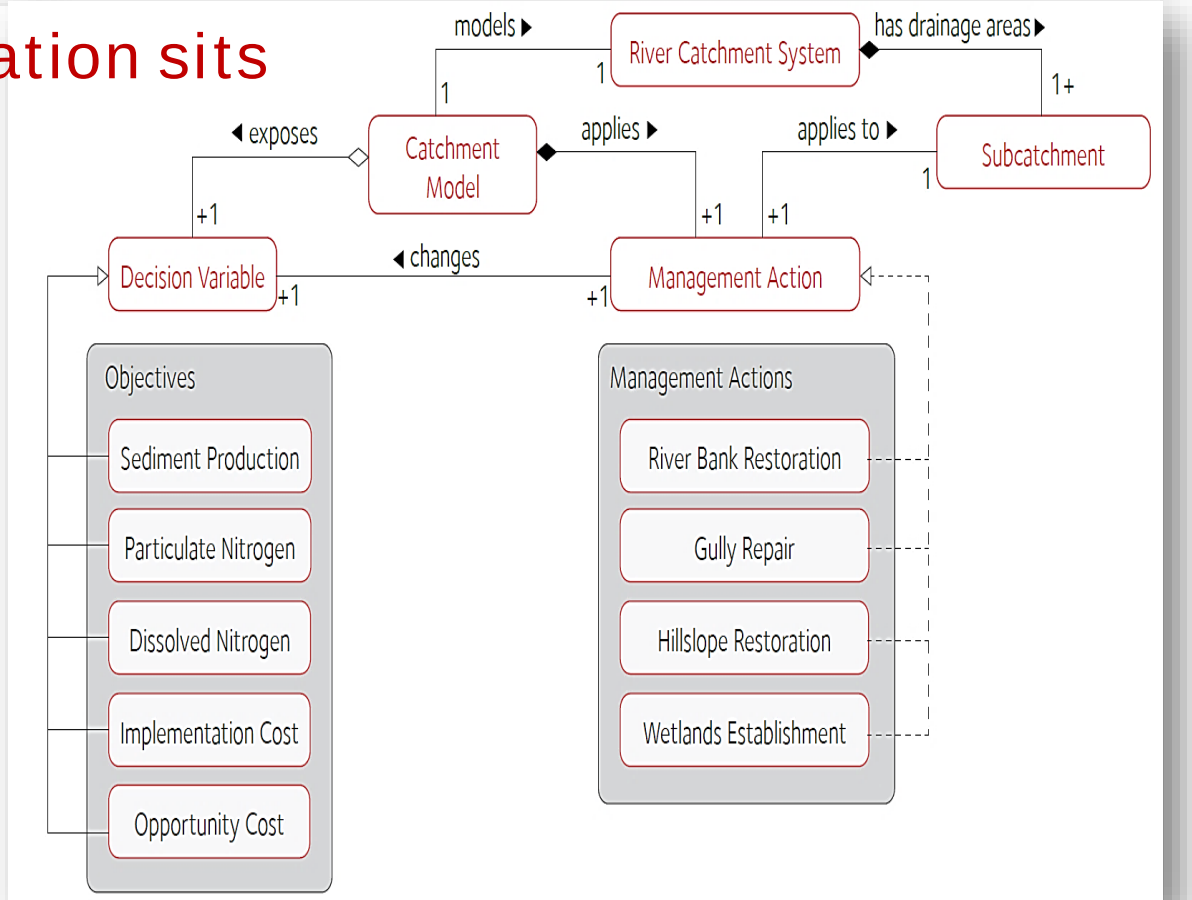


- Facilitate Collaborative Project Management: Collaborative software development aim to enhance project management capabilities for joint research initiatives.

