Incorporating climate change projections into water supply-demand planning in Victoria, Australia

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State Government Victoria
Department of Sustainability and Environment

What's the issue?

- Water managers are required to manage water supplies in light of changes in water availability and demand over a number of decades.
- This time frame means that the consequences of global warming on regional climate must be taken into account.
- As a result, water managers are turning to climate scientists and hydrologists to deliver projections of future water availability.

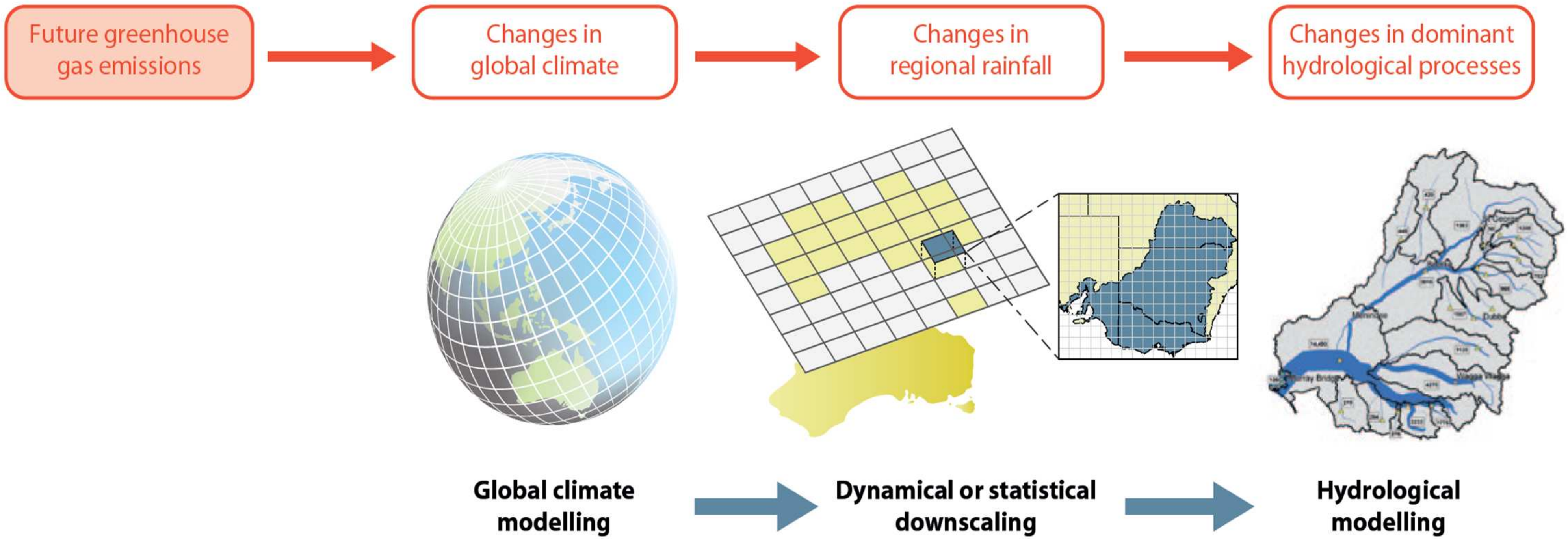
• However, doubts have been raised about the reliability of regional projections of future climate, as well as whether such studies are delivering the information required by water managers.

- This presentation discusses outputs from the *South Eastern Australian Climate Initiative (SEACI)* which aims to address these issues.

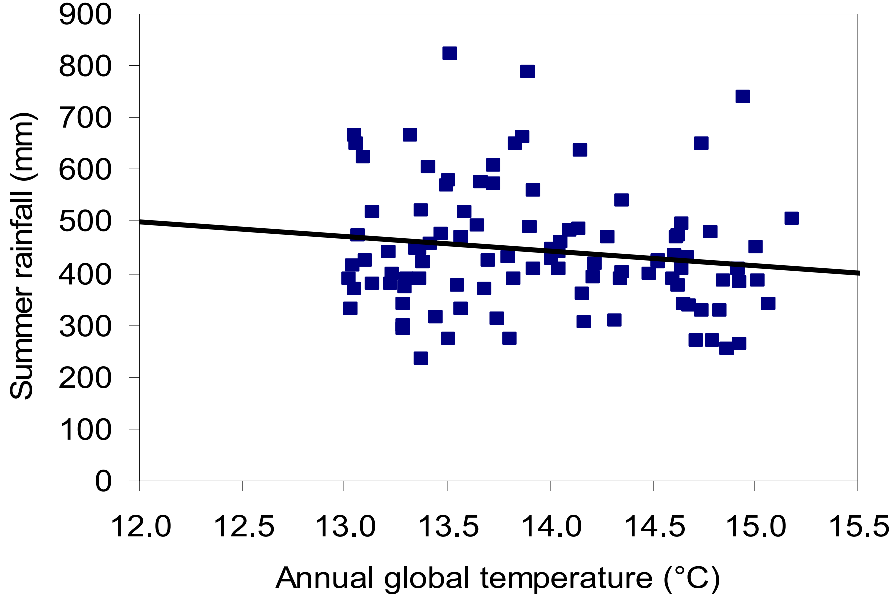
South Eastern Australian Climate Initiative

