

WATER QUALITY MANAGEMENT FOR ECOSYSTEM SUSTAINABILITY

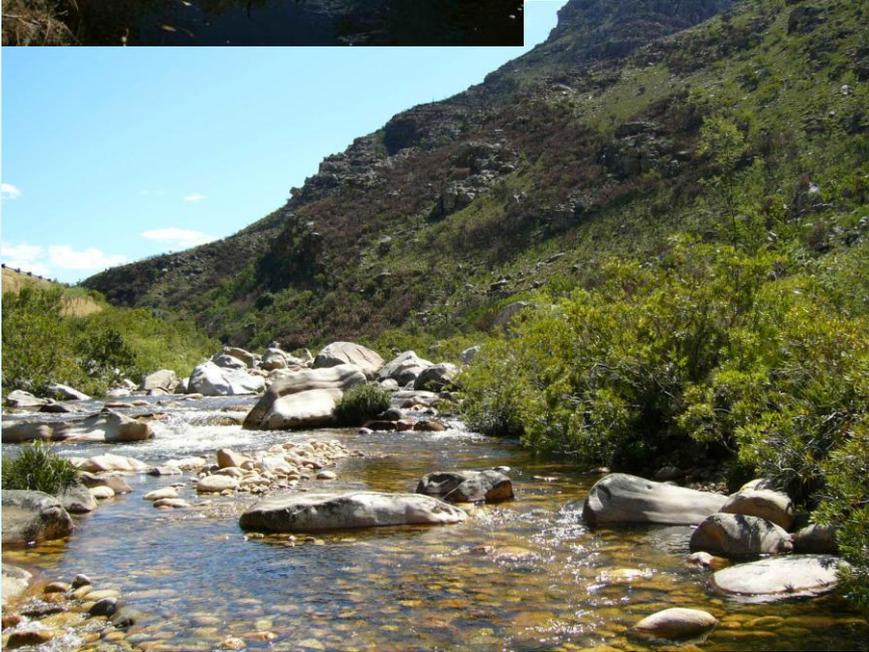
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31-August-2011



South African aquatic ecosystems



South Africa's water quality crisis

News headlines

Acid Mine Drainage

- rising 0.5 m/day
- already decanting >20 million litres/ day



Death of crocodiles
in Olifants River

South Africa's water quality crisis

Pesticide contamination



Non-compliance of WWTW
(2009 Green Drop report only
3.8% met international stds)

Eutrophication & high
bacterial counts



South Africa's water quality crisis

Salinisation



Urbanisation
Industrialisation
Climate change



South Africa's water quality crisis

SA Population = 50.5 million (Stats SA July 2011)
= 40.6 in 1996

 Pressure on aquatic resources

Increased abstraction of water

Increased discharge of waste



The pollutants

- Salts
- Nutrients
- Sediments
- Acids/alkalis
- Metals
- Organic compounds
- Pathogens

And others!



Emerging pollutants

- Pharmaceuticals & personal care products
- EDCs (pesticides, POPs, pharmaceuticals etc)
 - currently > 80 000 chemicals registered

