

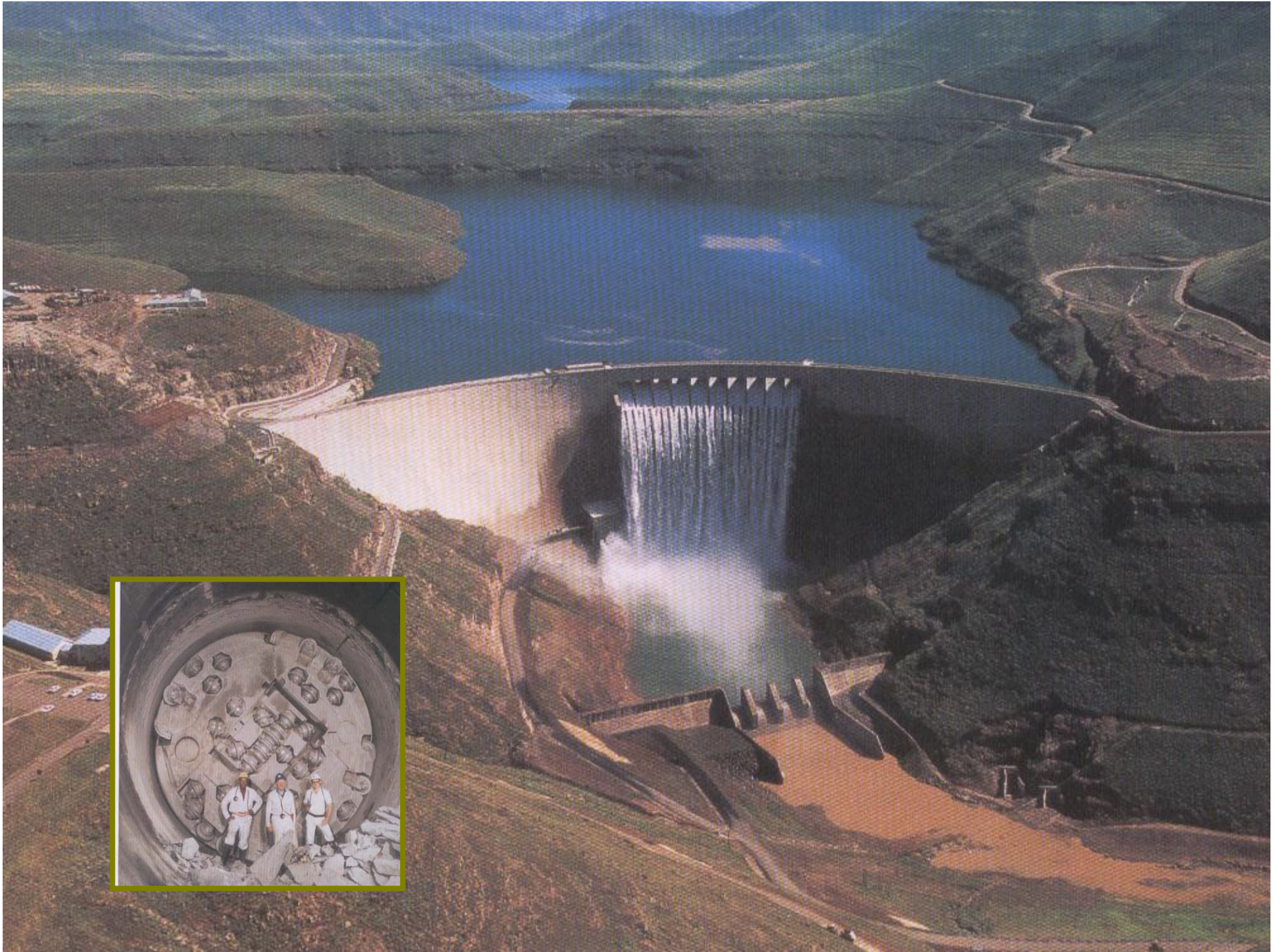
South African

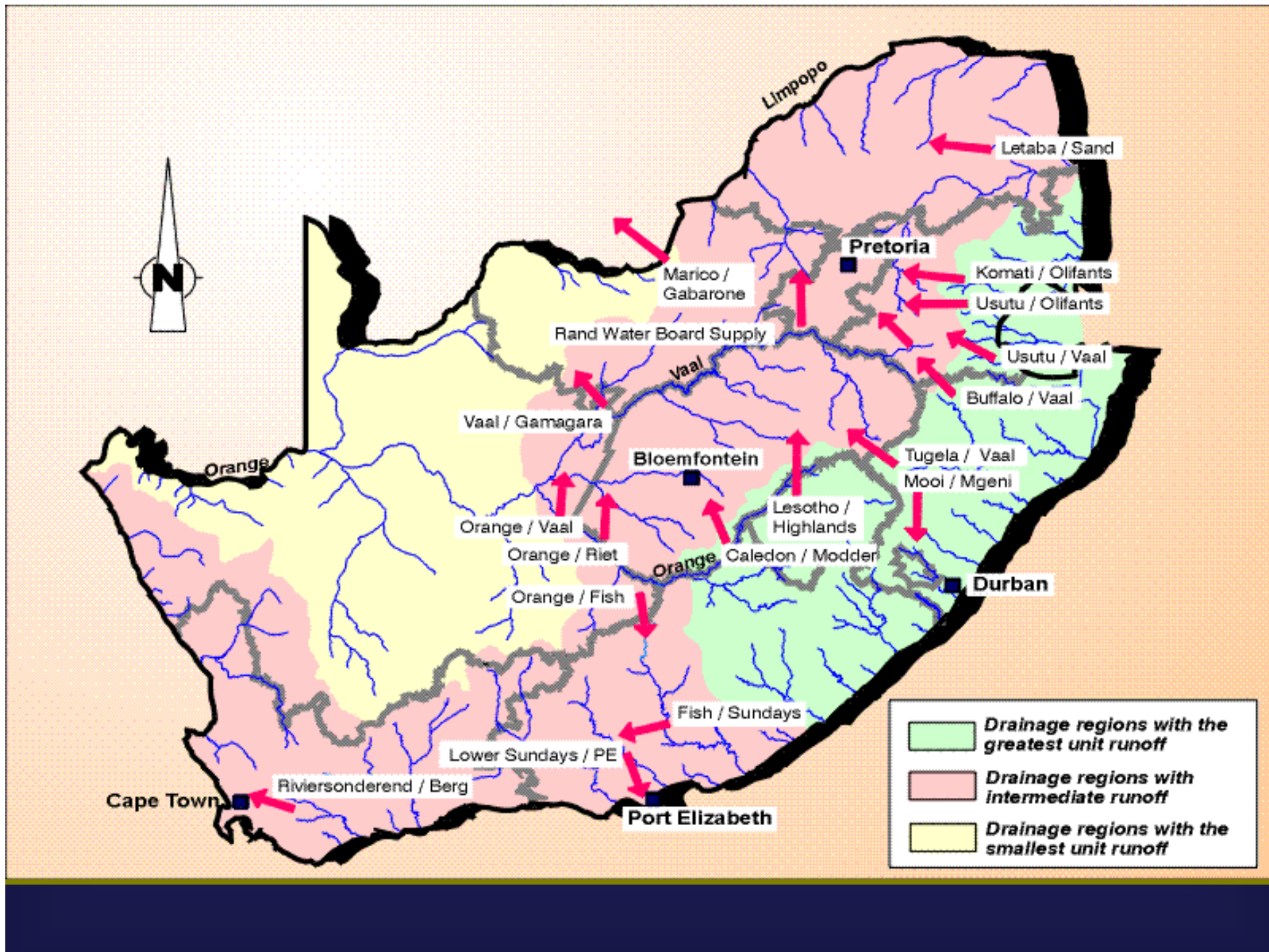
Water Research Commission

Supporting sustainable development through research funding, knowledge creation and dissemination



**WATER CENTRED
KNOWLEDGE...improving the
quality of lives of South
Africans**





Water for Society...

Solar Distillation



- The WRC funded research... development of solar stills as a small-scale potable water provision technology for use in single households or small communities



Water for Society...

