Balancing Use and Protection of Water Resources: Democratizing Water Management in South Africa

Evan Dollar

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Balancing the Use and Protection of Water Resources: a contribution to democratizing Water Management in South Africa: the Water Resource Classification System (WRCS)

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9 April 2007

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Background to the WRCS


• Guidelines and procedures - maintaining a balance between protection and use

• Procedures applied in the ‘Classification Process’

• Outcome is a decision on the desired characteristics for each of the water resources within a catchment
Background to the WRCS cont…

• The Classification Process recommends a ‘Class’

• The Class defines objectives for every significant water resource – watercourse, surface water, estuary or aquifer

• Three classes - minimally used, moderately used and heavily used

• Class describes the desired condition of the resource and the extent to which it can be utilized
Context to the WRCS

• First democratic elections in South Africa in April 1994

• Repeal of the 1956 Water Act

• ’56 Act applied the riparian principle + Land Act meant only a select group of people had equitable access to the Nation’s water resources

• ’56 Act – no provision for sustainability or equity – reform was needed
Context to the WRCS cont…

- Water reform process aided by a global paradigm shift recognizing
  - sustainable development
  - concept of ‘ecosystem services’ - contribute to the earth’s life-support system and human welfare

- South African Constitution (1996) recognizes
  - historic redress – attain a level of equity to ensure social stability
  - sustainable development – difficult to quantify & therefore to legislate
Relevant provisions of the National Water Act of 1998

• Preamble of the NWA – water resource management a powerful tool for restructuring society:

‘the discriminatory laws and practices of the past [which] have prevented equal access to water, and to use water resources…redistribution of water [for the benefit of all]’

• NWA requires the federal regulatory agency to:

‘use, develop, conserve, manage and control water resources for the benefit of all South Africans’
Relevant provisions of the NWA …cont

• Chapter 3 provides for the measures to ensure ‘…the comprehensive protection of water resources’ – protection for use

• Section 12 of Chapter 3 makes provision for the WRCS

• Section 13 makes provision for the Classification Process - the outcome of which will be the setting of the Class, Reserve and Resource Quality Objectives (RQOs)
Relevant provisions of the NWA …cont

• The Class sets the boundaries for the volume, distribution and quality of the Reserve, and therefore informs the determination of allocable portion of a water resource for off-stream use (compulsory licensing)

• The Class affects both ecosystem health and the amount of economic activity that relies on water supply

• Class is also inherently political – past imbalances require redress
The process of developing the WRCS

• Process of developing the WRCS must be understood in the context of South Africa’s past and its aspirations for the future

• Legislation was written to reflect the desired (future) socio-political landscape

• Once ’98 Act promulgated – process of institutional and organizational change started to meet requirements of the Act
The process of developing the WRCS…cont

• Negotiations on the ‘terms of reference’ for the development of the WRCS
  • protection-based
  • institutional arrangements
  • trade-offs – socio-economic & ecological implications quantified
  • ‘tail or the dog’
  • perceptions - Environmental flows (‘Reserve’) for ‘fish & bugs’

• Solved by a joint position paper and agreement on 11 guiding principles
  • balance & trade-off for optimal use (scenarios)
  • sustainability
  • national interest & consistency
  • legally defensible & scientifically robust
* SA ‘Govt Gazette’ = US ‘Federal Register’
Project objectives

• Definitions of the classes to be gazetted

• Guidelines for the procedures to be followed to recommend a Class based on a ‘proof of concept’ catchment, the Olifants/Doring
Definitions of the classes to be gazetted

- Management Class (MC) is the Class the Minister wants to achieve – classification is classification of the water resource (NWA)
  - Watercourse (spring, natural channel, wetland, lake or dam)
  - Surface water
  - Estuary
  - Aquifer
  - Any other water resource deemed significant

- The MC is not the same as the ecological condition category (A to E)
  - A  Natural
  - B-C  Moderately used/impacted
  - C-D  Heavily used/impacted
  - E-F  Unacceptably degraded
Proposed MCs for regulation by government gazette

