

THE WEEKEND AUSTRALIAN

IPCC models wrong again on impact of farm dams

Fresh research a reminder that the climate science is never settled

The findings of an Australian government-backed study that expose a disconnect between what Intergovernmental Panel on Climate Change models predict and the results of real-world observations of greenhouse gas emissions from farm irrigation dams is further proof that science is never settled. A reassessment of the greenhouse gas emissions from on-farm dams is no small matter.

Irrigated agriculture in Australia produces \$18.9bn worth of food, fibre and dairy products each year. If the findings of the new Australian research are confirmed it will prompt a recalculation of the nation's agriculture sector greenhouse gas emissions in a positive way. Most of all it will give farmers greater control over how they can manage their land and activists less of an excuse to fight against water storage for irrigation in a nation that does not do enough to capture a precious resource in times of plenty to guard against the inevitable periods of drought.

With a renewable energy transition under way, agriculture is firmly in the sights of policymakers and activists for its climate change impact. Agriculture contributes about 13 per cent of Australia's greenhouse gas emissions each year. The agriculture sector is under attack internationally, with calls to reduce cattle herds and subsidise the production of plant-based proteins over meat. In Australia there is a big emphasis on reducing the rates of land clearing but also taking back water from irrigators to give to the environment along the Murray-Darling river system.

Properly understanding the broader climate impacts of water storage is vital, as is knowing the limits to global models. The accuracy of models generally has been a long-term point of dispute in climate change discussions. These concerns were mentioned by the IPCC in its AR6 report. Ahead of the report's release, leading climate scientists conceded that models used to estimate how much the world will warm with rising levels of carbon dioxide in the atmosphere were running too hot. In an article published in *Science* magazine, Gavin Schmidt, director of NASA's Goddard Institute for Space Studies, said it was an issue climate scientists "can't avoid". Many climate scientists argue that even if some models overstate warming they are still useful when taken as a group.

In this case it is more of an instance in which one size model does not fit all. The IPCC models used to calculate the carbon footprint of farm dams are based mostly on livestock dams in areas with other climates. The new research shows the models are not fit for purpose in Australia's irrigation food bowl. It proves once again that the need to check model predictions against physical observations should always be considered basic scientific practice. In this instance, the Australian research provides a wake-up call for agriculture that it must check facts for itself. The study commissioned by the AgriFutures carbon program surveyed 38 on-farm irrigation dams across horticulture and broadacre cropping in the NSW Murrumbidgee Valley, to baseline their carbon footprint and provide an insight into areas that should be targeted for emission management. The comprehensive sampling campaign involved measurements of greenhouse gases, water quality, sediment carbon storage in farm dams, farm dam classification and an aerial drone survey for mapping biomass carbon storage. The survey captured the diversity of farming production within the Riverina region, with sites located in cotton, rice, wine grapes, citrus, cereals, canola and some mixed cropping with livestock.

The study demonstrated that methane and nitrous oxide emission estimates were five and four times lower than the global emission factors reported in the IPCC for constructed freshwater ponds and agricultural surface waters. It was the first detailed assessment of the carbon footprint of irrigation dams in Australia. Previous studies had looked at the emissions of dams on livestock farms that emit higher levels of greenhouse gases, particularly methane, because of the higher presence of nutrients in the water and the effect this has on algal growth and decaying organic matter.

The study identified factors that might enhance irrigation farm dam carbon storage and reduce greenhouse gas emissions, which means growers can incorporate new strategies to offset other on-farm emissions. So, rather than being a carbon dioxide burden for Australian farmers, it is possible that one day irrigation farm dams could be included in carbon markets for their potential to store carbon, providing more water to grow crops and another source of revenue for those on the land.