OVERVIEW

WHAT ARE WE ASKING?

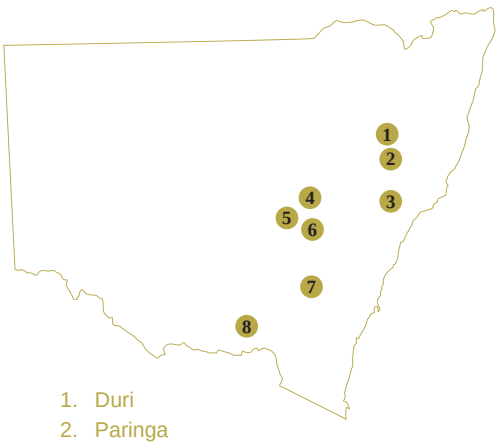
Where does the salt and water come from, and where is it going?

How do we account for water at a paddock scale and how does this relate to the catchment water balance?

How can land be managed to improve productivity and reduce salt and sediment movement?

Which land use is the most appropriate in terms of using the available water?

Are water and salinity models predicting results that are consistent with catchment observations?



1. Duri
2. Paringa
3. Hunter
4. Sloanes Creek
5. Baldry
6. Gumble
7. Boorowa
8. Livingstone Creek

WHY THE KEY SITES PROJECT?

Management of water has emerged as one of the key environmental and economic issues for NSW. This includes the obvious lack of water during droughts, and paradoxically, the 'excess' water which leads to salinity. Salinity is a major symptom of inappropriate water management and has become a social, economic and environmental issue. It has a direct negative effect on the environment and infrastructure and imposes costs on the community for land rehabilitation and from reduced production.

The cost of addressing salinity for both individual landholders and public funding is substantial. It is essential that new land use options not only fix the salinity problem but do so cost effectively and don't compromise catchment water needs.

Numerous methods have been developed to help predict water and salt movement under different land uses designed to address salinity. These include computer models and conceptual frameworks. However, most of these methods are conceptual and have not been validated against field data at a farm scale. The Key Sites project seeks to 'ground truth' the validity of these methods in eight first-order subcatchments which feature a range of common land uses from annual cropping through to forestry.

As a result of this research, Catchment Management Authorities, researchers, farm advisers and extension officers will have validated models to more confidently predict the salinity and stream flow impact of land use recommendations they make. The community will also have more confidence that public funds invested in salinity management are being spent wisely.

The Key Sites project is funded by the National Action Plan for Salinity and Water Quality. It is a State-wide project and combines the hydrology research of three different State agencies that commenced under the NSW Salinity Strategy and is linked to a range of national hydrology research projects.

WHAT IS KEY SITES?

KEY SITES is generating new knowledge in priority dryland salinity areas of NSW.

It is a research project with eight sites across upland fractured rock aquifers in local and intermediate groundwater flow systems.

These areas have been identified as being major salinity sources for NSW.

Each site addresses a different and locally relevant gap in salinity knowledge. The sites are not simply eight replicates of a single methodology.

The impact of all major land uses is being investigated, including: *annual cropping, improved annual and perennial pasture, native pasture, native forestry, planted forestry and rehabilitated open cut coal mine.*

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HOW IS THE RESEARCH BEING CARRIED OUT?

All sites have instrumentation to measure key components of the water balance and salt mobilisation. The sites are monitored using consistent techniques at the point, paddock and first-order subcatchment scale. The comprehensive data is managed to facilitate its use for the validation of salinity models.

Every month the project records one million data points that contribute to the most comprehensive farm scale hydrology database available in NSW. Data collection includes evapotranspiration, stream flow, salt, groundwater, soil moisture and rainfall.

The project accounts for water at the same level as farmers manage their properties, that is, at the paddock and farm scale. The Water balance is a measure of all water entering or leaving a paddock and first-order subcatchment. Water balances are generated on an annual basis for each land use at each site.

Research is conducted on the basis of individual site needs, plus specific research themes. These themes include groundwater, stream flow, tree and agricultural water use and modeling.

The Key Sites project is a collaborative project with CMAs and other NAP projects, including the DPI managed Beyond Salinity Solutions.

WHERE TO FROM HERE?

The knowledge being generated by the Key Sites project is enhancing the capacity of CMAs, researchers, farm advisors and agricultural extension services to deliver meaningful advice to farmers about land management systems that will best manage water and salinity on a paddock and subcatchment scale.

CMAs will be able to determine which models are delivering reliable results and make land use recommendations that are consistent with credible scientific data. This will ensure that new land use recommendations meet catchment objectives and public funds are invested effectively.

RESULTS SNAPSHOT

Key Sites research is delivering results that challenge conventional thinking on effective management of water and salt in NSW.

One of the sites (Boorowa) has quantified that conversion from annual crops to perennial pasture combined with tree plantings has reduced recharge to below measurable levels and halved the amount of salt and water leaving the catchment.

Conversely, research on other sites has delivered findings which are quite different, emphasizing that salinity investment must be based on a thorough understanding of local hydrology and geology. For example:

- Introducing perennials to cleared land will not necessarily address salinity (at the Gumble site)
- Salt movement to streams can be significantly reduced by managing soil health and groundcover – both of which will improve farm productivity (Duri and Gumble)
- Removal of annual crops from some alluvial flats would allow encroachment of saline aquifers onto prime agricultural land (Livingstone Creek)
- Salinity can decrease down the slope, which is contrary to established hillslope hydrology (Baldry)
- Landscape complexity at a local scale can control the rate of salt mobilisation (all sites)
- Solutions must be tailored to local conditions (all sites)

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Collaborators include local farmers who allow researchers to access their land, Catchment Management Authorities, University of Technology, Sydney; University of NSW; University of Sydney; University of Melbourne; CRC for Plant-based Management of Dryland Salinity; CRC eWater; and local Landcare groups.

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