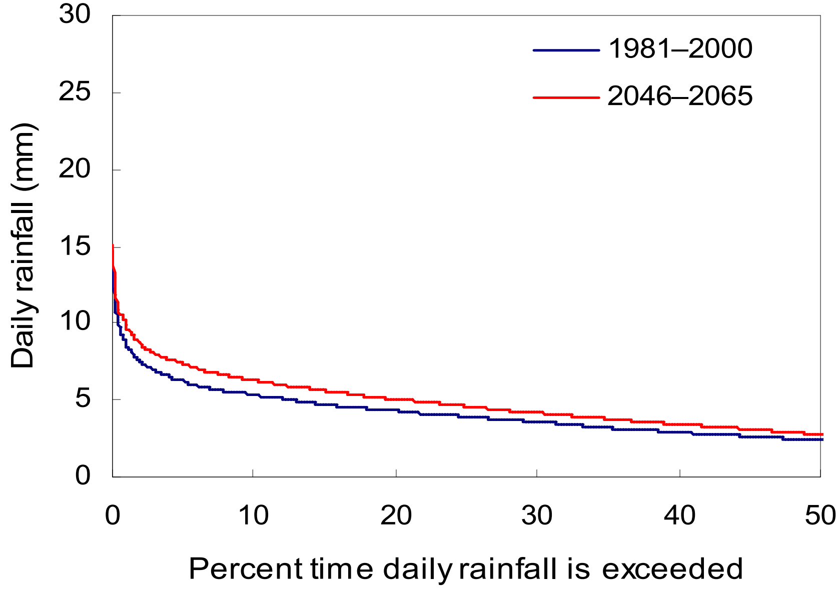
- Theme 1: Understanding Drivers
  - Better understand the factors that drive changes in both climate and streamflow within south-eastern Australia.
  - Determine how much of the recent “Millennium Drought” across south-eastern Australia was attributable to climate change.
- Theme 2: Hydroclimate Projections
  - Develop improved long-term hydroclimate projections for south-eastern Australia out to 2100.
- Theme 3: Seasonal Forecasts
  - Improve seasonal climate and hydrologic predictions at lead times ranging from several weeks to nine months.

