

Climate change and Australian groundwater

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The predictions of climate change in Australia are for a continuation of current trends, namely an increase in temperature (high confidence), an increase in extreme rainfall intensity (medium confidence), and a reduction of rainfall and runoff, with increased drought periods in southern Australia (medium confidence). Given the high climate variability in Australia and the winter-dominance of runoff and recharge in southern Australia, these climate trends will have a major impact on water resources in southern and eastern Australia. Groundwater is a major component of drought contingency measures for most areas. Far south-western Australia is already experiencing declining surface and groundwater resources, as a result of climate shifts, and are developing alternative sources of water. Such an obvious trend is expected to be masked for other southern areas by climate variability and only becoming evident during extended drought periods. This talk discusses the current knowledge with respect to risk assessment and management of climate change impacts on Australian groundwater.

Any reduction of rainfall is likely to mean amplified reductions in diffuse groundwater recharge. This would imply a reduction in extraction limits and the ability of groundwater to be used in droughts in southern Australia. However, the salinity of many groundwater systems means that most groundwater is not suitable for irrigation and systems are not stressed. Rather than a broad area of groundwater systems in southern Australia being vulnerable to climate change, the spatial pattern of vulnerable systems is more variable. This allows vulnerable systems to be treated in more detail, accounting appropriately for changed water demand, changes in surface water, availability of alternative sources, maintenance of water supply to groundwater-dependent ecosystems, changes in recharge due to changing land use, and changes in localized recharge (mainly from floods and river regulation). The challenges in predicting future impacts on groundwater are the uncertainties in climate forecasts, hydrogeological properties and inputs and irrigator behavior and demand.

Adaptive management used for stressed groundwater systems currently include water level response management, groundwater trading, groundwater triggers for localized areas and carry-over rules. There has been variable success in the application of these adaptive measures due to the lack of response once thresholds are triggered, the immaturity of groundwater trade and compliance and metering issues. However, by international standards, groundwater systems are managed sustainably and there will be pressure to resolve such issues.

Alternative sources of water, should they be required, often involve groundwater. Examples include deeper groundwater systems, managed aquifer recharge, desalination, demand management and changing recharge through changed land use. The severe conditions and increasing demand in the Perth region of south-western Australia means that water planning for climate change is most advanced there.

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