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>The configuration of water resources within a catchment results in an overall water resource condition that is <em>minimally altered</em> from its <em>pre-development condition</em></td>
</tr>
<tr>
<td>Class II</td>
<td>The configuration of water resources within a catchment results in an overall water resource condition that is <em>moderately altered</em> from its <em>pre-development condition</em></td>
</tr>
<tr>
<td>Class III</td>
<td>The configuration of water resources within a catchment results in an overall water resource condition that is <em>significantly altered</em> from its <em>pre-development condition</em></td>
</tr>
</tbody>
</table>
Project objectives

- Definitions of the classes to be gazetted

- Guidelines for the procedures to be followed to recommend a Class based on a ‘proof of concept’ catchment, the Olifants/Doring
WRCS procedure

• Begin with the end in mind
  • Information for the Minister to make a decision on the Class of a water resource
  • Part of the broader IWRM environment

• Catchment-based and therefore systems-based

• WRCS an integral component of the larger IWRM environment (i.e. Larger Process) – classification does not occur in isolation
‘Larger IWRM process’
1. Delineate the catchment & describe the status quo

2. Link economic + social value to ecosystem condition & water use

3. Quantify the Ecological Water Requirements at each node

4. Set a ‘baseline configuration’ for ecological sustainability…

5. Evaluate scenario implications

6. Stakeholder workshops

7. Select the preferred configuration of IUA Classes and Node categories
1. Delineate the catchment & describe the status quo
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- Relationship to water and aquatic ecosystems
- Prosperity score
- Human health score
- Utility score
1. Delineate the catchment & describe the status quo

**Value and use of water (economic sectors)**

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Doring Range-lands</th>
<th>Kners-vlakte</th>
<th>Koue Bokkeveld</th>
<th>Lower Olifants Irrigation</th>
<th>Olifants/Doring Dryland Farming</th>
<th>Upper Olifants Irrigation</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated average turnover per ha:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High value crops</td>
<td>60 000</td>
<td>40 385</td>
<td>60 000</td>
<td>40 385</td>
<td>43 810</td>
<td>60 000</td>
<td></td>
</tr>
<tr>
<td>Medium value crops</td>
<td>30 000</td>
<td>30 000</td>
<td>30 000</td>
<td>30 000</td>
<td>30 000</td>
<td>30 000</td>
<td></td>
</tr>
<tr>
<td>Low value crops</td>
<td>12 500</td>
<td>12 500</td>
<td>12 500</td>
<td>12 500</td>
<td>12 500</td>
<td>12 500</td>
<td></td>
</tr>
<tr>
<td>Total turnover (R millions)</td>
<td>109</td>
<td>22</td>
<td>611</td>
<td>427</td>
<td>110</td>
<td>690</td>
<td>1 969</td>
</tr>
<tr>
<td>Management jobs</td>
<td>3 482</td>
<td>689</td>
<td>19 523</td>
<td>13 650</td>
<td>3 517</td>
<td>22 035</td>
<td>62 896</td>
</tr>
<tr>
<td>Labor</td>
<td>113 534</td>
<td>22 472</td>
<td>636 625</td>
<td>445 114</td>
<td>114 676</td>
<td>718 531</td>
<td>2 050 952</td>
</tr>
</tbody>
</table>

**Value and use of aquatic ecosystems**

<table>
<thead>
<tr>
<th>Fishery</th>
<th>Fishers</th>
<th>Total value (millions)</th>
<th>Value from Olifants estuary (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Coast gill and seine</td>
<td>321 gill + 84 seine (+ crew)</td>
<td>R18.1</td>
<td>R1.07</td>
</tr>
<tr>
<td>West Coast commercial boat</td>
<td>9 000</td>
<td>R286.87</td>
<td>R0.18</td>
</tr>
<tr>
<td>West Coast recreational shore and boat</td>
<td>210</td>
<td>R341.71</td>
<td>R2.28</td>
</tr>
<tr>
<td>Total nursery value of Olifants estuary fish</td>
<td></td>
<td></td>
<td>R3.45</td>
</tr>
</tbody>
</table>
1. Delineate the catchment & describe the status quo

‘Integrated Units of Analysis’ with nested sub-units (‘Nodes’)

2. Link economic + social value to ecosystem condition & water use

Outcome: a set of quantitative relationships that specify how different levels of
- water use;
- ecosystem condition; and
- ecosystem goods and services affect economic value and social wellbeing.