Modelling climate impact on water availability



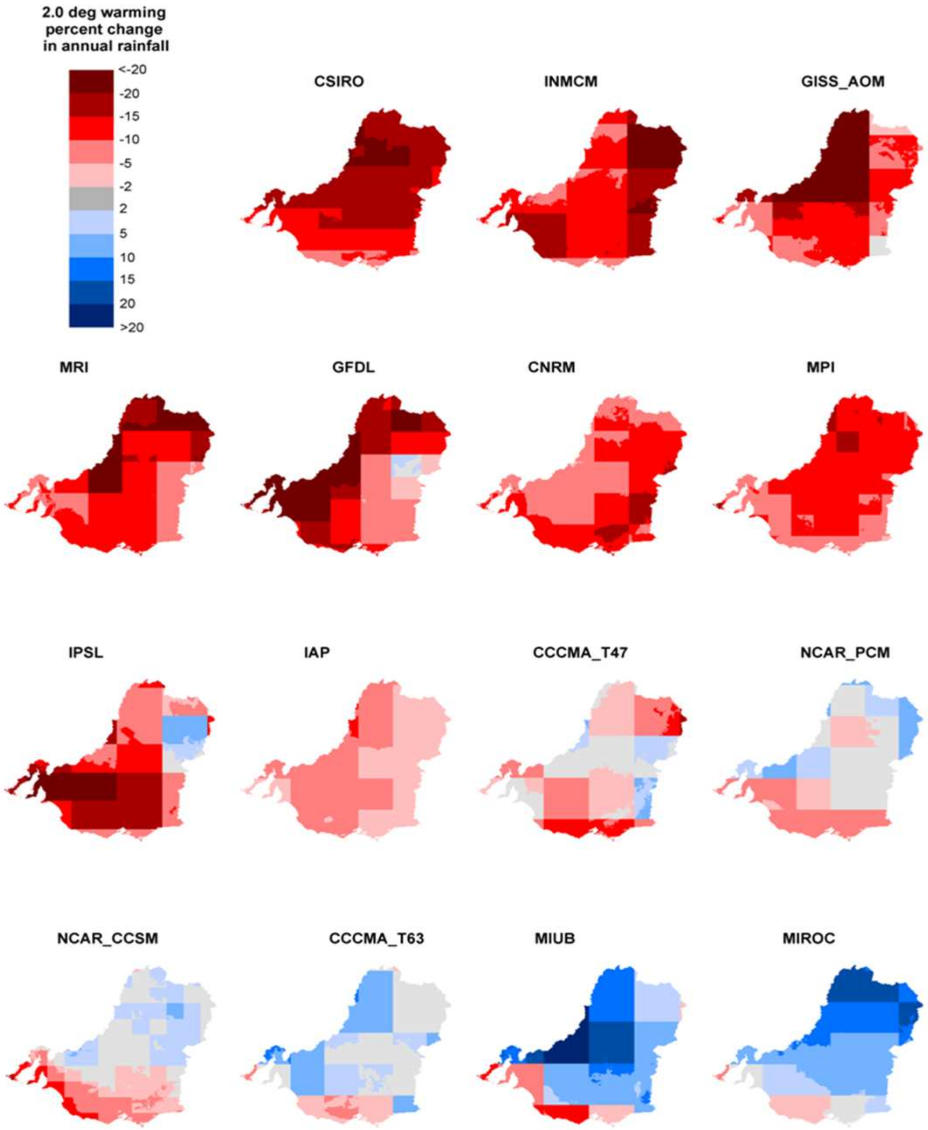
Methods

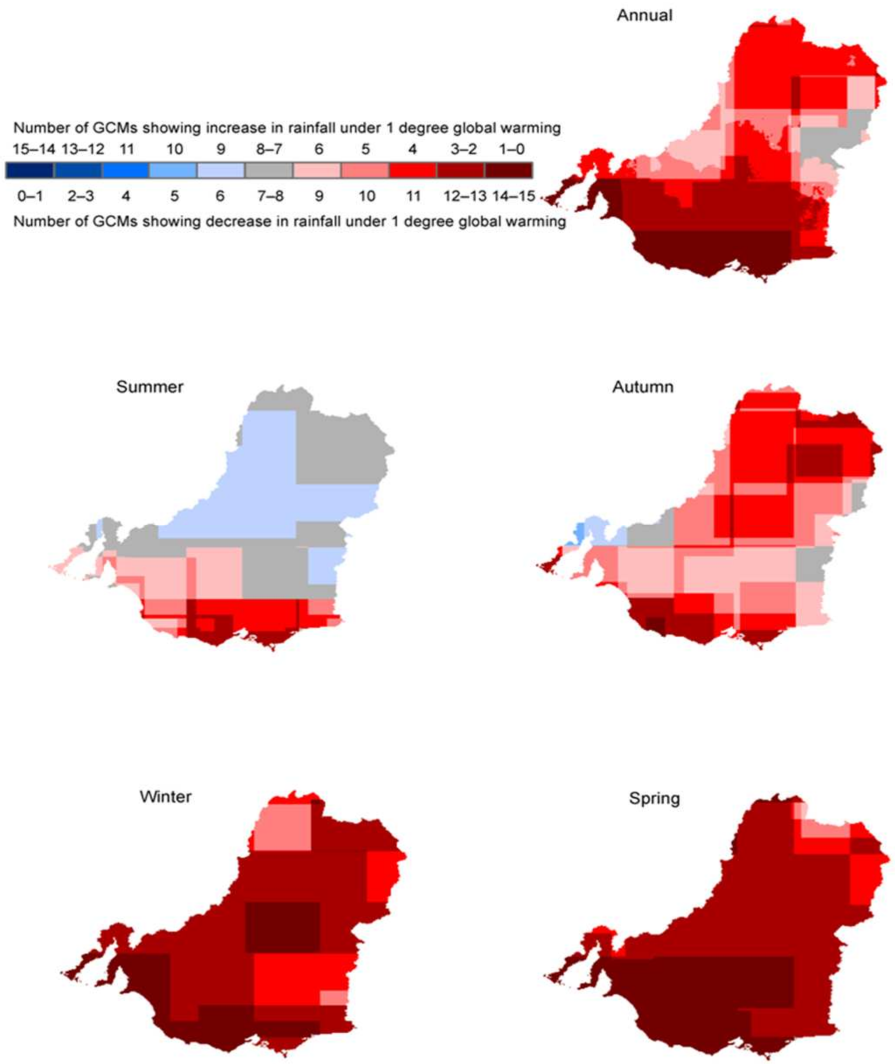




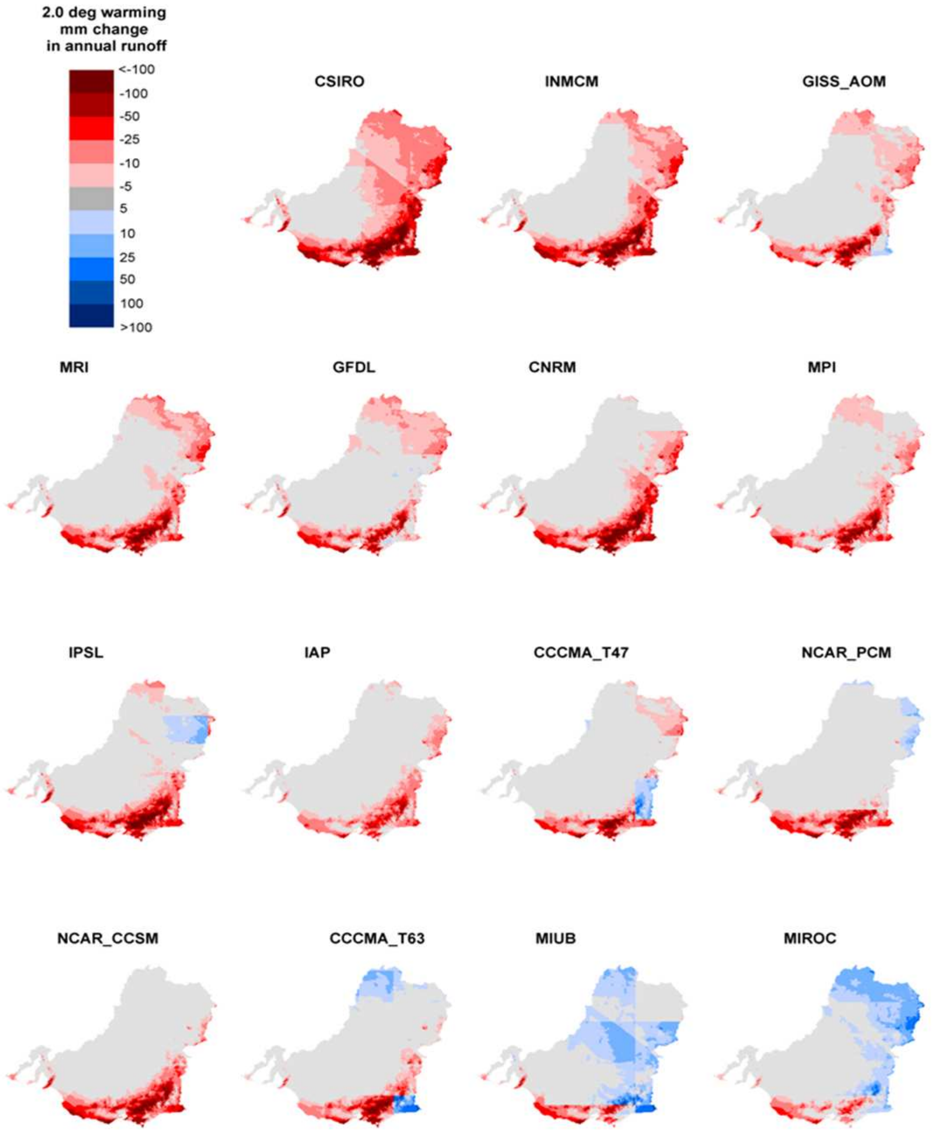
- Calculate change in seasonal rainfall per degree global warming for 15 of the 23 GCMs in IPCC AR4
- Scale daily rainfall amounts differently depending on their size

