Institutional Reform and Modernisation of Irrigation Systems in South Africa

By

Gerhard Backeberg and Felix Reinders
Pretoria

Outline of discussion

- Introductory remarks
- Policy instruments to change water use behaviour
- Water measurement for distribution and application
- Irrigation technologies for efficient water use
- Concluding observations

ICID 5th ARC
New Delhi, India
9-11 December 2009

SAIAE CDP Event
Pumulani Lodge, Pretoria
29 September 2010
1. Introduction

- Framework on Water for Growth and Development
  - Measurement of water use
  - Water use efficiency plans
  - Upgrading of irrigation systems

- Expansion of area under irrigation
  - Savings through water loss control
  - Improved irrigation efficiency
    e.g. application of drip irrigation

- Purpose of paper:
  - Explain available knowledge
  - Actions to accomplish water savings
2. Policy instruments to change water use behaviour

- Water institutional reform
  - National Water Resource Strategy of 2004

- Interventions for effective demand management
  - Implement water user charges
  - Enforce water use licenses
  - Promote self-regulation
  - Education and public awareness

- Incentives for efficient water use and water savings
  - Cost recovery for operating and upgrading of irrigation infrastructure
  - Regulated trade of water use licenses
Water conservation and demand management

- Framework for regulatory support in order to increase productivity of water use
  - Appropriate measures that reduce wastage of water
  - Progressive modernisation of water conveyance, distribution and application infrastructure, equipment and methods
  - Preventative maintenance programmes
  - Generation of sufficient irrigation information which is accessible to all stakeholders
  - Implementation of water audits from the water source to the end user

- Water user charges
  - Water resource management
  - Water resource development
    - Recover cost of planning, designing, constructing, operating and maintaining water supply infrastructure
3. Water measurement for distribution and application

- Trends in modernisation of irrigation technology

<table>
<thead>
<tr>
<th>Year</th>
<th>Area</th>
<th>Method of irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ha</td>
<td>Flood</td>
</tr>
<tr>
<td>1990</td>
<td>1,290,132</td>
<td>32.8%</td>
</tr>
<tr>
<td>2007</td>
<td>1,675,882</td>
<td>14.4% (23.3%)</td>
</tr>
</tbody>
</table>

- Technical efficiency standards

<table>
<thead>
<tr>
<th>Method</th>
<th>Current</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood</td>
<td>55 – 65%</td>
<td>86 – 98%</td>
</tr>
<tr>
<td>Sprinkler</td>
<td>70 – 85%</td>
<td>78 – 90%</td>
</tr>
<tr>
<td>Drip</td>
<td>85 – 95%</td>
<td>85 – 95%</td>
</tr>
</tbody>
</table>
Irrigation water measurement

- Technology for measuring is available
  - Correct installation
  - Regular maintenance
  - Accurate recording

- Managed implementation
  - A reason for measuring (the “trigger” of the management process)
  - Acceptance and support by the water users
  - Assessment of the current situation and planning the system
  - Choosing appropriate technologies
  - Correct installation by skilled technicians
  - Sound operation and maintenance practices
  - A system for data retrieval and management
  - Comprehensive financial planning
  - Procedures for handling disputes and tampering
Canal water loss control

- Water Administration System (WAS) designed as water management tool for irrigation schemes with main benefits:
  - Minimising of water distribution losses
  - Improved management of water distribution and usage per farmer
  - Management of date and time related flow data collected from electronic loggers or mechanical chart recorders
  - Availability of an extensive list of water reports on farm and scheme level
  - Increased productivity of scheme management personnel
  - Integrated accounting system that improves debit management

- Water use efficiency accounting report
  - Newly developed report module
  - Includes water orders, meter readings and water use
  - Records volume and % losses
4. **Irrigation technologies for efficient water use**

- Changing to more efficient drip irrigation requires:
  - Stable water supply
  - Higher capital and management inputs
  - Higher crop yields
  - Lower energy use
  - Regular maintenance

- Task of management:
  - Capital and operating budgets for irrigation technology
  - Crop enterprise budgets
  - Partial or whole-farm analyses
Investment and cost estimating procedures

- Comparison of drip with flood or sprinkler irrigation
- Consider range of technical, financial and economic variables
- Cost budgeting before decision and action
  - Long-term investment of preferred irrigation technology
  - Short-term operating costs for crop irrigation
- Guidelines applied by farmers or professional advisors
Performance of surface and sub-surface irrigation

- Field and laboratory tests of drip irrigation
- Emission uniformity declined over time for all dripper types
  - Decline in efficiency due to clogging
  - Correct emitter and filter selection
  - Correct installation and maintenance essential
  - Preventative measures e.g. root growth inhibitors
  - Regular water quality analysis
- Compile maintenance schedule for weekly, monthly and yearly implementation
- Technology transfer and training courses for designers and farmers
5. Conclusion

- Technologies, tools and procedures available for efficient irrigation water use
  - Water metering
  - Canal water distribution
  - Investment and cost analysis
  - High performance drip irrigation

- Improvements already under way with shift to drip irrigation

- Future priorities
  - Broad based water measurement
  - Refinement of policy instruments
  - Technology transfer and training
  - Improved management of water

- Successfully achieve water savings for expansion of irrigated area