3. Quantify the Ecological Water Requirements at each node

Outcome: table of EWRs for each node at varying levels of ecological integrity (e.g. for A/B, B, C, D)

4. Set a ‘baseline configuration’ for ecological sustainability...

...then generate scenarios

5. Evaluate scenario implications

6. Stakeholder workshops

iterative process

Stakeholders comment on the scenarios and their implications, and may also generate new options for consideration

7. Select the preferred configuration of IUA Classes and Node categories

These become legally binding when published in the Government Gazette
2. Link economic + social value to ecosystem condition & water use

Integrated Unit of Analysis

- Characteristics of water supply
- Supply of ecosystem services

Node

Sectoral outputs (e.g. tourism, irrig. agric.)

Community wellbeing (e.g. health, income, livelihoods)
2. Link economic + social value to ecosystem condition & water use
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Scenario 1

Scenario ‘n’

Economic, Social, and Ecological

6. Stakeholder workshops

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<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.044</td>
<td>0.066</td>
<td>0.095</td>
<td>0.116</td>
</tr>
<tr>
<td>2</td>
<td>0.206</td>
<td>0.302</td>
<td>0.436</td>
<td>0.532</td>
</tr>
<tr>
<td>3</td>
<td>1.582</td>
<td>2.308</td>
<td>3.324</td>
<td>4.059</td>
</tr>
<tr>
<td>4</td>
<td>0.07</td>
<td>0.104</td>
<td>1.301</td>
<td>1.587</td>
</tr>
<tr>
<td>5</td>
<td>1.364</td>
<td>1.989</td>
<td>2.864</td>
<td>3.496</td>
</tr>
<tr>
<td>6</td>
<td>178.51</td>
<td>178.51</td>
<td>290.14</td>
<td>349.18</td>
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<tr>
<td>7</td>
<td>0.894</td>
<td>1.301</td>
<td>1.872</td>
<td>2.285</td>
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<tr>
<td>8</td>
<td>91.43</td>
<td>122.066</td>
<td>165.994</td>
<td>197.297</td>
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<tr>
<td>9</td>
<td>1.489</td>
<td>2.148</td>
<td>3.08</td>
<td>3.757</td>
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<tr>
<td>11</td>
<td>0.519</td>
<td>0.749</td>
<td>1.073</td>
<td>1.3</td>
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<tr>
<td>12</td>
<td>89.689</td>
<td>108.571</td>
<td>141.614</td>
<td>169.937</td>
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<tr>
<td>13</td>
<td>31.989</td>
<td>45.699</td>
<td>66.546</td>
<td>86.827</td>
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<tr>
<td>14</td>
<td>68.653</td>
<td>90.428</td>
<td>122.99</td>
<td>147.741</td>
</tr>
<tr>
<td>15</td>
<td>28.814</td>
<td>41.162</td>
<td>61.743</td>
<td>78.208</td>
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<tr>
<td>16</td>
<td>2.007</td>
<td>2.9</td>
<td>4.16</td>
<td>5.074</td>
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<tr>
<td>17</td>
<td>28.018</td>
<td>40.025</td>
<td>60.038</td>
<td>76.048</td>
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<tr>
<td>19</td>
<td>88.796</td>
<td>107.49</td>
<td>140.205</td>
<td>168.246</td>
</tr>
<tr>
<td>23</td>
<td>5.988</td>
<td>7.45</td>
<td>9.847</td>
<td>11.916</td>
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<tr>
<td>33</td>
<td>62.979</td>
<td>76.238</td>
<td>99.441</td>
<td>119.33</td>
</tr>
<tr>
<td>40</td>
<td>43.412</td>
<td>52.552</td>
<td>68.546</td>
<td>82.255</td>
</tr>
<tr>
<td>42</td>
<td>33.933</td>
<td>41.687</td>
<td>54.902</td>
<td>66.447</td>
</tr>
<tr>
<td>44</td>
<td>24.529</td>
<td>30.11</td>
<td>39.645</td>
<td>47.967</td>
</tr>
<tr>
<td>47</td>
<td>11.548</td>
<td>14.147</td>
<td>18.618</td>
<td>22.523</td>
</tr>
</tbody>
</table>

