

The impact of climate change on crop irrigation requirements across the Murray-Darling Basin

#	Question	Answer
1	Are the 4 agriculture types chosen for interviews the largest water users in the Murray Darling. If not, why were they selected?	Quick response without looking up the numbers, almonds, rice, cotton and grapes are important crops and significant portion of water use. Pasture would be the obvious omission.
2	Can this work inform high-level system-level assumptions/scenarios about irrigation change due to climate change?	live answered
3	What are the implications of climate-driven irrigation shifts in the MDB for national food security, rural economies, and Australia's water governance regime?	live answered
4	Which CSIRO interpolated wind speed dataset was that?	live answered
5	Which CSIRO interpolated wind speed dataset was that?	McVicar, T. R. (2011). Near-Surface Wind Speed v10. https://doi.org/10.25919/5c5106acbc02 McVicar, T. R., Van Niel, T. G., Li, L. T., Roderick, M. L., Rayner, D. P., Ricciardulli, L., & Donohue, R. J. (2008). Wind speed climatology and trends for Australia, 1975–2006: Capturing the stilling phenomenon and comparison with near surface reanalysis output. Geophysical Research Letters, 35(20). https://doi.org/10.1029/2008GL035627
6	Would you consider running your analyses using NARCLIM2.0's SSP2-4.5 projections now that they're available (and closer to the Earth's current emissions trajectory)?	live answered
7	ARR 4.2 describe the change of rainfall pattern. How it could impact ET of MDB?	Changes to rainfall would be expected to change the humidity and the radiation which are major drivers of ETo. Rainfall is an important contributor to water supply in the northern part of the basin and Andrew is covering the projections of rainfall.
8	Use of Short grass Eto estimation underestimates the actual Eto in the MDB - primarily because all the areas considered are subject to significant advection. The FAO tall crop ETo method has been shown to be a more accurate estimate. Also, as ambient temperatures increase advection will become greater.	live answered
9	Use of Short grass Eto estimation underestimates the actual Eto in the MDB - primarily because all the areas considered are subject to significant advection. The FAO tall crop ETo method has been shown to be a more accurate estimate. Also, as ambient temperatures increase advection will become greater.	Hi wayne, We have adjusted the crop coefficients for local climate and crop height, which is the standard method using grass Kc's. We didn't use generic Kc values.
10	Can you explain why the confidence is higher for the later time period? seems counter-intuitive	live answered
11	Any comment on whether actual ET will increase by as much as ETo? I.e. due to enhanced CO2 for example?	Good point about carbon dioxide, also could change with quicker crop development due to warming. Another area of uncertainty in actual ET is the use of irrigation to manage heatwaves.
12	Do you plan to upscale the results with a land use dataset to calculate the total pressure on water markets within the basin?	live answered
13	While rainfall may not be much affected in growing districts, could climate change affect monsoon patterns and hence river flows and water availability downstream?	Yes, an important point. MDB irrigators depend on rainfall (and runoff) in upstream catchments.
14	While rainfall may not be much affected in growing districts, could climate change affect monsoon patterns and hence river flows and water availability downstream?	I'd argue that we are likely to see decreases in rainfall across most of the MDB, particularly in the south, so assuming effective rainfall does not change is underestimating likely increases in crop water use.

15	Here's an interesting article published recently, regarding drying in the Northern Territory. https://news.griffith.edu.au/2025/08/05/findings-show-nts-vital-water-source-is-drying-and-it-can-be-seen-from-space/	Noting the authors used two time slices 2003-2011 and 2011-2022, which had very different rainfall amounts. 2003-2011 was a very wet period and 2011-2022 was much drier so it is no surprise that the satellite imagery indicated a gain in water in the former and a decrease in the latter?
16	Here's an interesting article published recently, regarding drying in the Northern Territory. https://news.griffith.edu.au/2025/08/05/findings-show-nts-vital-water-source-is-drying-and-it-can-be-seen-from-space/	The steep decline in groundwater I think is the key issue, groundwater takes longer to replenish. Additional demands are likely and causing the reduction, combined with reduced rainfall (replenishment).
17	Does the interview average irrigation rate include an allowance for on-farm losses?	The question we asked was the ML/ha applied. So this wouldn't include losses between farm gate and field, but would include 'losses' within the field.
18	Can you please explain what the Management capacity is?	Ability of managers to achieve the same level of production even with an increase in irrigated demand.
19	Can you please explain what the Management capacity is?	The conclusion on management capacity may have misinterpreted this with management variability (eg irrigation layout). The water market and high transfer water prices have pushed all Management types to their limits. In this case, extra demand on permanent plantings should lead to less water on the market for annual cropping, and therefore net reductions in annual crop areas. Agree?
20	What does the research indicate for future of land use in the MDB? Will the existing key crops remain viable in the scenarios or may alternate crops be required?	live answered
21	Seems like an underestimation of impacts where spikes in temperature over longer durations, and rainfall contributing to higher runoff.	higher short term runoff but much slower watertable seepage
22	Your closing message is that irrigators have enough adaptive capacity to withstand changes to water demand out to 2070 under ssp370. I understand that you haven't looked at water supply, but I feel like you should be careful saying what you're saying without a caveat that water supply is expected to be constrained and that irrigators capacity to buy extra water may be limited if it is simply not available in the system, and that irrigated orchards are at risk. As has already happened in recent years (e.g. 2019).	Yes, water supply and cost is a major concern. This small study was on demand.
23	The short grass ETo is used because MOST of the calibrations have been from humid northern hemisphere observations!!	See my response for your earlier comment. We didn't use the generic Kc's but local climate and plant height modified values.
24	How did you get Kc for the presented crops?	We sourced the Kc from the published literature. As Paul mentioned there are numerous sets of Kc for the crops