Working for Water sixteen years on – assessments of value and progress

Brian van Wilgen and CSIR, ARC and WfW research team
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An assessment of the effectiveness of a large, national-scale invasive alien plant control strategy in South Africa

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Data sets available

- South African Plant Invaders Atlas (SAPIA)
- CSIR survey (1996)
- ARC survey (2010)
- Working for Water records (WIMS)
- Hakea (Esler et al.)
- Prosopis (van den Berg)
- Other smaller-scale studies
- Assessments of effectiveness of biological control
### Rates of spread

<table>
<thead>
<tr>
<th>Species</th>
<th>Region</th>
<th>Rate of spread (%)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>South Africa</td>
<td>5</td>
<td>Working for Water assumption</td>
</tr>
<tr>
<td>Prosopis</td>
<td>Northern Cape</td>
<td>10</td>
<td>Van den Berg</td>
</tr>
<tr>
<td>Pines</td>
<td>Tsitsikamma</td>
<td>5.9</td>
<td>Moeller</td>
</tr>
<tr>
<td>Jointed cactus</td>
<td>Eastern Cape</td>
<td>13.7</td>
<td>Moran and Anneke</td>
</tr>
<tr>
<td>Sesbania</td>
<td>Western Cape</td>
<td>9</td>
<td>Hoffmann</td>
</tr>
<tr>
<td>Lantana</td>
<td>KZN and (old) Transvaal</td>
<td>10.9</td>
<td>Cilliers and Neser</td>
</tr>
<tr>
<td>Acacia longifolia</td>
<td>Western Cape</td>
<td>7.4</td>
<td>Shaughnessey; SAPIA</td>
</tr>
<tr>
<td>Acacia pycnantha</td>
<td>Western Cape</td>
<td>7.4</td>
<td>Hoffmann</td>
</tr>
<tr>
<td>Hakea</td>
<td>Western Cape</td>
<td>8.8</td>
<td>Kluge and Neser</td>
</tr>
<tr>
<td>Chromolaena</td>
<td>KZN</td>
<td>15?</td>
<td>Howison</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
Pom-pom weed (Campuloclinium macrocephalum)
Pines, especially fynbos biome
“Our Working for Water programme is the world’s most comprehensive initiative to clear invading alien plants. It is estimated that approximately 750 000 hectares will need to be cleared each year to win the battle over a 20-year period”

Kader Asmal, August 1998

16 years later ……….
Working for Water 2003 proposal

Invaded area
- Proposed 20-year clearing strategy
- 2000 Level of funding
- Growth of invasions without Working for Water

Historical and proposed funding
- Historic Funding
- Proposed 20-year strategy

Now here!
We restricted our assessment to:

- The 10 taxa that covered the greatest area in the CSIR survey
- The 10 taxa that had the highest prominence values in SAPIA
- The 10 taxa that covered the greatest area in the ARC survey
- All taxa that accounted for >85% of control costs in WIMS

This yielded a list of 19 taxa:
- 11 tree taxa
- 5 shrub species
- 2 succulent plant taxa
- 1 reed species
## Major species targeted by Working for Water

<table>
<thead>
<tr>
<th>Species</th>
<th>Invaded area in 2008 (cond. ha x 1000)</th>
<th>Area treated 2002 – 2008 (cond. ha x 1000)</th>
<th>% of invaded area treated/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acacia mearnsii</em></td>
<td>461.8</td>
<td>38.7</td>
<td>1.2</td>
</tr>
<tr>
<td><em>Prosopis spp</em></td>
<td>344</td>
<td>15.1</td>
<td>0.6</td>
</tr>
<tr>
<td><em>Eucalyptus spp</em></td>
<td>229.9</td>
<td>9</td>
<td>0.6</td>
</tr>
<tr>
<td><em>Pinus spp</em></td>
<td>58.5</td>
<td>7.4</td>
<td>1.8</td>
</tr>
<tr>
<td><em>Lantana camara</em></td>
<td>22.5</td>
<td>11.2</td>
<td>7.1</td>
</tr>
<tr>
<td><em>Chromolaena</em></td>
<td>92.3</td>
<td>16.6</td>
<td>2.6</td>
</tr>
<tr>
<td><em>Solanum</em></td>
<td>31.9</td>
<td>7.4</td>
<td>3.3</td>
</tr>
<tr>
<td><em>Acacia saligna</em></td>
<td>45.6</td>
<td>2.6</td>
<td>0.8</td>
</tr>
<tr>
<td><em>Hakea sericea</em></td>
<td>36.6</td>
<td>4.5</td>
<td>1.8</td>
</tr>
<tr>
<td><em>Populus spp</em></td>
<td>45.3</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td><em>Salix babylonica</em></td>
<td>34.9</td>
<td>0.4</td>
<td>0.2</td>
</tr>
</tbody>
</table>
## Major species targeted by Working for Water

