



# Climate change reduces salinity risk

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Salinity continues to expand in Western Australian agricultural areas, but not at the rate previously predicted. Recent analysis of groundwater trends has shown that very dry conditions since 1975 are moderating the spread of salinity.

FFI CRC researcher, Dr Richard George (DAFWA), presented revised salinity figures at the 2nd International Salinity Forum held during April 2008. The figures were drawn from an analysis of more than 1300 surveillance bores in about 100 catchments across 19 million hectares in the Western Australian agricultural region.

Dr George said that in the northern agricultural region of WA, water levels in most monitoring bores are now falling, reversing a trend established to 2000.

"We are seeing the cumulative impact of a short, intense dry period when rainfall fell by more than 40 per cent below the pre-2000 level," Dr George said (see Figures 1 and 2).

Falls in groundwater levels (or reduced rates of rise) signal reduced risk of salinity, not a reduction in salinity as such.

## key points

- The drying climate is moderating the spread of salinity in some agricultural regions
- Planting perennials is still crucial for a range of management outcomes
- Monitoring is critical to enable future trends to be detected and allow appropriate focus of investment.

"In contrast to the northern agricultural area, in terms of salinity extent and risk, it's basically business as usual for the rest of WA's wheatbelt," Dr George said.

"In much of the central region, the south-west and western south coast, especially areas cleared during the past 50 years, water tables are either rising or stable, despite lower than average rainfall since 2000.

"In the eastern wheatbelt, some valleys show downward trends, especially where water tables are close to the surface. The magnitude of the trends vary, but usually the water table has only reduced by less than a metre."

It takes significant time for the effects of clearing to show up as salinity – in high rainfall areas this can be in the vicinity of 20-50 years; in low rainfall areas it can be centuries. The groundwater system needs time to reach an equilibrium before it stabilises.

In catchments that are still actively filling with groundwater and not yet near equilibrium, reduced rainfall appeared to have little or no impact on rising trends.

"As these catchments approach equilibrium and discharge (saline) areas grow, we expect climate impacts to become the dominant controller of trends."

### Rethinking the approach

This recently reported change in groundwater trends may have significant implications in assessing the likely future extent of salinity, and effects of management activities.

"Observed reductions in water tables under trees, drains or similar plantings of perennials must be corrected for climate.

Failure to do this may exaggerate the expected benefits of management on the salinity problem," Dr George said.

Far from signalling that trees and other perennials should not be planted, Dr George said the new figures could help refine where they should be planted.

"During the past, the paradigm has been that recharge management was good and more recharge control was better. However, our results suggest that in some areas we don't need them for that purpose now – climate change is doing the job for us.

"In the rest of the wheatbelt and on the south coast – especially broad valleys where the water table is less than five metres and rising – the focus on recharge management is still appropriate.

"In other words, instead of all options everywhere, it's now regionally specific."

### Role of perennials

While the need to develop recharge systems may have diminished in dry areas, the need for perennials remains, but for other reasons. For example, in drought-affected areas there is a heightened priority to prevent erosion.

In others, large areas of perennials may dry out surface and groundwater resources.

"As the land becomes drier, water deficiency becomes more of an issue and being aware of the effects of perennials on water resources grows in importance.

"These results also suggest that we now need to re-assess the many natural and man-made assets that have previously been thought to be at risk," Dr George said.

"For example, specified biodiversity assets in some wheatbelt valleys may now no longer be at risk, or the risk may have been postponed."

### Looking further afield

Dr George said the situation is similar right across Australia, although the drying started earlier in the east. Southern New South Wales, Victoria and parts of South Australia are analogous to the northern Western Australian agricultural region.

Since 1996, or earlier, the number of bores in those areas with rising trends has diminished, to the point where few remain with rising trends. By contrast, much of southern WA still has rising trends depending on where you are in the landscape.

A new drilling program is underway in WA to fill in the gaps, especially in areas at risk, where there is no data, or where reduced recharge may lead to water shortages.

