Management of irrigation-induced groundwater salinity - a novel approach
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The Tintinara-Coonaplyn Prescribed Wells Area (PWA) is located in the upper South East of South Australia approximately 200 km southeast of Adelaide. Managers of the groundwater resources in the PWA are dealing with a number of complex issues, including groundwater salinisation, groundwater level declines due to below average rainfall and over-allocation in some management areas. Groundwater extracted from a shallow Quaternary limestone aquifer is applied to Lucerne (alfalfa) by flood and pivot irrigation, resulting in increasing groundwater salinity due to the recycling of the irrigation drainage water. Over 50% of irrigation wells sampled show an increase due to this process. In 2003, the first Water Allocation Plan (WAP) for the Tintinara-Coonaplyn Prescribed Wells Area was adopted to provide a management framework for the groundwater resources. Problems arising from over-extraction from aquifers are managed by reducing such extractions to sustainable levels. However, the degradation due to recycling is caused by application of water to the crop rather than the physical removal of water from the aquifer, and hence a new approach was required. A buffer zone method was instigated to prevent concentrations of irrigation (and salt accessions) in any given area and allow dispersion and dilution of the salt added to the aquifer by rainfall recharge. This method will also prevent excessive drawdowns in water levels caused by pumping which may prevent lateral groundwater flow through the aquifer which removes salt from the region. Theoretical crop irrigation requirements (TCR) were used to determine the volumetric allocations for irrigators. An area limitation was also imposed so the area irrigated could not be increased. Metered data subsequently showed that actual extractions were only about 45% of the TCR for the same area of irrigated crop. The over-allocation issue was successfully addressed by recalculating the TCRs using more recent information, setting a reduction target for allocations and involving the 40 irrigators in determining the methodology for meeting that reduction target.