Catchment Resilience tool to optimize investment

Where our collaboration sits





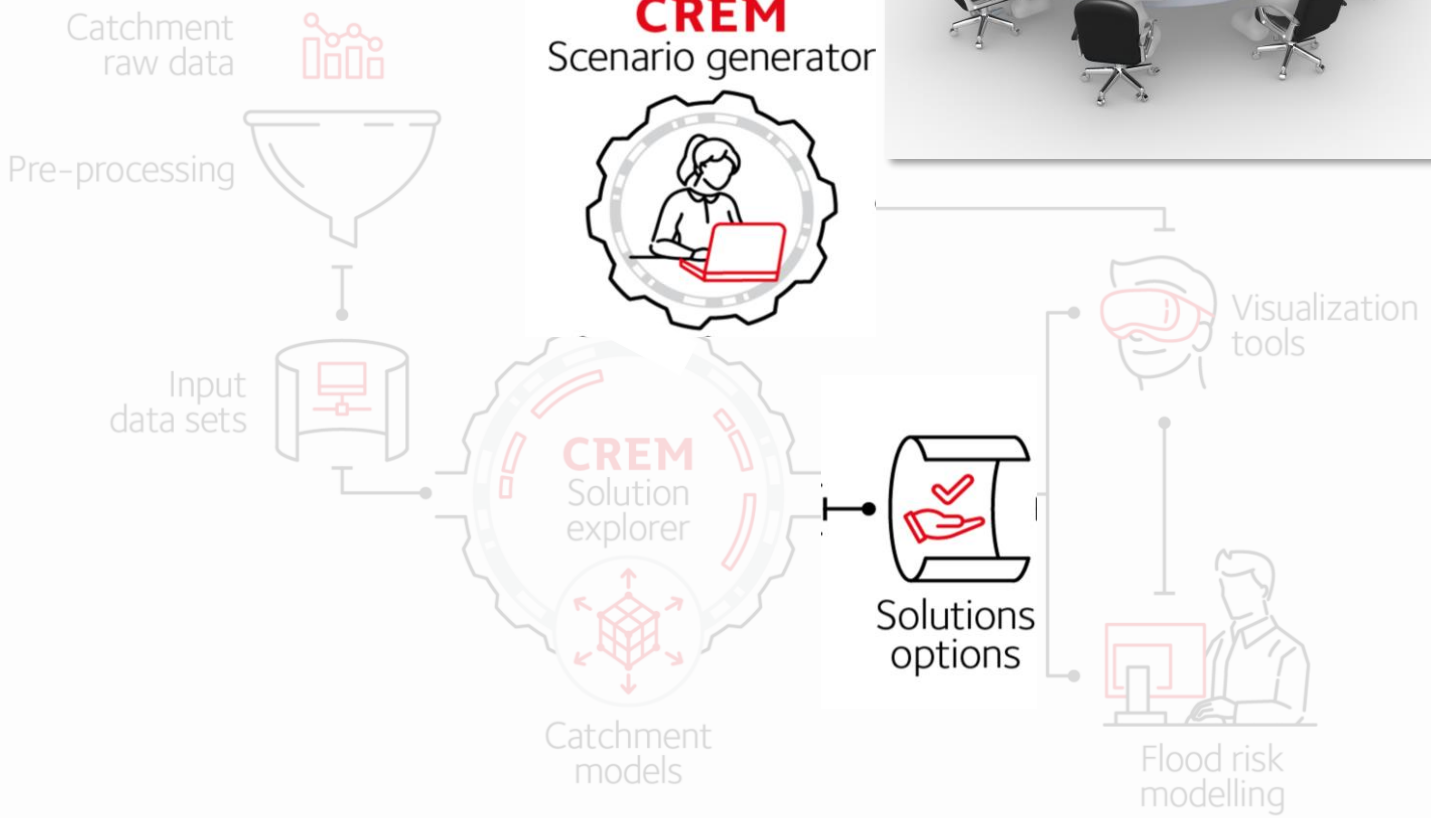
CREM Explorer

Multi-objective simulated annealing (MOSA)

Catchment Planning Scenarios

- What trade-offs between implementation, opportunity cost, and dissolved nitrogen will we find aim to halve sediment production?

- What trade-offs amongst pollutant production will we find with an implementation cost budget of $20M?