*Scenario tool*
3. Quantify the *Ecological Water Requirements* at each node

Quantitative relationships describing how different levels of:

- water yield
- ecosystem condition
- ecosystem services

affect economic value and social wellbeing.
1. Delineate the catchment & describe the status quo

‘Integrated Units of Analysis’ with nested sub-units (‘Nodes’)

2. Link economic + social value to ecosystem condition & water use

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4. Set a ‘baseline configuration’ for ecological sustainability...

...then generate scenarios

5. Evaluate scenario implications

Scenario 1: Implications
Economic, Social, and Ecological

Scenario ‘n’: Implications
Economic, Social, and Ecological

6. Stakeholder workshops

Stakeholders comment on the scenarios and their implications, and may also generate new options for consideration

7. Select the preferred configuration of IUA Classes and Node categories

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4. Set a ‘baseline configuration’ for ecological sustainability…

Iterate process until hydrologically feasible, ecologically feasible and meets ‘fitness for use’ water quality requirements.
4. Set a ‘baseline configuration’ for ecological sustainability…

...then generate scenarios

- planning scenarios (existing lawful use, equity, future use)
- protection scenarios (improved ecosystem condition, present state and degraded ecosystem condition)
1. Delineate the catchment & describe the status quo

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Scenario ‘n’

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5. Evaluate scenario implications

- Water quality implications (fitness for use) for all users
- Ecosystem health
- Social wellbeing
- Regional economic prosperity
- Overall scenario implications

IUA-level and catchment-level

Implications

Implications
5. Evaluate scenario implications
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6. Stakeholder workshops

Stakeholder workshop - share information - present scenarios

Stakeholder response

Capture responses, and revise scenarios if necessary

Stakeholder workshop - assess revised scenarios

Does the suite of scenarios cover the range of options for the stakeholders?

YES

Stakeholder workshop - present agreed scenario(s) short-list and ‘sign off’

NO

Generate additional scenarios

Stakeholder workshop - share information - present scenarios

Recommend classes for the IUAs

#1

#2

#3
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Implications
- Economic, Social, and Ecological

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7. Select the preferred configuration of IUA Classes and Node categories

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7. Select the preferred scenario of IUA classes and node categories and allocation schedules, catchment management strategy

- Scenario 1
  - Scenario 2
  - Scenario 3
    - Scenario 4
Conclusion

• **WRCS central to IWRM in South Africa**
  • Had many of the pieces, but they weren’t integrated
  • The ‘circle in the middle’ wasn’t thought through
  • Tool that helps provide for both redress and sustainability
  • Allows for the evolution of water trading

• **WRCS represents a significant step forward in the process of democratizing IWRM**
  • Transparency in the decision analysis process
  • Greatly increased stakeholder involvement
  • Moves water governance down to more grassroots level
Conclusion

• Further research & development work is required
  • Not all the tools and methods are equally well-tested but overall the system is conceptually robust
  • Intentionally non-prescriptive so that as the science and technology improves, it can be incorporated

• We are at the start of the process
  • Superficially, the 2007 water resource ‘landscape’ might look similar to the 1994 landscape
  • BUT… it’s taken 10 years to change the organizations, institutions, methods, tools, etc to meet the demands of the 1998 Water Act