Tools to bridge the gap between climate science and adaptation: The SimCLIM integrated modelling system

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PART 1:

Filling the research gap: the example of the SimCLIM integrated modelling system

SimCLIM

The integrated modelling system for assessing impacts and adaptation to climatic variability and change

www.climsystems.com

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SimCLIM can be used to:

- Describe baseline climates
- Examine current climate variability and extremes
- Assess risks – present and future
- Investigate adaptation – present and future
- Create climate change scenarios (including GCM ensembles)
- Conduct sensitivity analyses
- Examine sectoral impacts (e.g. links to DHI hydrologic models)
- Examine uncertainties
- Facilitate integrated impact analyses

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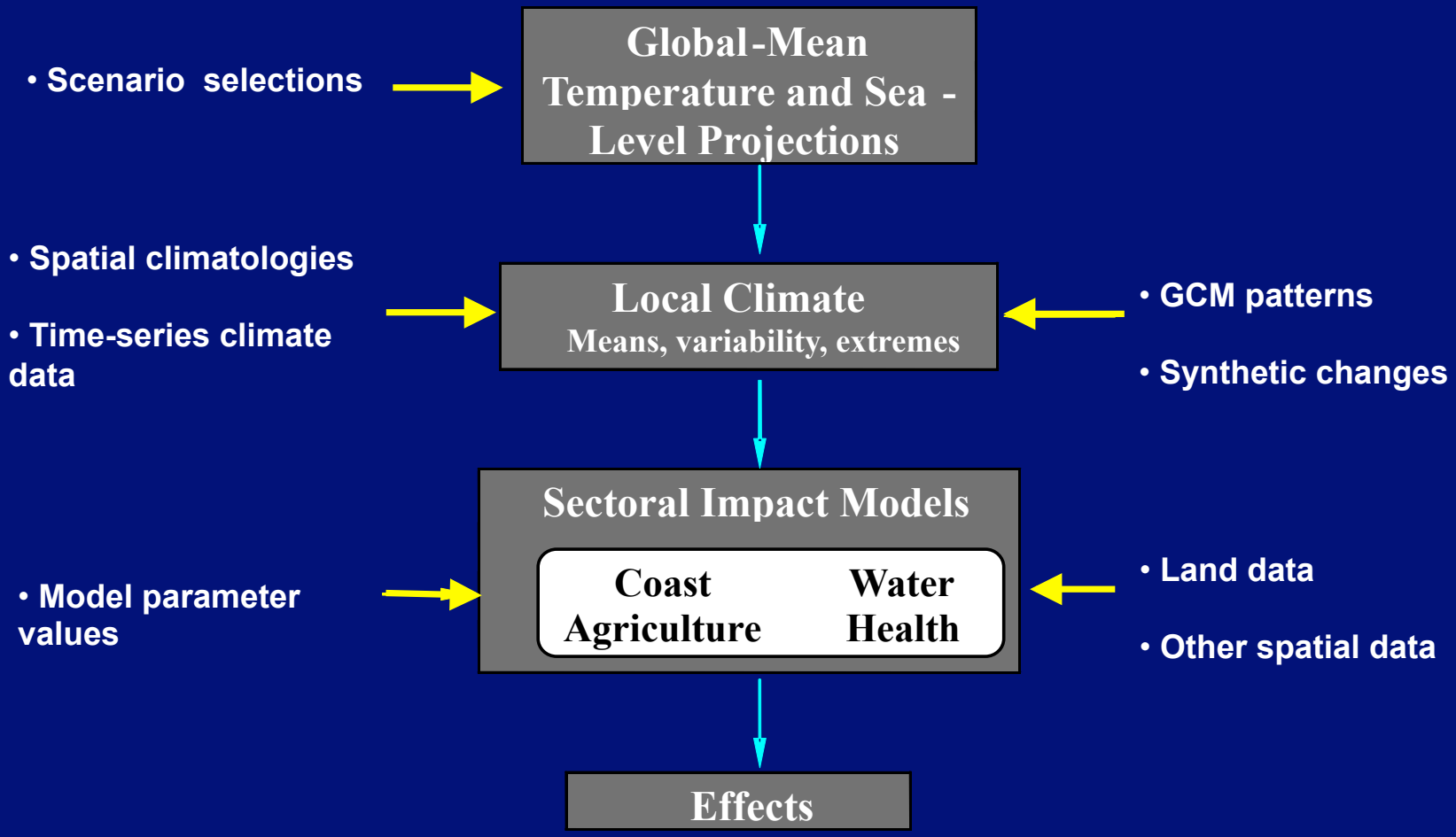
The SimCLIM System