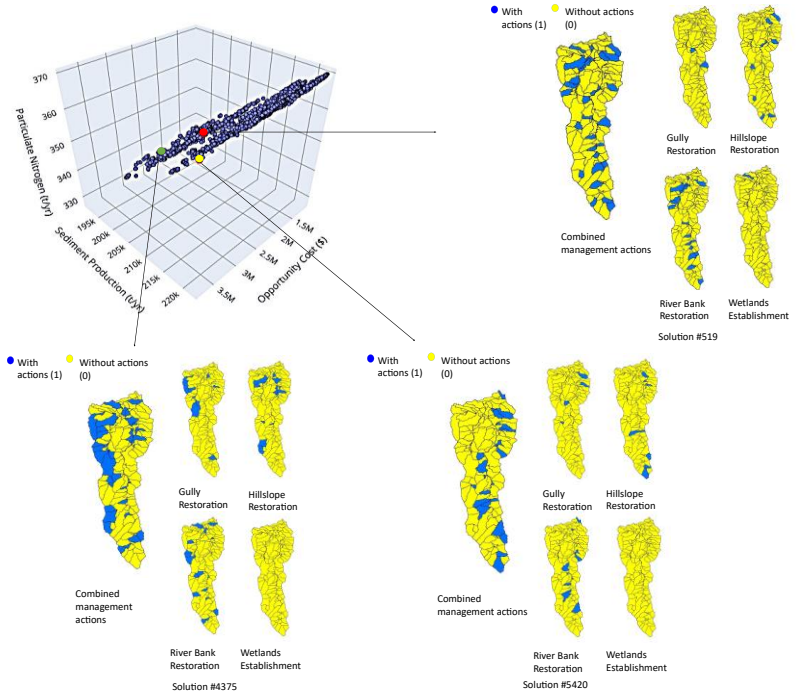


The ‘software stack’

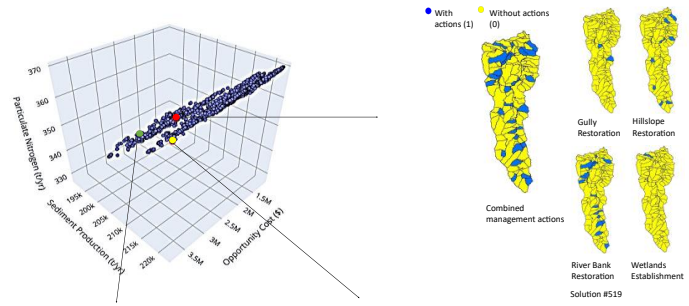
Recalling…

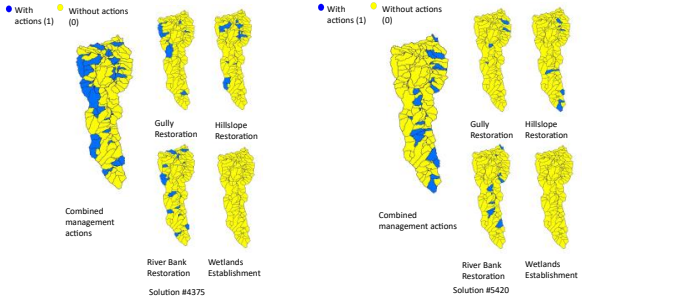
The focus is on a simple, economical, and accessible visualisation – end users will have varying degrees of digital literacy.