"We now have 1-2 Mha salt affected, depending on how you do the figures," Dr George said.

He points out it is the area at risk that has diminished, or in other words, the time to realise that risk has lengthened. If the climatic trend observed since 2000 continues, the data suggests that, in the north eastern agricultural areas, the risk of salinity may further diminish, or no longer exist.

Future climates may have other impacts on salinity. For example, salinisation could also be significantly affected by an increase in flood frequency, which is a possible scenario under climate change.

Dr George said despite lower than average rainfall over much of the Western Australian wheatbelt since 2000, episodic floods in 1999-2000, 2001 and 2006 caused a rapid expansion of salinity.

### Monitoring is the key

The research results have highlighted the importance of monitoring.

"It's cheaper and easier to monitor and to be discerning of investments," Dr George said. "These figures capitalise on more than 10 years of consistent monitoring – it gives us the ability to notice changes.

"Given the trends, some areas' and regions' risks, and hence investment priorities, have changed, and may change again. We need to know when. It's cheaper to monitor than to invest in actions that aren't effective. For farmers, early warning enables them time to act." 🌱

### More information

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FIGURE 1. Change in annual rainfall (%) from pre-1976 to 1976-1999

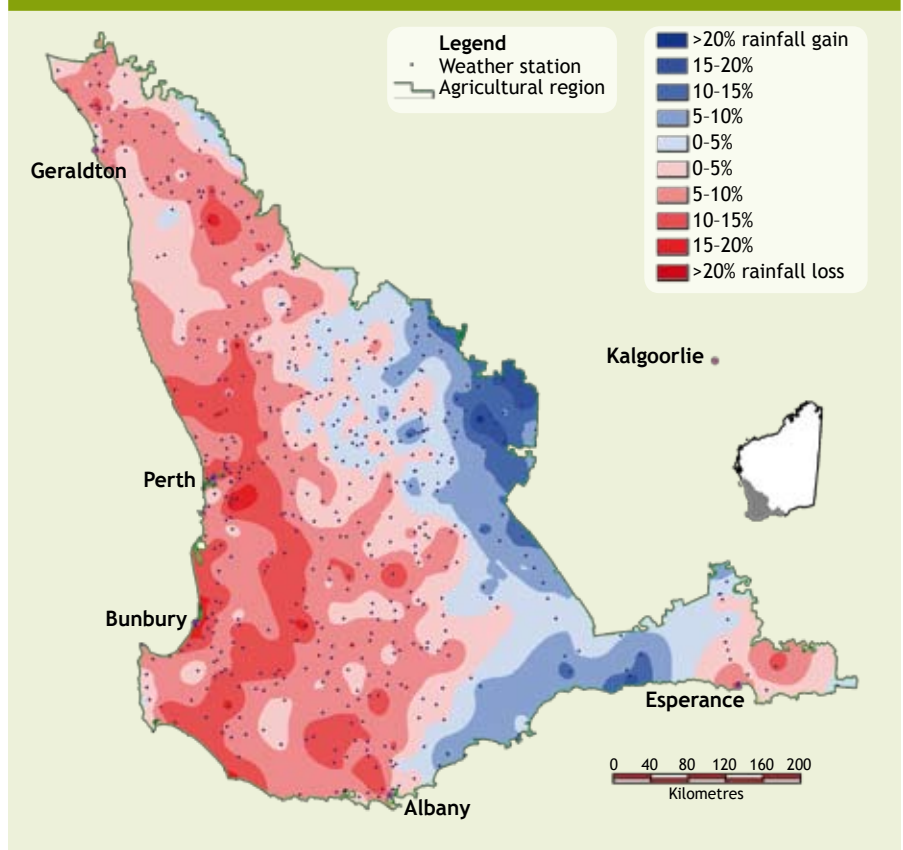


FIGURE 2. Change in annual rainfall (%) from 1976-1999 to 2000-2007