<table>
<thead>
<tr>
<th>Species</th>
<th>Cost (millions 2008 rands)</th>
<th>Degree of control achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acacia mearnsii</em></td>
<td>561.9</td>
<td>Remains prominent (8% treated)</td>
</tr>
<tr>
<td><em>Prosopis</em> species</td>
<td>435.5</td>
<td>Spreading at 10%/yr</td>
</tr>
<tr>
<td><em>Eucalyptus</em> species</td>
<td>237.0</td>
<td>Most species not invasive</td>
</tr>
<tr>
<td><em>Pinus</em> species</td>
<td>183.5</td>
<td>Remains prominent, and growing</td>
</tr>
<tr>
<td><em>Lantana camara</em></td>
<td>180.6</td>
<td>Some progress?</td>
</tr>
<tr>
<td><em>Chromolaena odorata</em></td>
<td>171.8</td>
<td>Remains prominent and is expanding</td>
</tr>
<tr>
<td><em>Solanum mauritianum</em></td>
<td>121.5</td>
<td>Remains prominent?</td>
</tr>
<tr>
<td><em>Acacia saligna</em></td>
<td>88.4</td>
<td>Decreasing, assisted by biocontrol</td>
</tr>
<tr>
<td><em>Acacia dealbata</em></td>
<td>79.3</td>
<td>Remains prominent</td>
</tr>
<tr>
<td><em>Hakea sericea</em></td>
<td>69.3</td>
<td>Decreasing, assisted by biocontrol</td>
</tr>
<tr>
<td><em>Cereus jamacaru</em></td>
<td>57.9</td>
<td>Under complete biocontrol</td>
</tr>
</tbody>
</table>
Kouga and Krom projects

50 - 1000 years to clear the sites at the current rates of clearing

Assumes no spread

High levels of uncertainty (1/4 of sites recorded as treated had no treatment)

No effort by landowners to maintain cleared sites

Study by Matt McConnachie
Track record of biological control

- 284 species released against 48 invasive plant species
- 21% (10 weed species) under complete control
- 38% (18 weed species) under substantial degree of control
- Examples (complete control): Aquatic weeds, cacti, *Sesbania*
- Examples (substantial control): cacti, Australian *Acacia* species, *Hakea, Lantana*
Impact of biological control on selected species

**Prickly Pear**
- 1933
- Area occupied from 1930 to 2000

**Hakea**
- 1970
- Area occupied from 1940 to 2000

**Red Water Fern**
- 1997
- Area occupied from 1970 to 2000

**Australian Wattles**
- 1987-1994
- Area occupied from 1940 to 2000
With hindsight, we have adopted a “strategy of hope”

- Attack the problem without proper prioritization
- No clear time-based goals
- No monitoring of progress against goals
- Only work in the easy places
- Hope that a large effort will reduce and contain the problem
What should we do?

- Learn from past experience
- Factor in new learning
We must become more professional

Alien plant control in the Cape of Good Hope Nature Reserve 1941 – 1987

“Control operations were almost totally ineffective for at least the first 35 years ….”

Introduction of systematic control plans in 1974, leading to decreases.

“…. this reserve requires a qualified ecologist on its staff”

Invest in planning, monitoring and evaluation

• Investing an appropriate portion of funds into the prioritization of control operations, planning, monitoring and evaluation.

• By setting clear goals, and targeting fewer species in selected priority areas, and allocating sufficient funds to meet goals, you can become more effective.
Funding does not always address priority areas – how should this be corrected?
Highest priority
Determine funds needed to clear area within an agreed timeframe
Allocate *sufficient* funds to complete the job

Next priority
Determine funds needed to clear area within an agreed timeframe
Allocate *sufficient* funds to complete the job
Direct more funding to biological control

• Currently only 3% of total funds

• Significant returns on investment (hundreds or thousands of rands return for every rand invested).

• The only area where substantial progress has been made

• The only really sustainable option
Socio-political realities

• Clearing invasive alien plants is essential for the protection of resources that will support sustainable development
• Job creation is an attractive added benefit
• Job creation has become the main motivator for funding and political support
• This makes it difficult to divert funds to where they are desperately needed
• Is the tail wagging the dog?
Conclusions

• Despite substantial funding, Working for Water has only reached a small proportion of estimated invaded areas.

• Many species continue to expand, and new, potentially invasive species continue to arrive.

• There are some success stories in localized areas, and for some species using biological control.

• Significant changes will be needed if real progress is to be made.