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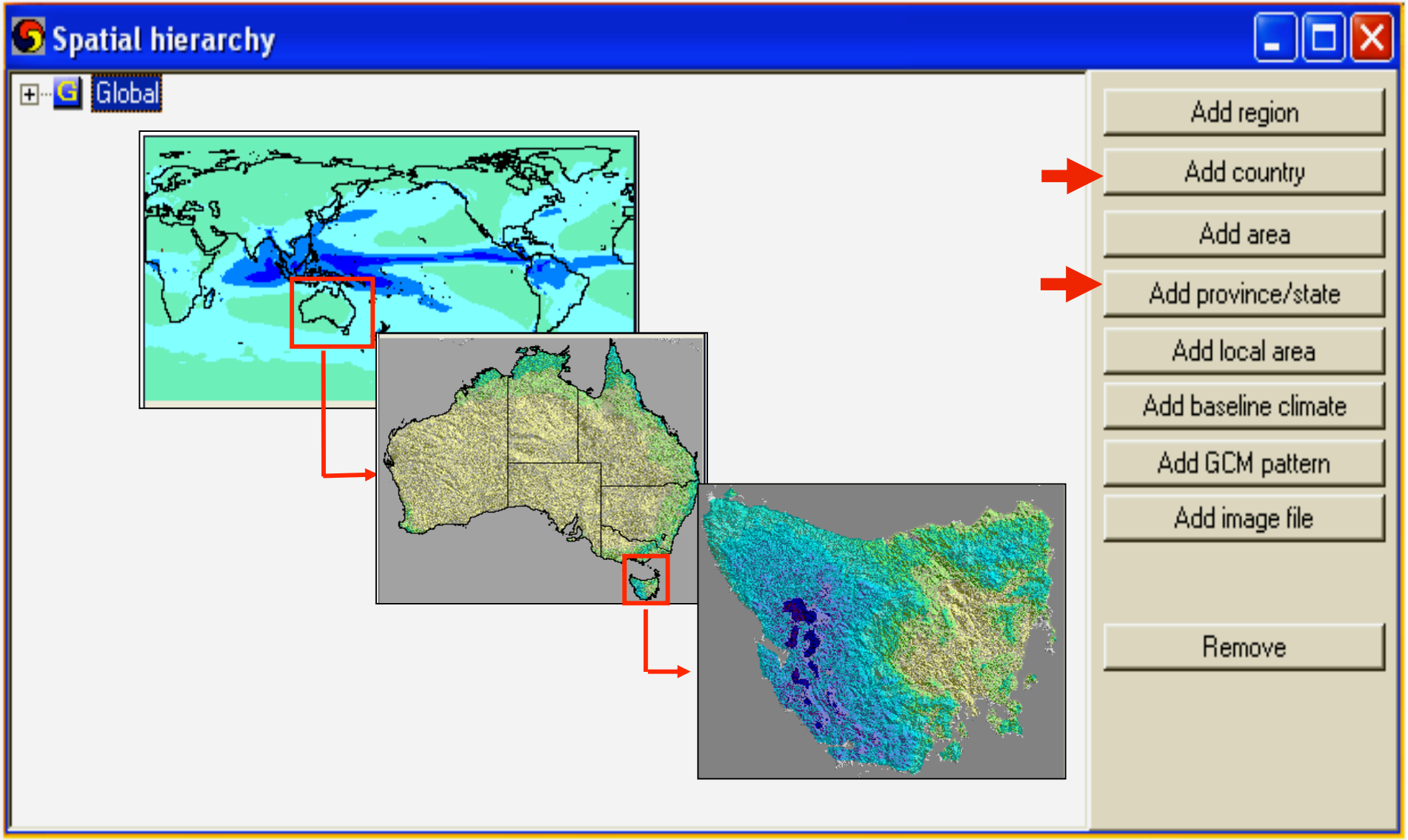
Multi-scale, open-framework system