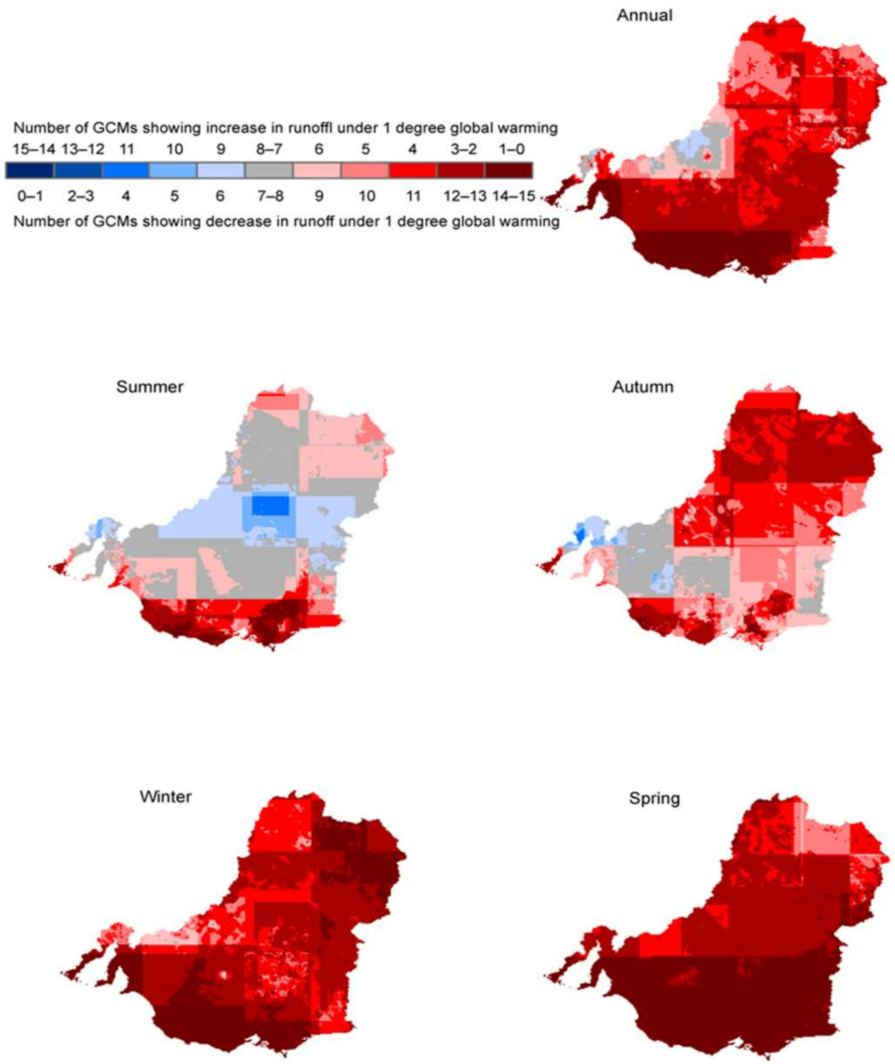
Projected changes in rainfall and runoff