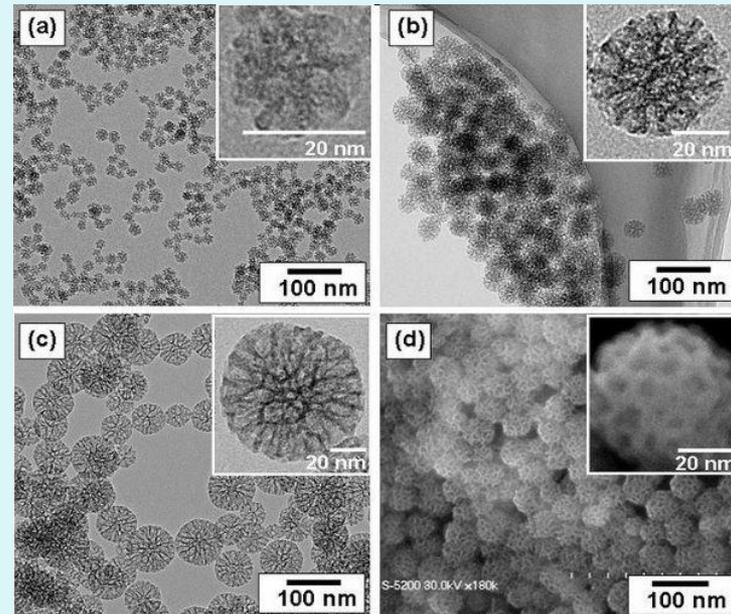
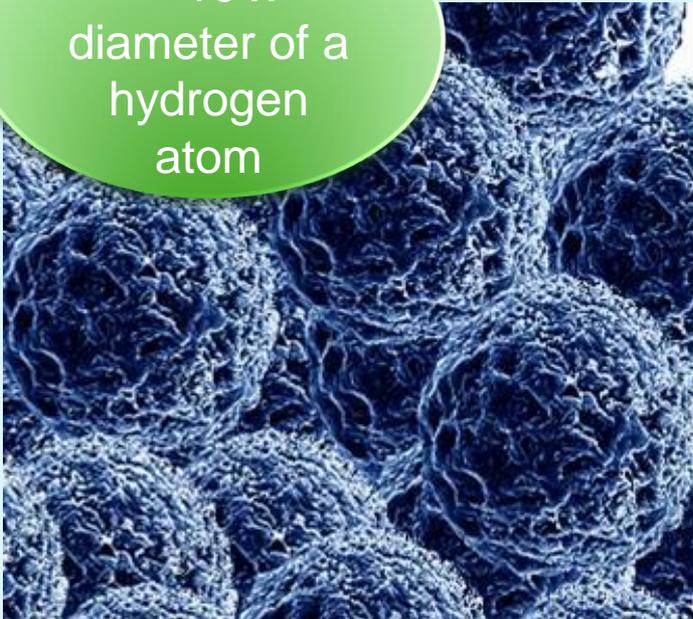
How many are potential EDCs?



Emerging pollutants

- Nano-particles – water purification treatment
 - new type of threat

1 nanometer
= 10 x
diameter of a
hydrogen
atom



Emerging pollutants



New challenges:

- water treatment (WWTW and drinking water)
- monitoring & conservation of aquatic ecosystems



Emerging pollutants

Challenges in monitoring and treatment:

- Extremely low concentrations
- Wide range of chemical structures
- Risk to organisms not well known
 - mode of action
 - persistence in environment
 - synergistic/antagonistic factors



Pathways of entry

Point-sources = challenging

Nonpoint-sources = even more so

Land use management

- sensible land use decisions

e.g. Mining near sensitive wetlands

- Difficult because multi-sectoral



The impacts

Direct impacts to humans:

- Health impacts from recreation/drinking untreated water (e.g. typhoid, cholera, other pollutants)
- Risk to drinking water (insufficient cleaning)
 - + increased cost
- Damage to infrastructure



The impacts

Direct impacts to ecosystems:

- Toxicity (e.g. fish kills)
- Loss of biodiversity

84% SA's freshwater ecosystems = threatened

> 40% in a **critical** condition

(WWF Living Waters Partnership, Annual Report 2010)



The impacts

Loss of biodiversity

- exploitation by weed species
- change in trophic state (pea-green soup)

More subtle effects.....

Loss of ecosystem services

- reeds, fish, medicinal plants
- purification of pollutants

National Water Act 1998



Do we have a WQ crisis?



Cause for major concern

Likely to get worse

Most not unique to SA



Not all doom and gloom!

National Water Act 1998

- WQ component of the Ecological Reserve
- WQ objectives (“ecospecifications”)

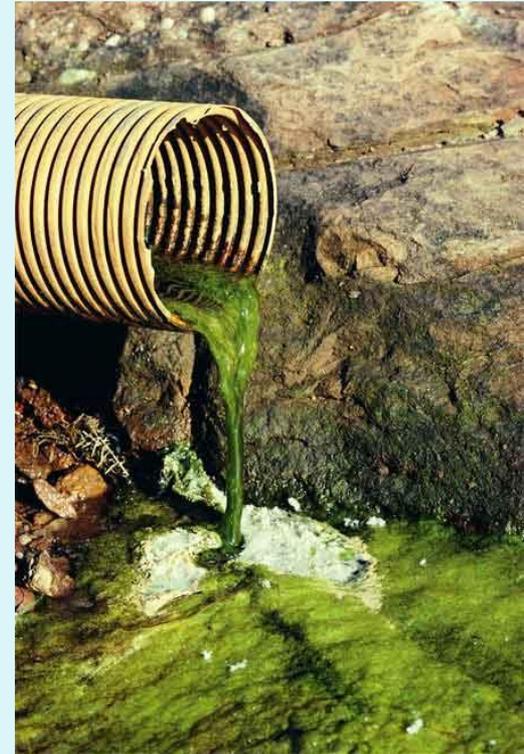
Concentrations of chemical constituents, and values of physical variables that must not be exceeded for a given water resource



Scientifically &
legally defensible

BUT

Pragmatic: limited
capacity and resources



Not all doom and gloom!