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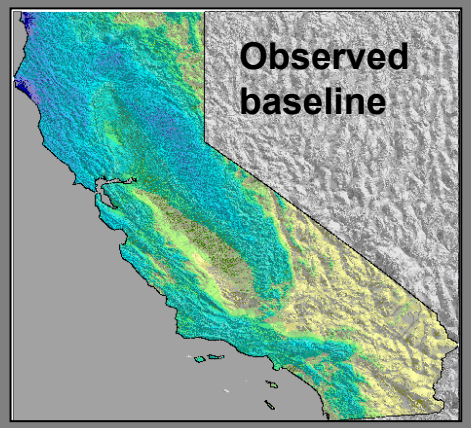
SimCLIM Version 2.0

Scenario Generator

california

Spatial pattern, time-slice analysis

e.g. California Oct-April precipitation



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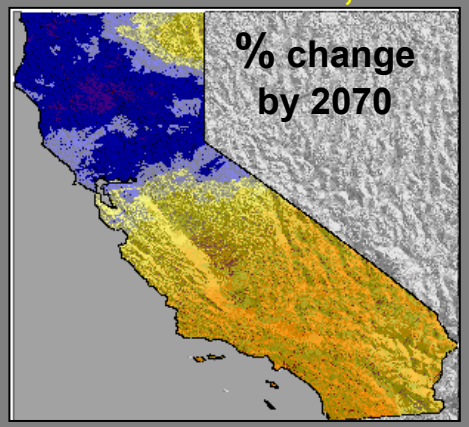
20 GCM ensemble, A1B



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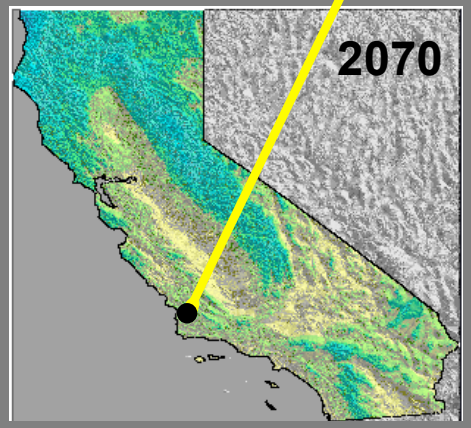
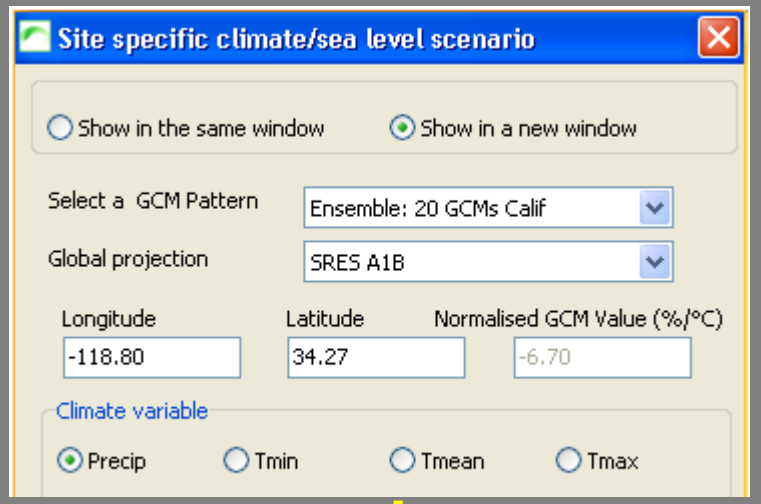
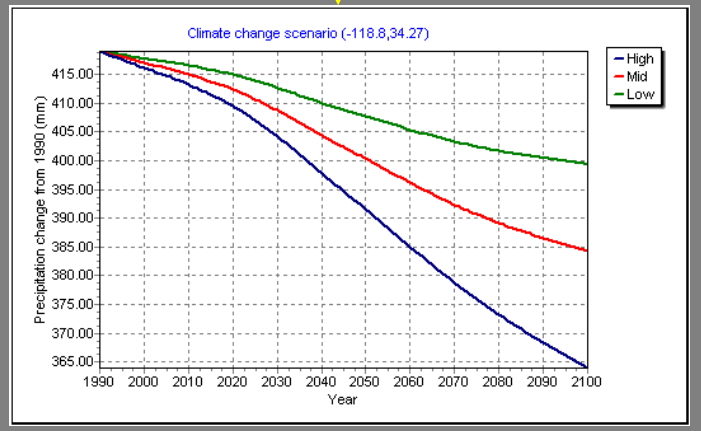