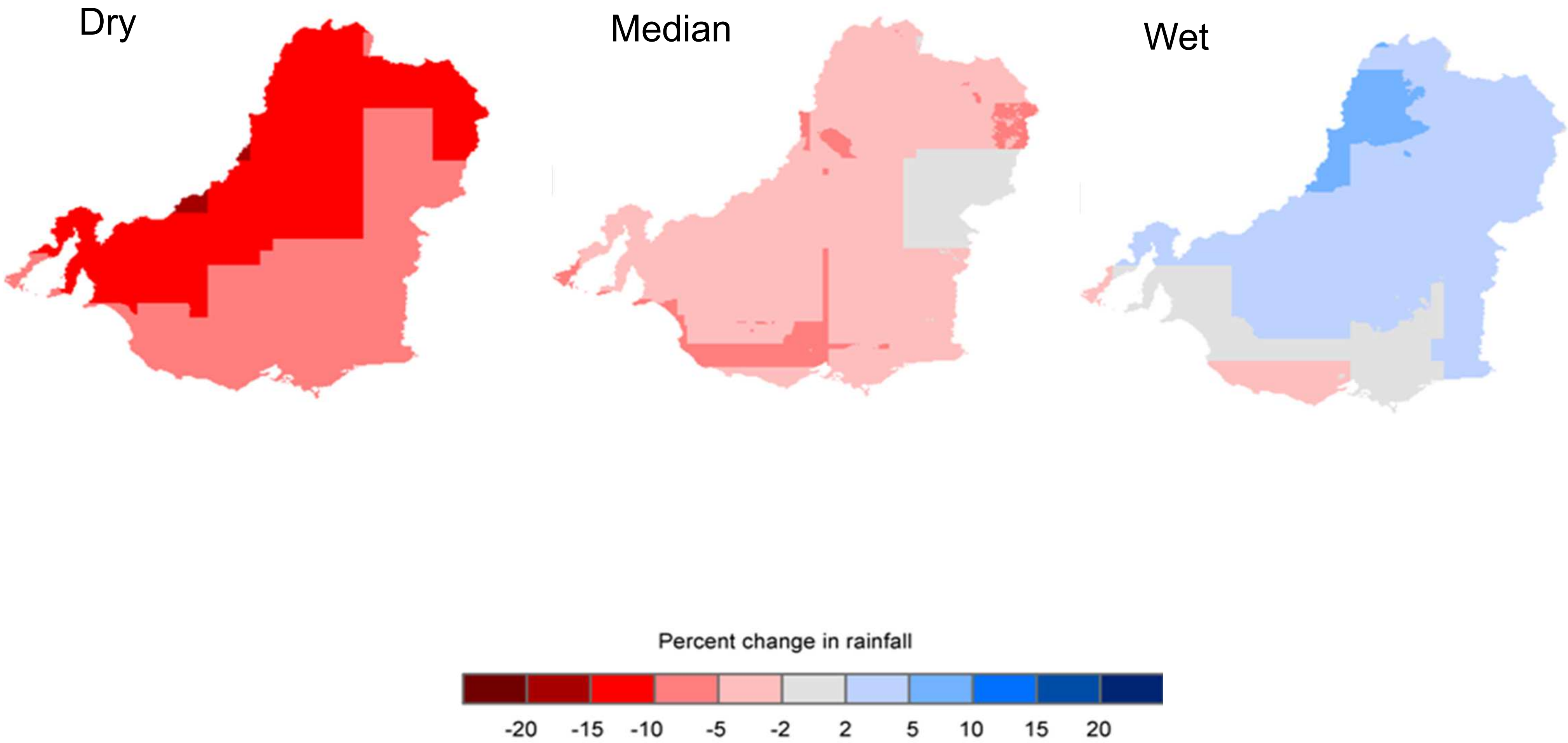


Projected changes in rainfall and runoff

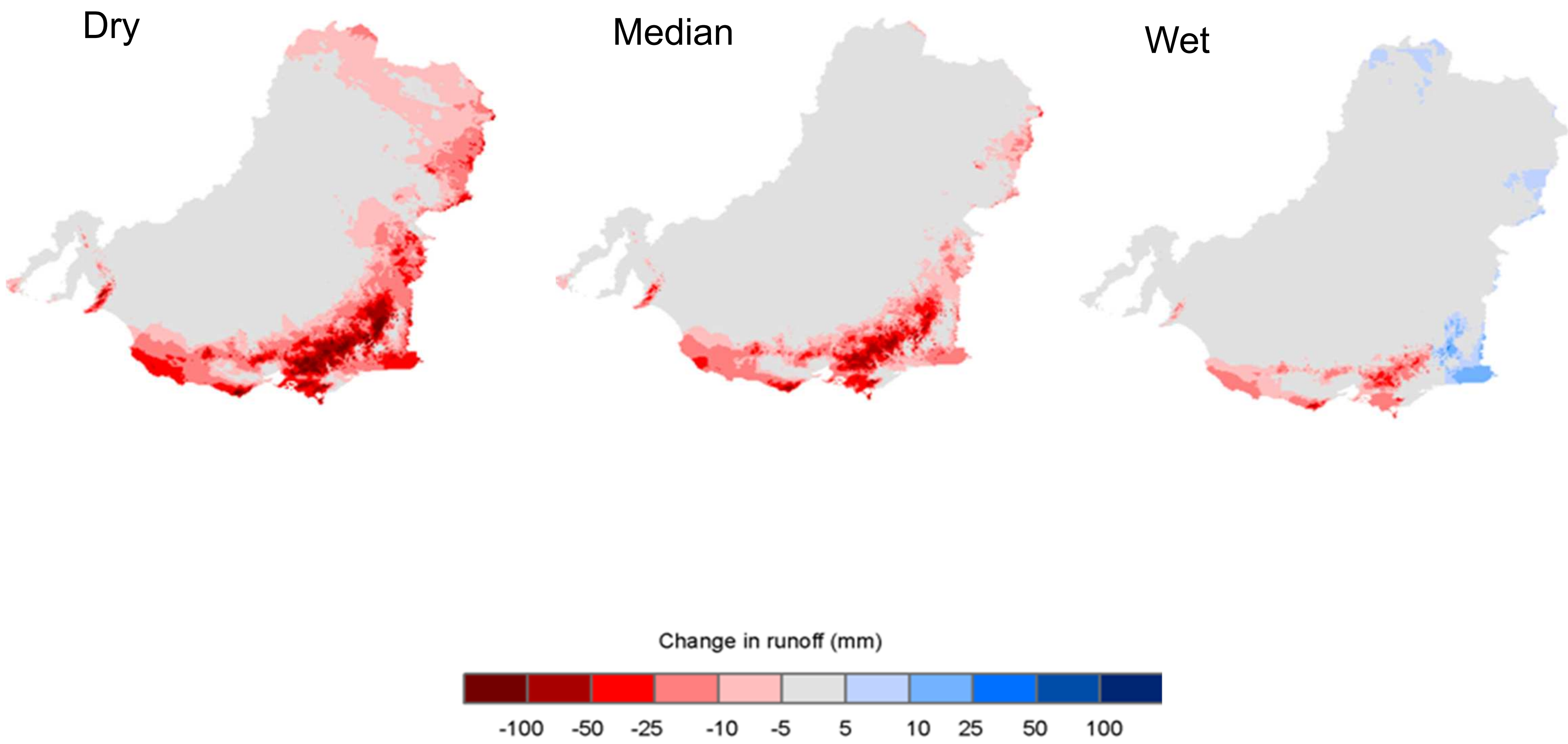




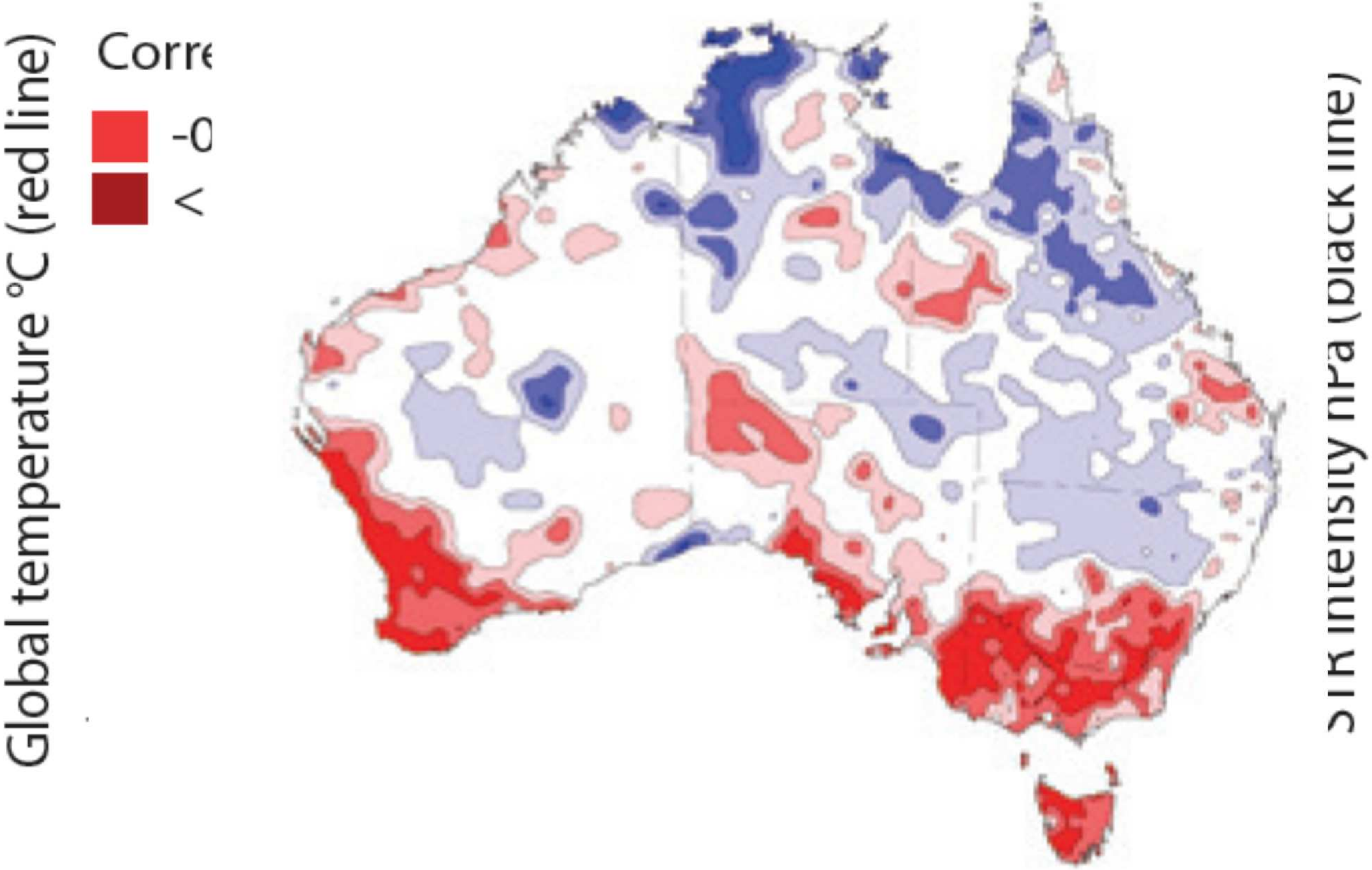
Rainfall and runoff change scenarios



Rainfall and runoff change scenarios



Not just relying on GCM projections!



How best to present this information?

Year	2030			2060		
Catchment	**Wet**	**Median**	**Dry**	**Wet**	**Median**	**Dry**
1. Upper Murray	0%	-9%	-19%	0%	-16%	-36%
2. Ovens	-2%	-13%	-20%	-4%	-23%	-38%
3. Goulburn-Broken	-3%	-12%	-21%	-5%	-21%	-38%
4. Murray Riverina	10%	-13%	-27%	21%	-22%	-45%
5. Campaspe	-7%	-16%	-27%	-13%	-28%	-48%
6. Loddon-Avoca	-7%	-17%	-29%	-12%	-29%	-48%
7. Wimmera	-7%	-19%	-31%	-12%	-32%	-52%
8. Lower Murray	10%	-7%	-23%	23%	-9%	-38%
9. Millicent Coast	-10%	-18%	-34%	-19%	-33%	-58%
10. Glenelg River	-10%	-18%	-31%	-19%	-34%	-54%
11. Portland Coast	-12%	-16%	-22%	-19%	-29%	-40%
12. Hopkins River	-11%	-22%	-30%	-19%	-36%	-50%
13. Otway Coast	-7%	-15%	-18%	-14%	-27%	-34%
14. Lake Corangamite	-10%	-20%	-24%	-16%	-33%	-42%
