

Challenges faced in human capital development and new technological innovations in the water sector in South Africa

THE WATER RESEARCH COMMISSION

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South African Water Research Commission

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Introduction

Water resources are under growing serious pressure from;

- ◆ Natural supply is limited;
 - South Africa has an average annual rainfall of about 500 mm.
 - Sixty-five percent of the land area receives less than 500 mm of rain per year, and about 20 percent receives less than 200 mm per year.
- ◆ Water is unreliable;
 - Varied loss of water through evaporation,
 - highly variable stream discharge rates,
 - Current use is already two thirds of the surface water available annually (2005 estimates).
- ◆ Climate change and climatic variability will exacerbate the limited supply.



Introduction

- 💧 Demand is growing to support;
 - Population growth.
 - Economic growth for social development.
 - Redress .
 - 💧 Water quality is deteriorating due to;
 - 💧 Diffuse and point source pollution.
 - 💧 Non compliance with water licenses.
 - 💧 New more complicated chemicals.
 - 💧 Failing infrastructure including monitoring stations.
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Facing the challenge...

Developing science, technology and technology capacity will generate knowledge, which if well utilised will form the basis for good governance of water resources and will address most, if not all, these urgent needs regarding water.



We need skilled people to...

- ◆ Continued implementation of water law that requires sophisticated intervention measures, stakeholder consultation and decentralization in the management of water resources to the lowest appropriate level;
- ◆ Because South Africa is a water scarce country there must be a focus on demand side management approaches to reconcile water requirements with expected economic growth;
- ◆ Dealing with resource issues such as climate change and the expectant increase in intensity and variability of extreme events such as floods and droughts;
- ◆ The need to manage water quality deterioration which can render water unfit for use and presents a major threat to both human and environmental health;
- ◆ The lack of capacity especially at municipal level to operate and maintain water and wastewater systems with the resultant human health impacts;



Fostering technological innovation in the water sector

- ◆ “Innovation” turns new ideas and scientific findings into “products, systems and services that people will either buy or use.
- ◆ The consequences of innovation are increased wealth and improved quality of life for all members of society” (DST, 2008).
- ◆ In addition to scientific skills, specific training in innovation may be needed (DST, 2008).



Examples of innovations we have

- ◆ Effluent treatment and water reclamation technologies and processed for municipal wastewater treatment
- ◆ A biotechnological system (BioSure™) for joint treatment of mining/industrial wastewater and sewage sludge
- ◆ Rapid detection methodologies for pathogenic micro-organisms in water eg. EDC analyses.
- ◆ Membrane technologies for purification of saline and waste water
- ◆ Biomonitoring systems for rapid surface water quality assessment
- ◆ A cloud seeding technology for rainfall enhancement
- ◆ An integrated real-time rainfall monitoring and mapping system for real-time water resource management and flood warning



Examples of innovations we have

- ◆ An in-field rainwater harvesting system for enhanced crop production
- ◆ Artificial groundwater recharge methodology for fractured hard-rock aquifers
- ◆ Solar-still-based desalination technology for provision of potable water to small communities
- ◆ Software systems, sometimes used in conjunction with appropriate instrumentation, for efficient irrigation management
- ◆ Real-time flood warning system
- ◆ Leak detection and water loss management systems
- ◆ Groundwater exploration and exploitation technologies
- ◆ Models for prediction of land-use impacts on water resources.
- ◆ Methodologies for establishing environmental flow requirements of rivers.



Is skill shortage really a big problem??

- ◆ It has been estimated that nearly half a million posts are vacant in the government or public sector alone (Economist, 2008).
- ◆ The Joint Initiative on Priority Skills Acquisition (JIPSA) shows there are about 300 vacancies for engineering academics, and it has been estimated that more than 1 000 engineers, 300 technicians and 15 000 artisans must be trained to reduce the national skills shortage (Mail and Guardian, 2008).



What are the causes?

- ◆ Poor mathematics and science education at primary and secondary school level resulting in a reduced pool for further human capital development in the water sector;
- ◆ Lack of throughput of suitable mentors to guide young professionals in their early career development;
- ◆ Competition of various sectors for scarce skills, with the higher paid professions being more attractive to young professionals;
- ◆ Retirement and emigration
- ◆ Slow recruitment processes in municipalities.



What have we achieved so far?

- ◆ *Skills development levy.*
- ◆ *DST Chairs.*
- ◆ *The DWAF Academy.*
- ◆ *SAICE and other professional societies training.*
- ◆ *WISA graduates database.*
- ◆ *Mentoring on the job.*
- ◆ *WRC pre-requisite for funding.*
- ◆ *Eskom skills “university”*
- ◆ *Etc.*



Areas where more innovation is needed in;

- 💧 **water resource management**
- 💧 **Groundwater and groundwater resource management**
- 💧 **Water quality management**
- 💧 **Ecosystem management**
- 💧 **Agricultural water management**
- 💧 **Domestic and municipal water management**
- 💧 ***Industrial and mine-water management***



What more do we need to do?

- ◆ We need proper assessments of technical needs and reliable future projections.
- ◆ Creating new capacities to be informed by the needs.
- ◆ Build on existing initiatives.
- ◆ The need for a champion person, department or society to ensure coordination and alignment of efforts and to measure progress.
- ◆ The private sector should be part of the solution and not the problem.
- ◆ Formal institutionalised mentoring, not as an add on.
- ◆ We should all assist in the realisation of Science, Engineering and Technology (SET) Human Capital

Development Strategy 2008-2028 of DST as the lead body.



Thank you