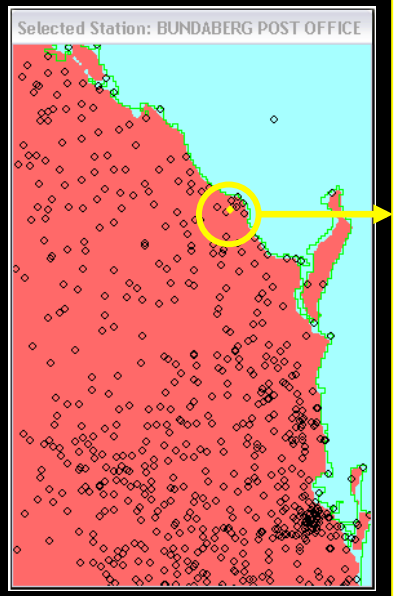
Time-series projections, for sites





Analyses of time-series data

Example: change in risk of extreme hot days



Extreme Value Analysis Result

BUNDABERG POST OFFICE: Daily Data, Scenario Year: 2050
South East Queensland, HadCM3, IPCC SRES A2, BestGuess

Return Period (years): 200, 100, 50, 20, 10, 5, 2

34 35 36 37 38 39 40 41

Extreme high maximum temperature (°C)

Observed
Calculated

Months selected: 1 2 3 4 5 6 7 8 9 10 11 12

Climate data from historical period 01/01/1892 to 31/12/1990

Design Value	Extreme event value	39.00	Return Period	13.24	Add to chart	
Risk	Return Period	13.24	Time Horizon	10	Probability	0.54

Extreme Value

BUNDABER

Return Period (years): 200, 100, 50, 20, 10, 5, 2

33

Climat

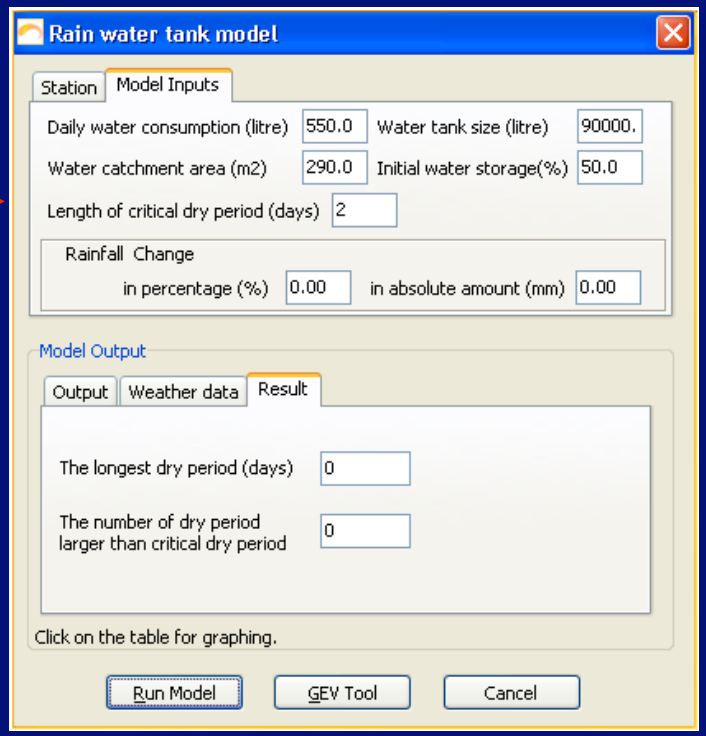
Design Value	Extreme event value	39.00	Return Period	46.52	Add to chart	
Risk	Return Period	46.52	Time Horizon	10	Probability	0.20

Produced using the *SimCLIM model*

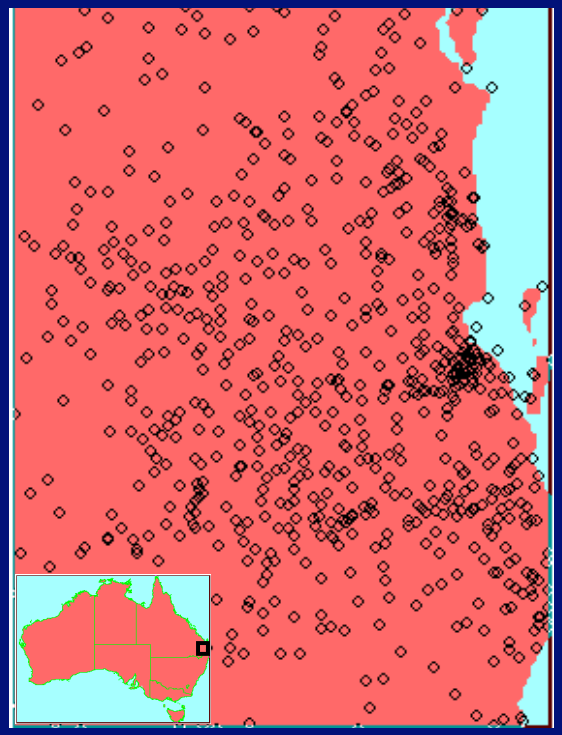
PART 2:

Assessing the risks to domestic rainwater harvesting systems from climate variability and change in Queensland, Australia

SimCLIM Water Tank Model



SimCLIM Water Tank Model

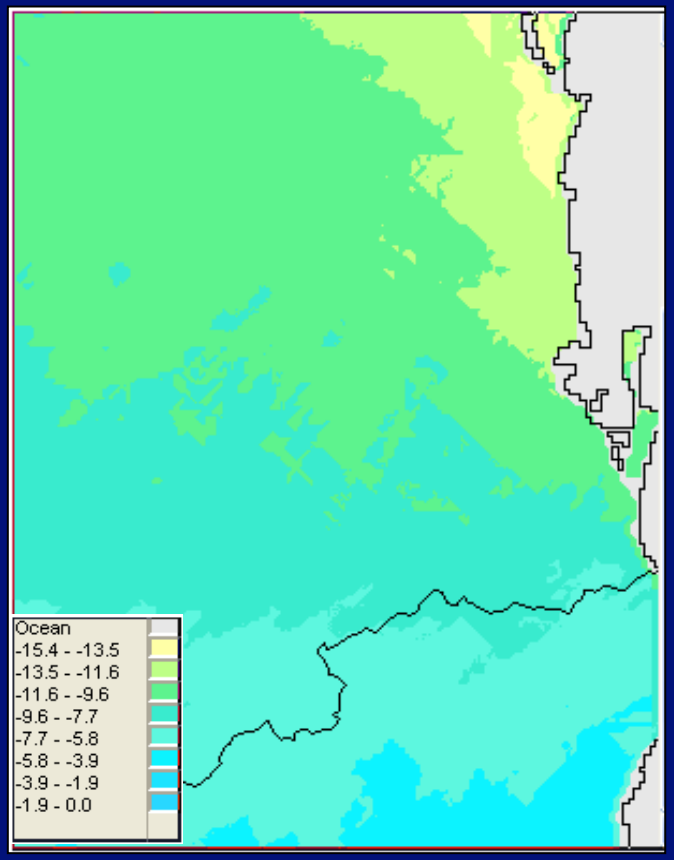


Initial model run
Variable: Daily rainfall
Station: Brisbane Aero
Time-series: 1961-1990

Subsequent runs
Variable: Daily rainfall
Station: 41 sites
Time-series: 1961-1990