python™ + plotly =



Receive feedback quickly – iterate & improve

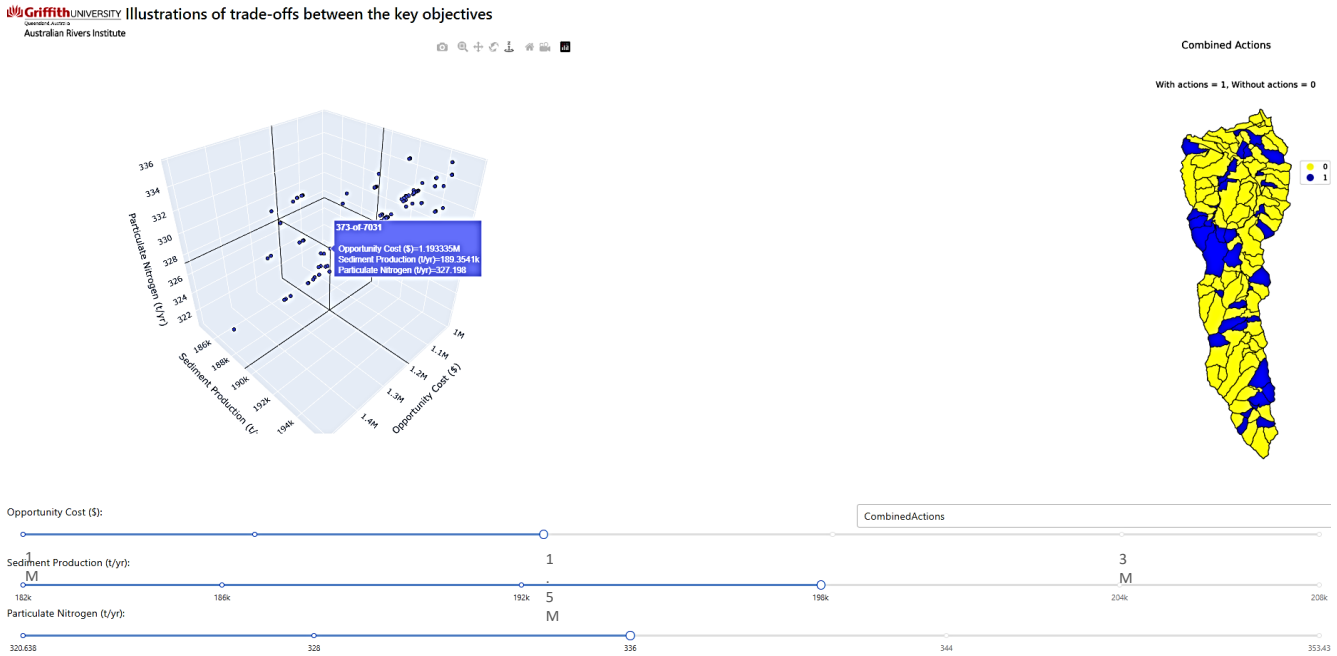




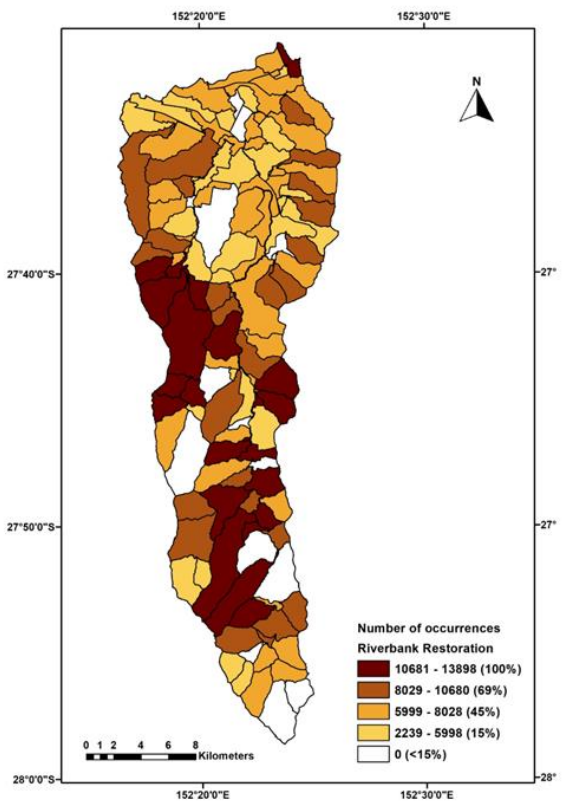
Present to stakeholders. Capture feedback. Home in on needs, wants, and motivations.

Improve dashboard. Reflect end user desires in line with project goal.