The Project



- **Specific research goals were achieved, namely:**
 - **developing an in-depth understanding of the factors that determine the economics of the desalination process,**
 - **theoretically integrating these unit processes into a plant design which is affordable to rural households and**
 - **practically demonstrating the feasibility of the technology.**



Water for Society...

Rain Water Harvesting



- **The WRC-funded project on rainwater harvesting was aimed at increasing food security among impoverished rural communities**
- **Communities.... were able to produce maize, beans, spinach and fruit...**
- **.... able to sell some of their crops to local markets...**



Water for Society...



Water for the Economy...

Cost-Benefit Analysis



- **ACRU Model Development**
- **Hydrosalinity System Models**
- **Surface Water Resources of South Africa**
- **Biological Nutrient Removal**
- **Dry Cooling in Power Generation**
- **Combined Services Model**
- **The Cost-Benefit Analysis (CBA) method provides a logical framework by means of which projects can be evaluated, thus serving as an aid in the decision making process. In layman's terms, the principle of a CBA can be described as the comparison of costs and benefits that emanate from a particular project. A factor that complicates the technique is the capitalization of costs and benefits to present values.**

Water for the Economy...

Benefit Cost Ratio



Project, 1999 economic prices	Cost of WRC Research	Benefits	NPV
ACRU Model Development	16.9	117.9	101.0
Hydrosalinity System Models	4.5	16.8	12.3
Surface Water Resources of South Africa	5.7	34.4	28.7
Biological Nutrient Removal	0.5	163.0	162.5
Dry Cooling in Power Generation	14.4	558.3	543.9
Combined Services Model	0.4	146.1	145.7
TOTAL	42.4	10356.5	994.1

Water for the Economy...

Econometric Model



- **A start was made with the development of an integrated econometric model that evaluates the role that water plays and to predict the likely effect of management and policy approaches to the efficient utilization of water resources in the South African economy**



Water for Environment...

Rhodes BioSURE™



- **BioSURE™ process...solution for treating acid mine water drainage**
- **...most cost-effective biological treatment option developed to date for reducing sulphates in acid mine water without the external addition of chemicals**



Water for Environment...

Mine Water Pollution



Grootvlei Mine is pumping 75 M³/day of water to retain access to its underground workings.

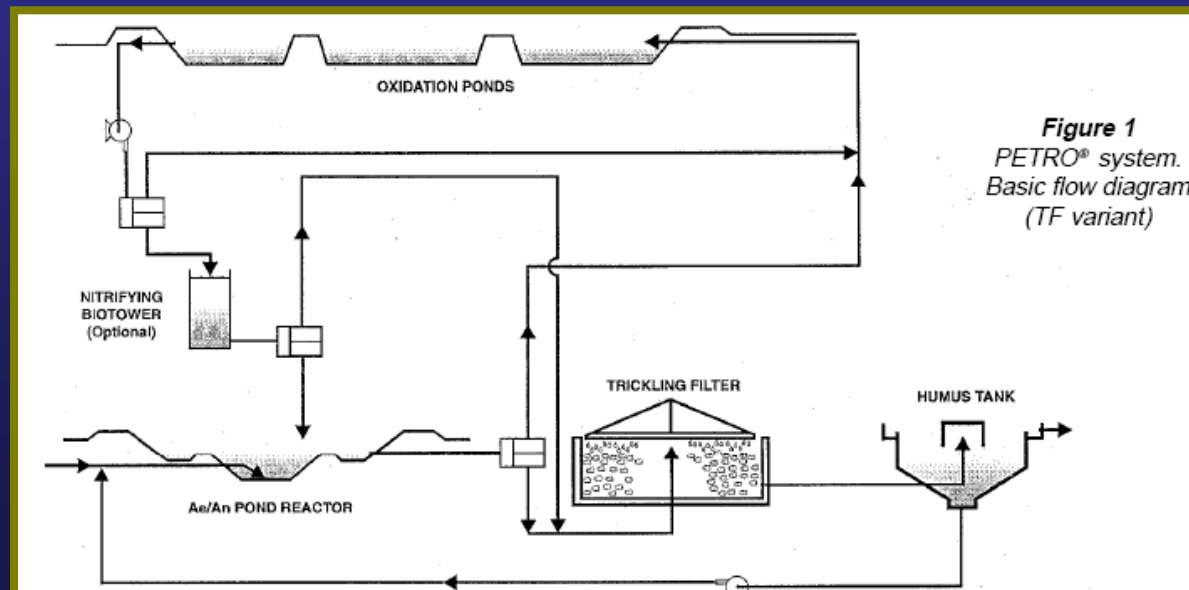
- More than a decade of research by the WRC and other agencies has gone into finding solutions to the potential pollution caused by potentially harmful water emanating from the gold mines on the Witwatersrand

Water for Environment...

