

## DOWN TO EARTH

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# Managing the Burdekin aquifer

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**B**urdekin canegrowers have always realised the importance of maintaining the health of the aquifer — this was evident when the North and South Burdekin Water Boards were set up in the 1960s to manage the groundwater systems. So growers have joined a major new initiative to address current water management practices and their potential impacts on long term sustainability of the Burdekin Delta aquifer.

The first crops of sugarcane were grown on the Burdekin Delta's rich, alluvial soils back in 1883. The early canegrowers could not have envisaged that nearly 120 years later the Delta would support around 35,000 hectares of irrigated cane and other crops (Figure 1).

### DELTA IS UNIQUE

The Burdekin Delta is unique because:

- It overlies shallow major groundwater supplies and relies heavily on these supplies for irrigation water;
- It is situated close to environmentally

sensitive wetlands, waterways, estuaries, and the Great Barrier Reef; and,

- Water pricing and water management practices have evolved in response to local needs.

Until the 1960s, growers relied exclusively on the major groundwater systems that underlie the Burdekin Delta for irrigation. But a series of dry years in the middle of the decade put unprecedented pressures on the groundwater. The low water levels raised fears that salt water might intrude into the aquifer potentially rendering some or all of its water unusable for irrigation.

### WATER BOARDS REPLENISH AQUIFER

With this in mind, the Delta's canegrowers took the step of setting up the North and South Burdekin Water Boards (NBWB and SBWB). The boards have a charter that requires them to manage replenishment of groundwaters of an open aquifer system under constant threat of seawater intrusion. They also promote

a policy of continual review and improvement — this has led to the water boards initiating and being involved in several research projects within the Burdekin Delta in recent years.

Currently the boards use a number of strategies to manage groundwater replenishment, including the use of sand dams in the Burdekin River, a series of distribution channels and natural waterways, and large recharge pits.

Farm water practices such as 'recycling', 'water spreading' — and more recently direct pumping from recharge channels to farms in outlying parts of the aquifer — have evolved to play an integral role in the management of the groundwater systems (Figure 2).

### Water recycling

'Recycling' refers to the practice where irrigation water not used by the plants (excess irrigation) cycles through the soil back to the groundwater. It is felt that this

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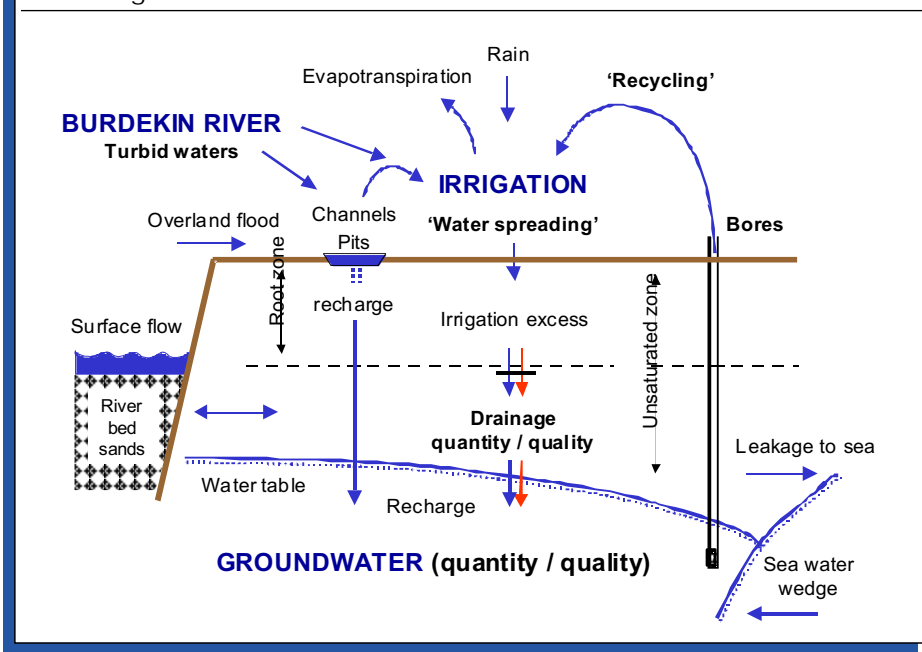


Farmers and scientists working together to improve water management in the Burdekin.

FIGURE 1: Map of the Burdekin Delta



**FIGURE 2:** Diagram showing the most important factors in the Burdekin Delta irrigation area



#### ◁ 11...MANAGING THE AQUIFER

helps with the recharge and maintenance of groundwater levels.

#### Water spreading

'Water spreading' refers to when water too turbid for recharge through the recharge pits (because it blocks the pits making them ineffective) is made available across the scheme as surface water for farm irrigation. This helps spread the silt load across the farmland and, while keeping the silt out of the recharge pits, is thought to benefit the soils and assist the replenishment process.

#### MORE KNOWLEDGE NEEDED

But there isn't enough knowledge of how the current scheme and farm activities affect groundwater quality and quantity and other offsite impacts. We need to know whether current practices and use (or increased use) of the groundwater are sustainable in the long term.

We also need to know how current and improved irrigation efficiencies affect 'recycling' and 'water spreading', and if there are any subsequent interactions with nutrient, salt and chemical loading of the groundwaters. These issues are perhaps the most critical from a sustainability point of view.

Addressing these issues will need a thorough understanding of the impacts of policies on practical and economic water management at the scheme and farm level. We will also need to know how irrigation waters are stored and transported

through the unsaturated zone — the soil layer from the surface to the top of the watertable. This is essential because the fate of nutrients, salts and chemicals and their impacts on the groundwater systems is linked to soil type and water movement through the unsaturated zone.

#### BURDEKIN INITIATIVE

But no one group or organisation can tackle all these issues. This has led to the Burdekin Initiative being set up. It includes many organisations who have an interest in sustaining the aquifer or potential downstream effects of irrigated agriculture (see footnote for details).



We need to know whether current or increased use of the aquifer is sustainable.

The first Burdekin Initiative coordination meeting was held recently and brought a large number of the groups involved in the initiative together to 'fine-tune' the coordination and collaboration to encourage maximum return from effort invested.

Groundwater modelling is the core activity

Groundwater modelling will be used to see how certain practices affect the aquifer in the long term. After the model has been validated to ensure that it is accurate, it will be used to test how various water management practices may impact on groundwater levels in the aquifer. The baseline case will be a 50 year future simulation period (2000 to 2050).

The groundwater model is the core around which the various Burdekin Initiative activities are being organised. These also include:

- Metering of a sample of groundwater pumps;
- Soil mapping;
- Soil characterisation;
- Measuring on-farm recharge rates and quality;
- Analysis and improvement of on-farm management practices; and,
- Economics of a range of alternate irrigation and water management practices.

Although the initiative is focussed initially in the Delta, in time efforts will expand to include the whole Burdekin irrigation system.

The research aims to investigate links between groundwater quantity and quality and current management practices at the farm and irrigation scheme level. A better understanding of these links and (if needed) improved management practices, will have long term economic and environmental benefits to Burdekin Delta farmers, the wider community and other irrigation areas around Australia — especially those who use groundwater supplies for their irrigation.

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Along with individual farmers, organisations involved in this effort include the North and South Burdekin Water Boards, CSIRO, BSES, Department of Natural Resources, James Cook University, Australian Centre for Tropical Freshwater Research, Australian Institute of Marine Science, Canegrowers, CRC Sugar, Burdekin Landcare, National Program for Irrigation Research and Development and the Rural Water Use Efficiency Initiative. ■