THE WATER AND SALT BALANCES
OF THE
BURDEKIN RIVER IRRIGATION AREA

Importance for strategic planning and institutional arrangements for the entire lower Burdekin.
Issues

Two issues to be managed:

• Rising groundwater levels

• Salt concentrations in groundwater
Points to remember

Sustainable management of the groundwater of the lower Burdekin will be achieved through a mix of four mechanisms

- Deep drainage to remove saline groundwater
- Pumping of groundwater for irrigation
- Improved irrigation practices to reduce leakage beneath root zone
- Reduced channel leakage

Strategic planning, policy and pricing will need to be converged to get the right mix
Starting point

- Project began in May 2007
- First stage Document of Discovery
  - talking to stakeholders
  - reviewing the science
  - bringing together a snapshot
- Key findings
  - a lot of science but no big picture
  - stakeholders working in different directions
  - issues important for whole lower Burdekin
How to move forward

• All stakeholders need to undertake a strategic planning process together to map out way forward

• Before this process can start people needed to have a feel for the problem
  - how big is it?
  - what is contributing to it?
  - what else do we need to know?

• With these things broadly quantified the next step of the process can begin
Contributors - irrigation

It is much easier to add water to the groundwater system than drain it to the sea.

Leakage to groundwater 48 – 455 mm/year

Discharge to sea 2 – 20 mm/year
Contributors – irrigation

- Drainage beneath Woodland is ~2 to 20 mm/yr
- Drainage beneath irrigation is ~50 to 500 mm/yr
- Drainage to sea ~2 to 20 mm/yr
- 0.4 to 4.0 Gl/yr
- 1.5 to 15 Gl/yr
- 23 to 225 Gl/yr
## Contributors - irrigation

<table>
<thead>
<tr>
<th>Leakage beneath irrigation (mm per year)</th>
<th>Leakage beneath woodland (mm per year)</th>
<th>Area of irrigation (ha)</th>
<th>Total area (ha)</th>
<th>Landscape drainage capacity (ML)</th>
<th>Water leaking to groundwater (ML)</th>
<th>Water in excess to landscape capacity (ML)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>12</td>
<td>45,000</td>
<td>63,000</td>
<td>15,000</td>
<td>47,000</td>
<td>32,000</td>
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<td>63,000</td>
<td>15,000</td>
<td>182,000</td>
<td>167,000</td>
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</table>
## Contributors - irrigation

<table>
<thead>
<tr>
<th>Leakage beneath irrigation (mm per year)</th>
<th>Water excess to landscape capacity (ML)</th>
<th>Estimated rise in watertable (mm per year)</th>
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</thead>
<tbody>
<tr>
<td>100</td>
<td>32,000</td>
<td>508</td>
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<tr>
<td>200</td>
<td>78,000</td>
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Groundwater rise
## Contribution channel leakage

<table>
<thead>
<tr>
<th>System</th>
<th>K=1 mm/day</th>
<th>K=5 mm/day</th>
<th>K=10 mm/day</th>
<th>K=100 mm/day</th>
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</thead>
<tbody>
<tr>
<td>Haughton</td>
<td>0.18</td>
<td>0.90</td>
<td>1.81</td>
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<td>Barratta</td>
<td>0.12</td>
<td>0.58</td>
<td>1.17</td>
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<td>Total (GL/yr)</td>
<td>0.30</td>
<td>1.48</td>
<td>2.98</td>
<td>29.79</td>
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</tbody>
</table>
Combined leakage

- However SunWater figures estimate is 67.6 GL/year
- This channel leakage input combined with the irrigation leakage means:
  - 160 GL/year entering the landscape
  - 15 GL/year can naturally drain
  - 145 GL/year addition to landscape
- This would give double the rise in observed groundwater levels – water is escaping from the system
- But where – what is the relationship and connections with the aquifers of Burdekin delta irrigation district?
Watertable rise
Sodic/Saline soils
Sodic/Saline soils

Sodic Soils

- Rain
- Irrigation
- Runoff
- Leaching
- Recharge to groundwater

Ameliorated Sodic Soils

- Rain
- Irrigation
- Runoff
- Leaching
- Intercept/drain
- Recharge to groundwater
Relationship of salt and groundwater

Diagram showing the relationship between water level (m), electrical conductivity (μS/cm), and rainfall (mm) over the years from 1972 to 2007.
What are the options?

- Drainage from landscape: 2 to 20 mm/yr
- Leakage beneath irrigation: 50 to 455 mm/yr
- Intercept pump drain: 48 - 435 mm/yr
- Re-use for irrigation if salinity suitable
- Dispose excess water and salt in accord with EPA specifications

Dispose excess water and salt in accord with EPA specifications.
Where to from here?

- All stakeholders feel they know the way forward
- Need to share that vision and agree
- Need to work together to develop knowledge to fill gaps in the picture
- Need to work together to develop a Strategic Plan for how to achieve the vision using the options available
- Plan must contain targets and actions which all stakeholders agree with
- All stakeholders must combine their efforts to deliver the Plan
Timelines

- This may take some time:
  - it took 20 years to make the mess
  - important to get the planning right
  - some old wounds that may take some time
- May need an interim set of criteria for any project undertaken before the Plan is complete
- Any projects must be able to show they are reducing recharge or removing water/salt
- Cost benefit assessment done to determine which projects deliver the best value for money
Any questions or suggestions?