PETRO™



- Pond Enhanced Treatment and Operation (PETRO™)
- ...wastewater treatment process that involves passing wastewater through an anaerobic reaction zone so that the organic matter in the wastewater is subjected to anaerobic biological degradation.
- Then the wastewater is passed through an aerobic reaction zone in which the organic matter is subjected to aerobic biochemical breakdown.



Water for Environment...

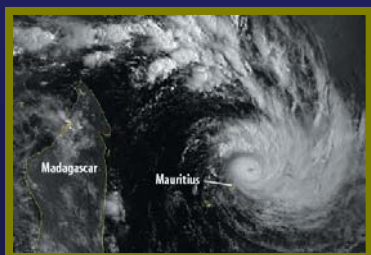
SAREP



- **South African National Precipitation Research and Rainfall Enhancement Programme**
- **Awarded the UAE Int. Prize for Weather Modification in a world-wide competition run by the World Meteorological Organization for**

- *“the design and execution of a successful weather modification experiment, involving the revolutionizing concept of injection of hygroscopic nuclei and superb radar-based storm-tracking software”.*

- **Cited by WMO panel as ‘the world’s showpiece because of technological innovations and advances, and successful conclusion of the research**

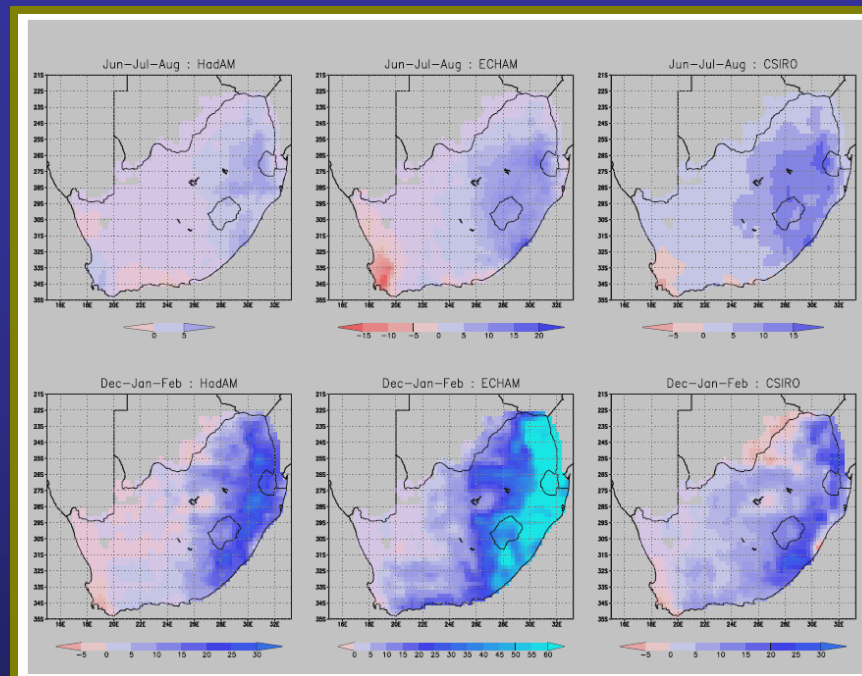


Water for Environment...

Climate Change



- Climate change and water resources in South Africa
- Vulnerabilities and sensitivities of communities to climate change, in regard to water resources
- Climate change and aquatic ecosystems
- Disseminating knowledge of climate variability and its consequences



Water for Health...

