

# Rural towns seek salinity solution in desalination

Salinity is costing Australia millions of dollars each year in lost crops and damaged infrastructure. But innovative research and co-operation are paving the way to better management of rural water resources. This article details an exciting project to desalinate saline water in the Western Australian wheatbelt.

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for CSIRO

Australian farmers concerned about the sustainability of their properties and the rural towns that support them will find plenty to interest them in an exciting collaborative project on salinity remediation.

The project involves, among others, CSIRO and the Department of Agriculture, Western Australia.

In the Western Australian wheatbelt town of Katanning, less than 300 kilometres south-east of Perth, the Department of Agriculture, WA, estimates salinity damage will cost almost \$7 million over the next 30 years.

Roads in and out of Katanning are also affected, requiring \$245,000 each year for salt damage repairs.

Waterlogging is so bad homes must be jacked up for protection from salty water percolating up through the soil.

Salinity becomes an issue when the watertable is at less than two metres; already the watertable across more than 60 per cent of Katanning is less than 1.5m below the surface.

According to the National Resource Monitor audit, about six million hectares of WA's wheatbelt are at risk from salinity. Thirty-eight WA towns are affected significantly by salinity, with Katanning leading the way to an estimated wheatbelt damage bill of \$55 million during the next 30 years.



CSIRO Land and Water

*A new research partnership aims to tackle two of the most pressing problems facing rural communities — salinity and freshwater supply. Saline groundwater will be extracted and desalinated to supply fresh water to existing agricultural industries and attract new commercial ventures. The project will produce a model for integrated water management and industry development suitable for adoption in towns across Australia.*

The real cost of salinity goes far beyond economic impacts to include significant and long-term social and environmental effects.

For example, salt damage can drive residents from rural towns and prevent the growth of new industry, affecting the future development and viability of rural towns.

### Managing the future

Rather than becoming resigned to rising salinity and groundwater levels, Katanning Shire Council has teamed up with the WA Department of Agriculture and CSIRO to develop a water management plan to reverse

and eventually eliminate waterlogging and salinity in Katanning. The collaboration examined the specific nature and extent of the salinity problem and worked with the Katanning community to tailor some solutions.

### Desalination plant

Although water and salinity management in Katanning will take an integrated approach, the keystone in the campaign is a pilot desalination plant, designed to pump salty water from the ground and pass it through a filter membrane to produce fresh water.

The trial plant will produce 200 kilolitres of fresh water a day, reducing the town's dependence on water piped from the coast and easing restrictions that currently see the cost of fresh water nearly double over summer, reaching \$2.64/kL for commercial users

Ongoing use of the plant will remove salty water from the ground, lowering the watertable and reducing salinity, while producing enough fresh water to support town and industry (subject to health and quality requirements), with ample left over for new projects or sale.

Preliminary calculations suggest water produced by the desalination plant would cost \$1.25/kL, based on operation and maintenance costs of about \$90,000 a year. The government, possibly through the Regional Partnership Program, is expected to step in to cover set-up costs of

### At a glance

- Water for a Healthy Country Flagship and its partners will tackle two of the most pressing problems facing rural communities — salinity and freshwater supply.
- To reduce townsite salinity, researchers will build a pilot desalination plant in the Western Australian town of Katanning.
- The plant will remove salty water from the ground, lowering the watertable and reducing salinity, while producing enough fresh water to support the town and local industries.



*Townsite salinity destroys infrastructure such as roads, public buildings and bridges as well as causing houses to crumble and contaminating water supplies. While often overlooked, townsite salinity is just as serious as farmland salinity.*

about \$500,000. When these capital costs are factored in, desalinated water will cost about \$2.21/kL over a 20-year plant lifespan.

### Water saving

Currently Katanning's WA Meat Marketing Co-operative abattoir, the town's largest employer and consumer of water, uses about 322,000 kilolitres of water each year, more than one-third of the town's average total water consumption. The desalination plant could reduce the abattoir's water bill considerably.