DWA WQ monitoring data (various monitoring programmes eg. NCMP, RHP, NMMP)

> 40 years data

Many WQ variables

1000 sites (frequency varies
– currently only 333)

BUT

Needs to be maintained

= basis for sound WQ management!



Not all doom and gloom!

Green Drop Awards

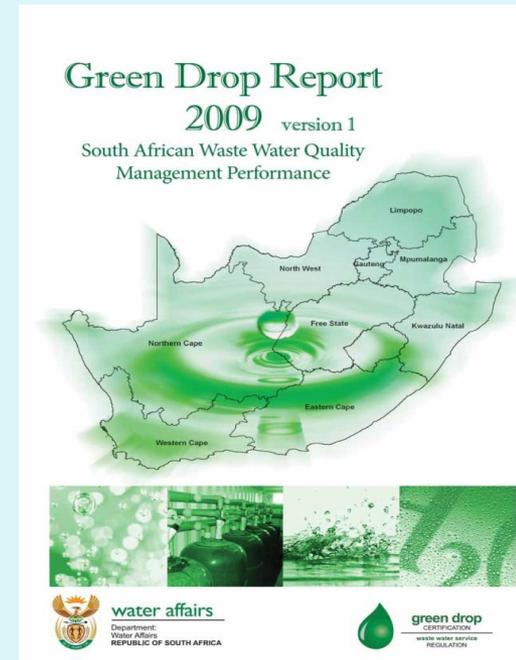
- incentives
- naming and shaming municipalities

Green Drop results 2009 = pretty dire

449 WWTW assessed

32 Green Drop Status (\equiv international stds)

55% failed to comply with minimum effluent standards



Not all doom and gloom!

Green drop 2011 – some improvement

821 WWTW assessed

40 awarded Green Drop Status

Overall score = 71%

(<http://www.dwaf.gov.za/Documents/GreenDropReport.pdf>

<http://www.iclei.org/index.php>)



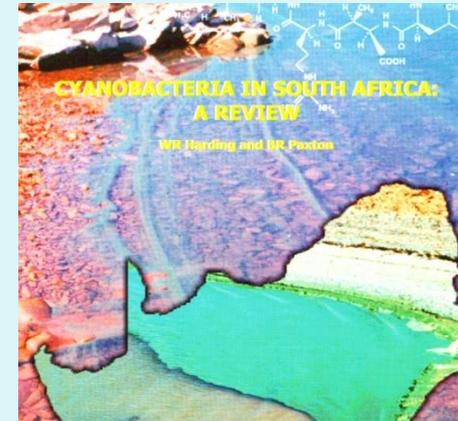
BUT

Need to put pressure on the relevant authorities

Not all doom and gloom!

Extensive research on WQ through the WRC

- individual pollutants
e.g. AMD
EDC research programme
- purification techniques (drinking water, waste water)
- management tools
- WQ + ecosystem processes
- socio-economic aspects



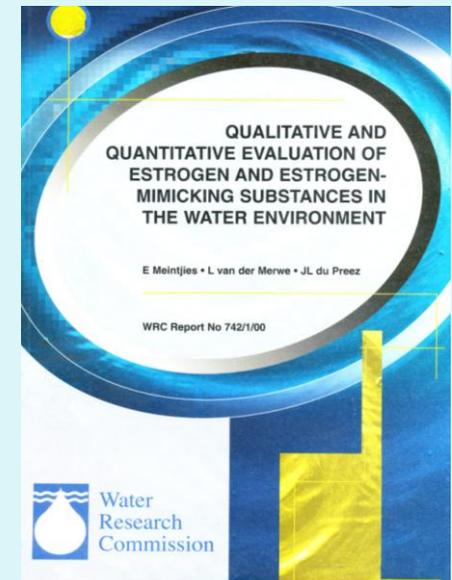
Not all doom and gloom!

Extensive research on WQ through the WRC.....



BUT

Better implementation and uptake
of findings – by all the water sector



Conclusion

- SA faces significant challenges wrt WQ
- Considerable body of research
- Initiatives to tackle this problem – but it wont be easy
- Will need effort and commitment from all sectors of society

BUT

Do we really have a choice?



Acknowledgements

The Water Research Commission

Members of the Freshwater Research Unit (Jenny Day, Matt Bird, Bruce Paxton, Fynn Corry and others) for photographs, comments on the presentation and support