Water-related issues



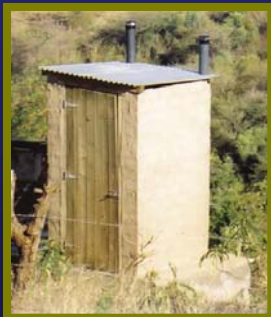
- **Household hygiene and water**
- **Disinfection of water and disinfection by-products**
- **Water quality in small towns and their water supply**
- **Sanitation & hygiene and water**
- **Fluoride in rural areas**
- **Organic and inorganic chemicals (EDC's, industrial, emerging chemicals)**
- **Eutrophication of water bodies & algal toxins**
- **Enteric sicknesses from pathogenic organisms**
- **Vectors, e.g., malaria and bilharzia**
- **Aerosols, e.g., Legionella**
- **Algae-related health problems (toxins, disinfection by-products)**
- **Water and HIV/AIDS**
- **Nitrates in boreholes**

Water for Health...

Ecological Sanitation



- The *Ecosan* approach to sanitation promotes a cycle or 'closed' system (as opposed to the linear nature of water-borne sanitation)



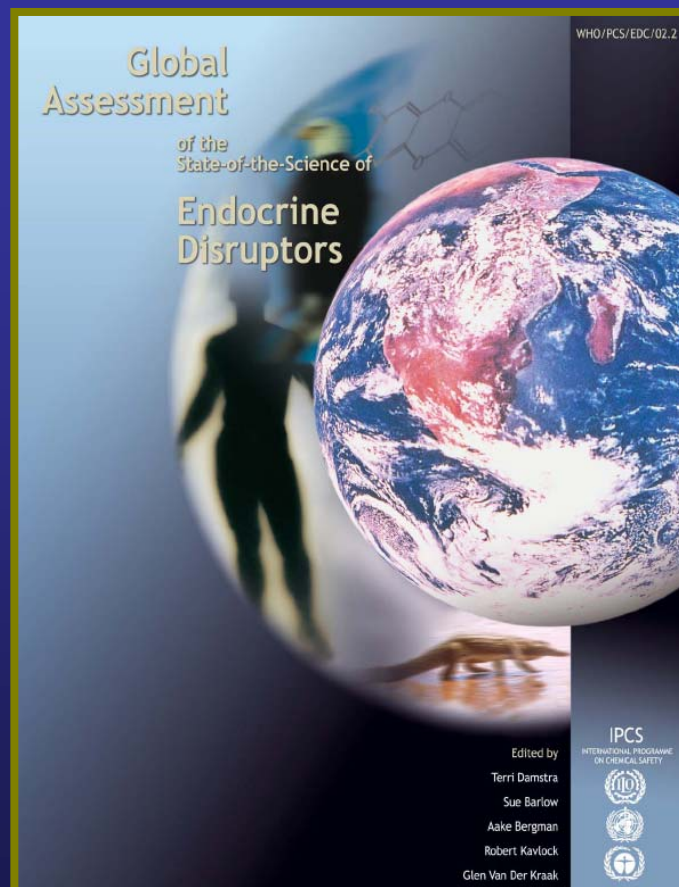
About 16% of South African households with urine diversion toilets do not use them at all or use them for unintended purposes, such as storage areas or animal pens.

Water for Health...

EDCs



- **Endocrine Disrupting Chemicals...interfere with the structure or function of hormone receptor complexes**
- **...impact male and female production systems**
- **e.g. DDT**



Water for Health...



Water for Health...

Water treatment



- Rural membranes
- Anti-fouling sea water desalination
- High-frequency surface discharge ozone generator



KNOWLEDGE TRANSFER - COMMERCIALISATION



- **In South Africa “There is evidence of good technologies that are lost or not commercialized because of lack of innovation resources”** (SA’s National R and D Strategy, 2002)
- **Innovation “Introduction into the market (economic or social) of new or improved products and services (solutions)”**

Application of S&T



- **The WRC holds 32 clusters of patents**
- **Licenses/commercialisation**
 - **PETRO™ (cluster of 8 patents)**
 - **Rhodes BioSURE™ (cluster of 36 patents)**
 - **CUF Technology (cluster of 5 patents)**
 - **Secondary metabolites (cluster of 13 patents)**
 - **Acid Mine Drainage (ferrite process)**
 - **Detection of Fouling of Membranes**