Scenario of climate change

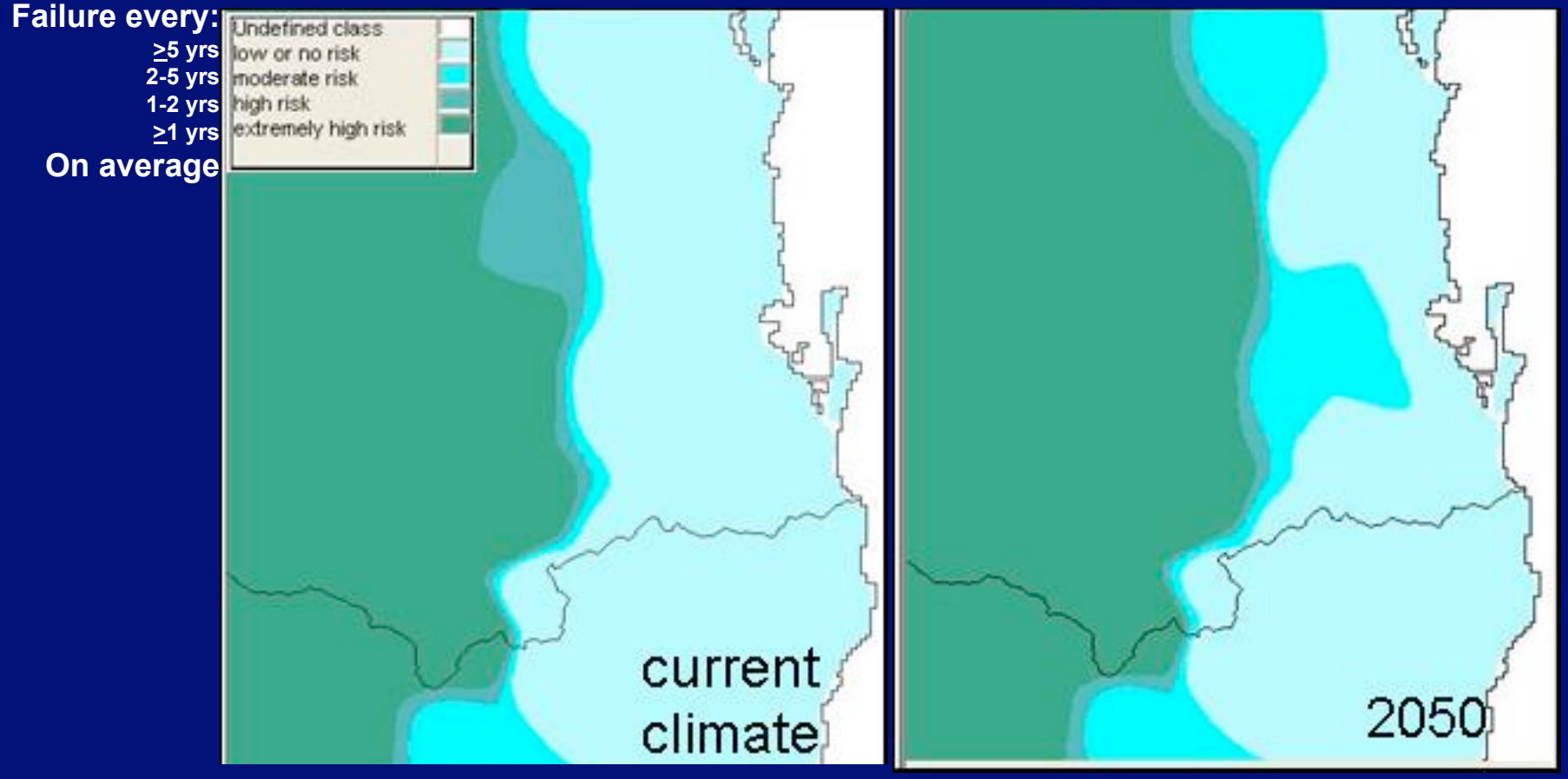
Percent change in April-September rainfall in 2050



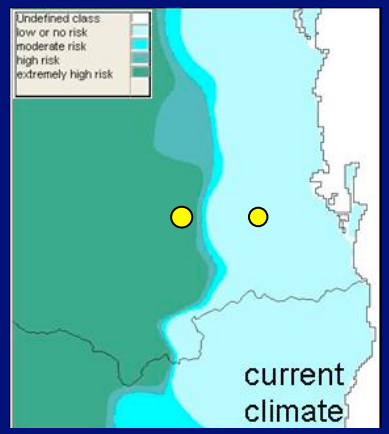
Based on an eight-GCM ensemble, AIB emission scenario and mid-range climate sensitivity

Spatial patterns of risk:

Frequency of empty tanks



Assessing adaptation options to reduce the risks



SITE: University of Queensland, Gatton		
Without Adaptation	Number of tank failures in 30 years	Longest period of empty tank (days)
Without climate change	**1**	**39**
With climate change	**13**	**44**
With Adaptation and Climate Change	Adjustment to attain low risk (≤ once in 5 yrs on average)	
Additional tank storage	+ 15,000 litres	
Reduce daily consumption	- 2%	
Add catchment area	+ 10m^2	
Raise critical threshold level	+ 8 days	

SITE: Aughamore		
Without Adaptation	Number of tank failures in 30 years	Longest period of empty tank (days)
Without climate change	**36**	**38**
With climate change	**52**	**41**
With Adaptation and Climate Change	Adjustment to attain low risk (≤ once in 5 yrs on average)	
Additional tank storage	+ 340,000 litres	
Reduce daily consumption	- 16%	
Add catchment area	+ 73m^2	
Raise critical threshold level	+ 21 days	

CONCLUSIONS

- Research need: closing the gap between high-level climate science and on-the-ground adaptation
- In particular, there is a lack of user-friendly and user-accessible models and tools for bridging the gap
- Adaptation options to reduce the risks from climate variability and change can be assessed through simulation using integrated model systems like SimCLIM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