15. Barwon River	-8%	-18%	-21%	-14%	-31%	-37%
16. Moorabool River	-7%	-16%	-25%	-12%	-28%	-41%
17. Werribee River	-6%	-16%	-25%	-11%	-27%	-44%
18. Maribyrnong River	-7%	-16%	-27%	-12%	-29%	-47%
19. Yarra River	-5%	-13%	-22%	-8%	-24%	-38%
20. Bunyip River	-5%	-14%	-20%	-8%	-26%	-36%
21. South Gippsland	-6%	-12%	-22%	-9%	-23%	-40%
22. Latrobe River	-6%	-14%	-21%	-8%	-26%	-37%
23. Thomson River	-3%	-13%	-20%	-5%	-23%	-35%
24. Mitchell River	-2%	-11%	-20%	-3%	-20%	-36%
25. Tambo River	2%	-11%	-24%	5%	-20%	-42%
26. Snowy River	11%	-9%	-22%	21%	-18%	-40%
27. East Gippsland	11%	-8%	-19%	22%	-15%	-35%

Summary

- There are multiple lines of evidence indicating that future conditions across the southern half of south-eastern Australia are likely to be warmer and drier.
- Water resource planning in Victoria is taking into account the potential decline in water availability, in the context of other drivers and issues.
- Water planning and management decisions will always need to consider the balance between risk and rewards, taking into account the uncertainties implicit in climate change projections.

Conclusions

1. Water managers need to articulate clearly what they *need* from the science, understanding that they may not be able to obtain what they *want*.

2. Climate scientists and hydrologists need to state what it is they can provide along with the associated uncertainties, and not *oversell* what it is they can provide.

3. Water managers and scientists need to engage in a dialog early in a project in order to determine how to best tailor outputs in the light of both (1) and (2).

Questions?

Post, D. A. and Moran, R. J. 2011. Practical application of climate-induced projected changes in water availability to underpin the water planning process in Victoria, Australia. *MODSIM 2011 International Congress on Modelling and Simulation*, 12-16 December 2011, Perth, Australia, 3629-3635.
http://www.mssanz.org.au/modsim2011/I6/post.pdf



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