Contributing Paper

Example of Demand Side Management: A neglected heritage provides profitable alternatives

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Assessment of Water Supply Options

For further information see http://www.dams.org/

Suggested Boxes for Report by the World Commission on Dams

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Four suggested boxes illustrating the need to consider alternatives to dams, are presented for your consideration. These are:

1. The *Working for Water* Programme
2. The *Greater Hermanus Water Conservation* Programme
3. The User-pays Project in Parks
4. The Schools' Resource Audit Project

1. The *Working for Water* Programme to Clear Invading Alien Plants

South Africa's *Working for Water* programme clears invading alien plants – species that have been introduced into the country from other parts of the world, and have spread out of control – so as to restore the indigenous vegetation. Estimates are that about 7% (10 million hectares) of the land surface of South Africa has been invaded, and that these plants use around 3 300 million m^3 of water each year – 6,7% of the total amount of water that would otherwise flow into its rivers. (These figures exclude legitimate forestry plantations using invasive species.) The biomass of these plants is increasing by at least 5% per year, with a concomitant wastage of water (ie, doubling in 15 years). The cost of clearing the plants can increase 40-fold within twenty years.

It is clear from general research (see footnote) and the most comprehensive overview of the problem to date ("Alien Invading Plants and Water Resources in South Africa: A Preliminary Assessment", CSIR, 1998) that the country has little option but to clear the plants. Not only are they a massive threat to water security, but they also have negative impacts in terms of water temperature, chemical balance, turbidity, eutrophication, water quality, scouring of rivers, soil erosion, siltation of dams and estuaries, and lead to both flooding and the destruction of rivers as living entities. Many once-perennial rivers have run dry in the dry seasons, massively reducing the biological diversity of those rivers. During the wet seasons, the rivers flush at unprecedented rates, with all of the negative ecological and economic consequences.

There are many other reasons why the plants should be cleared:

- They are regarded as the single biggest threat to the country's exceptional biological diversity.
- They break down ecological functioning (upon which we all ultimately depend).
- They cause massive and intense fires, with all their impacts.
- They destroy the productive potential of agricultural land.
- They detract from the eco-tourism potential – the country's single biggest economic advantage.

Case-specific studies have shown that the cost of clearing invading alien plants is significantly lower than the costs of building new dams, in terms of water yield. In the Western Cape, for example, the cost of clearing the invading alien plants was a mere 11% of the cost of the most attractive new dam option (Skuifraam Dam), for similar returns on investment in water. What is more, this was measured in financial terms, and not economic terms. The programme is possibly the country's most successful job-creation initiative, even though these jobs are of a temporary nature (<5 years). However, the development of down-stream industries based on the products of the work (ie, water, land, wood, trained people) is exceptionally promising. Furthermore, if the work is not done, many existing ("permanent") jobs will be lost.

The lesson for the World Commission on Dams is that alternatives must be fully explored. The inter-disciplinary approach has enabled the impact of invading alien plants on water security to be given greater recognition in South Africa's water planning. Furthermore, the full economic costs and

benefits, and not just those to the line-function sector, are beginning to be put into the equation when assessing these alternatives.

[Data and references backing up these statements are available from wfw@dwaf-wcp.wcape.gov.za]

2. The Greater Hermanus Water Conservation Programme

Hermanus is a coastal town near Cape Town in South Africa. In 1995, the Town Engineer, Mr James van der Linde, approached Dr Guy Preston (then head of the *National Water Conservation Campaign*) for assistance in averting a projected water security problem in the town. Instead of opting to augment its water supply through a dam or transfer scheme, it adopted Dr Preston's 12-point conservation package. The first 3 years of the programme have had spectacular results, when compared to the 3 years prior to the programme:

- 32% reduction in *per capita* peak-demand for water.
- 20% increase in revenue from water sales.
- South Africa's most socially just tariffs.
- 96% level of support from residents.

The reduction in water demand still requires deeper analysis to understand the impact of rainfall in the longitudinal comparisons. The levels of additional revenue from water sales are being audited at present. On the other hand, some of the components of the 12-point plan have yet to be fully implemented (and notably water-loss management and retrofitting), and the real savings are expected to be even greater once the programme is fully implemented. The money that is raised will be ploughed back into helping residents to use water more efficiently, thereby reducing water sales, until a new equilibrium is reached which will give Hermanus a significant delay in its need to seek additional supplies of water.

A principal driving force is the notion of social justice. In Hermanus (as in so many other places in the world), it is the big users who are primarily responsible for the need to seek new water sources, and they should then pay the bulk of the costs of doing so. (In economic terms, those driving the marginal cost pay the marginal price of water.) Furthermore, the programme creates jobs, helps in promoting the payment of services, and improves quality of life and social harmony. It is such returns on investment that garnered the exceptional support from the people of Hermanus.

The Hermanus model is becoming the standard model for urban water management in South Africa. It also spawned the *Save the Sand* (River) Water Catchment Management project, which adopts similar principles in a stressed catchment in the north-east of the country. A combination of incentives and disincentives, linked to a ring-fenced conservation programme that delivers real returns on investment, is beginning to have a dramatic impact on water security, water quality, social justice and quality of life in the catchment. There are also critical spin-offs for the life-blood of both the Kruger National Park and Mozambique.

The 12-Point Plan

1. **An assurance-of-supply tariff**
   Ensuring that those visiting only in peak periods pay for the ability to obtain sufficient water at that time.
2. **An 11-point escalating block-rate tariff**
   The more water you use, the more you pay per unit. Basic levels of water use are far more affordable.
3. **Informative billing**
   Monthly accounts to show water users how much water they have used over the past 13 months.
4. **Intensive communication**
   Newsletters, newspaper articles, ratepayer meetings, water conservation tips, hot line for leaks.
5. **Schools' resource audit**
   Pupils examine their use of water at school and at home, and find ways to reduce these levels.