Katanning residents have indicated they would like the extra water saved to improve town amenities and for town beautification measures such as parks, gardens and public swimming pools. While the remaining desalinated water could be sold, for example to the Water Corporation, it would cost more to produce than would be recaptured from the purchase price.

Desalination is still expensive to be used as a competitive means for producing fresh water but the research suggests the Katanning desalination plant will be successful since it integrates water management with salinity control and the development and support of new industries thanks to improved water supply and desalination by-products.

The desalination by-products include salts and minerals separated from the saline water, which can be used in the manufacture of cattle licks and flame retardants. The exact nature of these by-products depends on local conditions but they could include gypsum and Epsom salts, as well as gourmet table salts.

### Putting theory into practice

The challenge now for Katanning lies not in the technology behind the desalination plant but in finding the best way to implement the plans. While the science underpinning the plant already has been



Historically, country towns were built to support agricultural communities and included facilities for transporting produce to major ports and cities via rail. Because the rail system was constructed in the lower sections of the landscape, the towns also tended to be located in hollows or lower slopes. This location has been a prime reason for the development of salinity in lower lying towns while towns in the upper landscape do not have significant problems.

trials, the plant itself will be the first of its kind. Logistical questions such as how to manage the plant and its by-products and how to handle reticulation and water flow now must be answered.

The Katanning desalination project is also supported by the State Water Strategy, the Water Corporation, Wheatbelt Enterprise Technologies and the Shire of Katanning.

CSIRO scientist, Dr Olga Barron, has led the CSIRO contribution of the project since 2003 and said the parties involved have developed a positive rapport that has helped smooth progress of the project. Dr Barron is confident this rapport, along with continued community support, will see the project through to construction and beyond.

### Rural towns — liquid assets

With water restrictions tightening across Australia, desalination plants such as that planned for Katanning could well become more common, as one of a few options to manage water resources.

Fifteen other towns with a high salinity risk have been identified by the WA Salinity Investment Framework: Merredin, Pingelly, Wongan Hills, Lake Grace, Brookton, Wagin, Cranbrook, Dowerin, Dumbleyung, Nyabing, York, Woodanilling, Perenjori, Moora, Morawa and Tambellup. These towns are the focus of the large-scale Rural Towns — Liquid Assets project.

This larger project is a three-year project coming to the end of its first year. Rural Towns — Liquid Assets has a budget of about \$6 million and combines the resources and know-how of the Department of Agriculture, CSIRO's Water for Healthy Country Flagship, 15 local Shires, and the National Action Plan for Salinity and Water Quality, as well as the Cooperative Research Centre for Landscape Environments and Mineral Exploration, the WA Chemistry Centre and the University of

Western Australia. The project aims to develop a water management plan for each of the 15 towns, monitoring and evaluating groundwater and salinity conditions and combining these data with information on the demand and supply of water resources in each town.

The towns were selected to represent different catchment areas, distances from Perth and climate conditions, population sizes and water demands. This variety has provided the opportunity to explore many scenarios and to assess the ways in which different factors affect water management schemes.

The specific needs of each town will be assessed using the combined knowledge of shires, residents and local industry alongside the efforts of economists, social and biophysical scientists, providing strategies to take account of broader community needs.

Water management plans will be established to meet each town's requirements, optimising the treatment, use and re-use of rainwater, groundwater, storm water and the scheme water.

Four pilot towns, one from each of the Regional Catchment Councils in the agricultural area, will be selected for the partial implementation of integrated water management schemes.

At the end of the three years, the project will have identified possible approaches to new water supplies and recycling schemes to reduce dependence on scheme water and to improve quality of life in rural towns by reducing salt damage and improving the freshwater supply.

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Without rapid intervention about three million hectares across WA's agricultural area will be affected by salinity by 2010. It is estimated up to 40–60 towns in Western Australia will eventually experience increased flooding and decay of buildings, roads, bridges and other infrastructure.

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