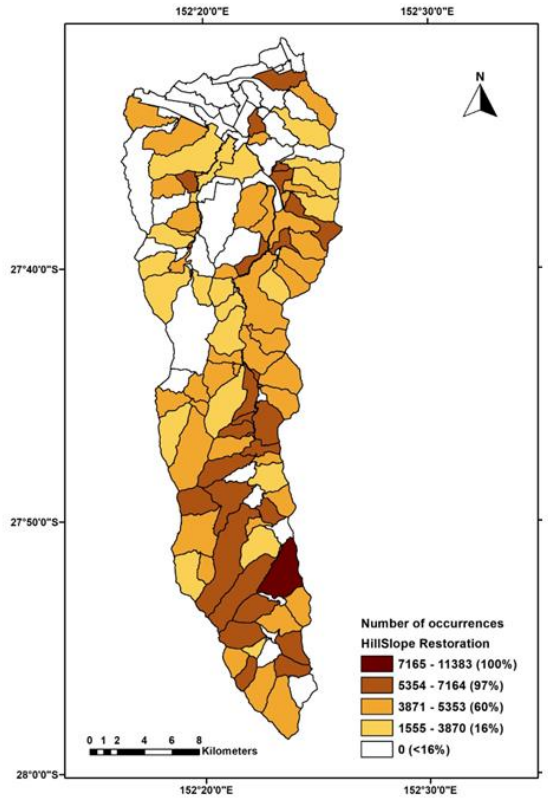
Improving the dashboard



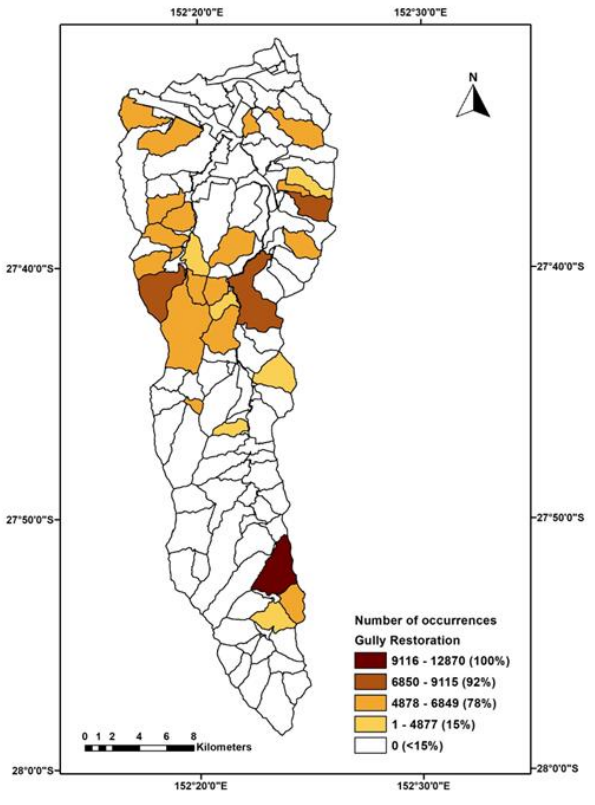
Prioritisation of planning units for restoration



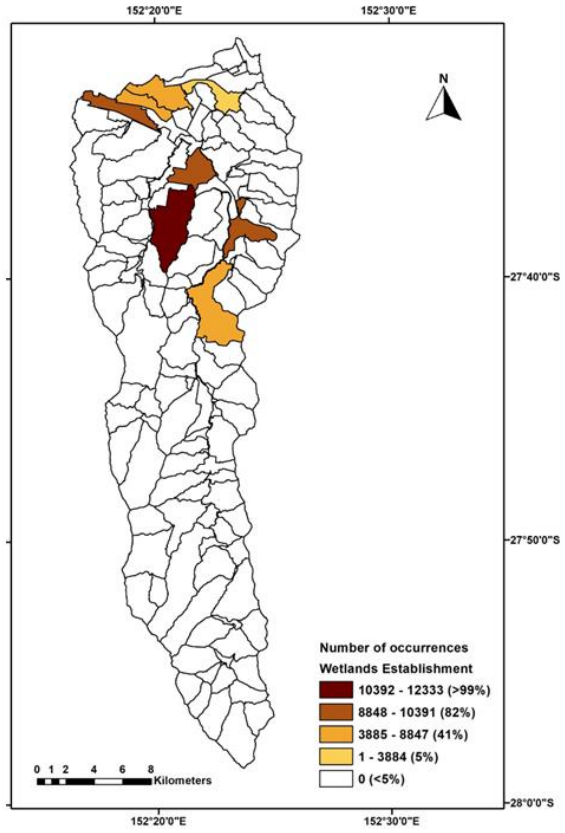
Riverbank Restoration



Hillslope Restoration



Gully Restoration



Wetland Establishment

The Path Forward (On–ground virtual reality)

Thank you!!

Jagriti Tiwari j.tiwari@griffith.edu.au/jagritit27@gmail.com

Isaac Jennings i.jennings@griffith.edu.au

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