6.	**The Hermanus *Working for Water* project** Labour-intensive clearing of water-consumptive invading alien plants, to conserve water supply.
7.	**Retrofitting project** Installing water-saving devices (eg, dual-flush toilets) into all dwellings, and fixing leaks.
8.	**Water-wise gardening** Demonstration gardens; promoting water-wise gardening in nurseries; pertinent information.
9.	**Water-wise food production** Promoting sustainable food gardens by the poor, that help to ensure their access to this resource.
10.	**National water by-laws** Regulations designed to reduce water wastage (eg, banning automatic-flushing urinals).
11.	**Water loss management** Reduction of unaccounted-for water (eg, fixing leaks, detecting unpaid use of water).
12.	**Security meter project** On-line pre-payment meter, giving users greater control over their lives (eg, information, security, e-mail).

[Data and references backing up these statements are available from wfw@dwaf-wcp.wcape.gov.za]

3. The *User-pays* Resource Conservation Project in Parks

A research and awareness-raising project was run in two South African nature reserves to promote water and electricity conservation. The rationale was simple:

- Nature reserve visitors tend to be affluent.
- Affluent people use hugely disproportionate amounts of water and electricity, as a rule.
- Nature reserve visitors are more open to conservation messages and experiences whilst in the reserves.
- The user-pays approach is fundamentally fair, and is likely to win support.
- Real changes in resource-use behaviour can be achieved in the visitors' homes and places of work.
- The experiences will be repeatedly reinforced as most visitors return to reserves for further vacations.
- Nature reserves can therefore be significant catalysts in promoting sustainable lifestyles.

The study at Mopani Rest Camp in the Kruger National Park had spectacular results: annual average savings of 73% of the water, and 60% of the electricity, used by visitors in their accommodation units. The water savings did not differ greatly during Winter (74%) and Summer (72%), whereas the electricity savings were far higher in Summer (66%) than in Winter (52%). The electricity difference reflects the far greater propensity to save electricity in the heat of Summer, when air-conditioners are more commonly used.

Extremely comprehensive surveys were undertaken at Mopani, which revealed that the Experimental group visitors were very positive about the measures adopted in their units. The level of inconvenience was low, and the vast majority found it to be instructive and interesting. Indeed, the enthusiasm proved to be something of a problem, as it was difficult to stop this influencing the behaviour of the Control group visitors. It also impacted upon the behaviour of the cleaning staff.

Statistically significant reductions in water and electricity in the homes of those from the Experimental Group were not shown. However, significantly greater conservation interventions (eg, retrofitting) and support of resource conservation measures, were shown, in comparison to those from the Control group.

Method

- Visitors' accommodation costs were reduced, but they paid for their own use of water and electricity.
- A data-logger showed visitors how much water or electricity they had used at any particular time.
- It also showed electricity use on their geyser, lights, air-conditioner, fan, plugs and stove.

- Resource-saving fittings were used to make it easier for visitors to use water and electricity more efficiently (eg, dual-flush toilets, low-flow showerheads, compact fluorescent light bulbs).
- The communication (including comparisons between units) was a critical component of the intervention.
- The water and electricity use by visitors in Control units were the yardsticks by which to estimate the savings of the visitors in the Experimental units. Detailed of the Control groups' levels of usage were recorded, without their knowledge. Individual data was treated in the strictest confidence.

Water and Electricity Use Per Person Per Day

Winter:	**Litres**	**N**	**l/c/d**	**KWh**	**N**	**KWh/c/d**
Control	124 707	844	148	2 929	630	4.65
Experimental	30 416	798	38	1 797	798	2.25
% Saving:			74%			52%
Summer:						
Control	184 794	1 186	156	8 403	1 186	7.09
Experimental	41 723	960	44	2 368	980	2.42
% Saving:			72%			66%

The lessons for the World Commission on Dams are that the potential for the conservation of water and electricity is far greater than is often understood. Nature reserves are very different from urban areas, of course, but there are a great many similarities in the way in which we use resources in such accommodation units (ie, including hotels and resorts) and our homes. They make people aware of what is possible, and more open to water management interventions, at extremely low costs for the returns on investment.

[For more details, see "*The effects of a user-pays approach, and resource-saving measures, on water and electricity use by visitors to the Kruger National Park*", by Guy Preston. South African Journal of Science, Vol 90, Nov/Dec 1994, pp 558-561, or contact wfw@dwaf-wcp.wcape.gov.za]

4. The Schools' Resource Audit Project

South Africa has introduced a resource audit programme in schools (called the *20/20 Vision* Project), in which pupils are taught to measure their use of water, the quality of water, and their use of electricity – both at school and in their homes and communities. The project is expanding to deal with waste management, food gardens, invading alien plants and the "greening" of schools and communities.

The project has reached over 4 000 schools, with some spectacular success stories. For example, one school was able to reduce its in-house water use by 91% merely by replacing automatic-flushing urinals with a user-operated model. The money that schools can save through reducing their water and electricity bills, and selling their recyclable materials, can then be used for promoting education in the schools. More importantly, it makes school pupils far more aware of the practicalities of resource conservation, and more open to the conservation measures that South Africa has no option but to adopt. Children are also, as some parents may know, fairly persuasive in altering the knowledge, attitudes and behaviour of others!

[For more details, contact qta@dwaf.pwv.gov.za]

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