Water Sensitive Urban Design (WSUD): The global and South African contexts

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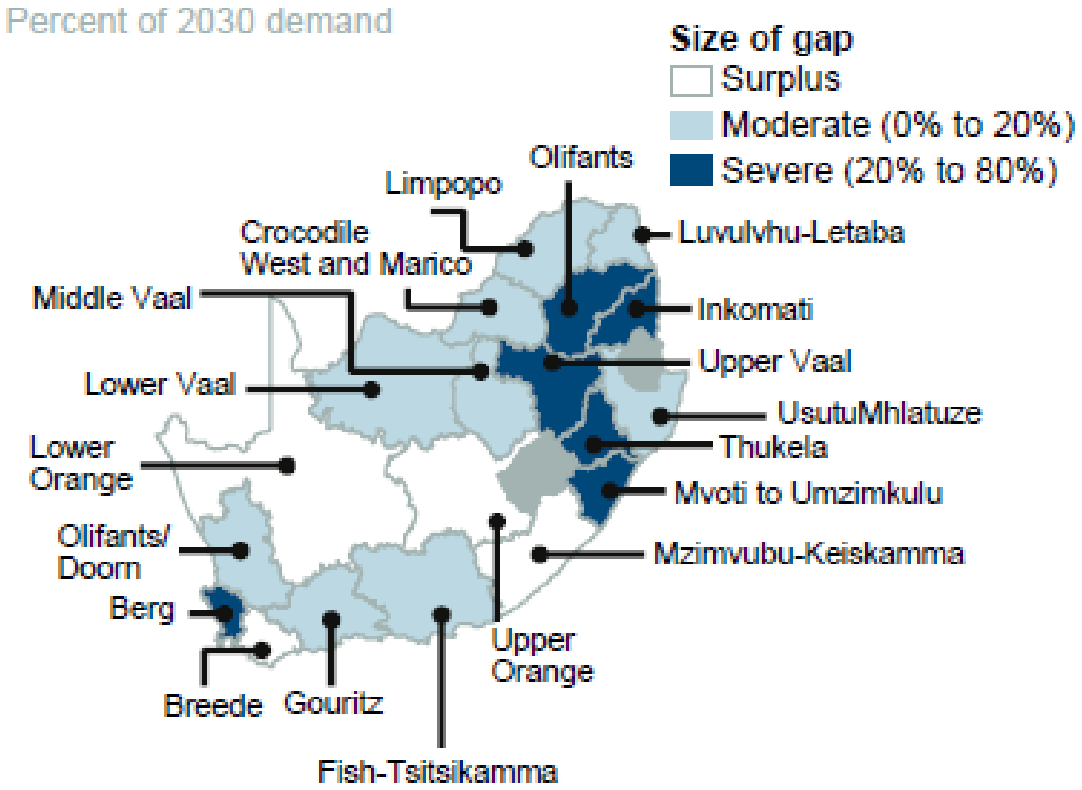
South African context

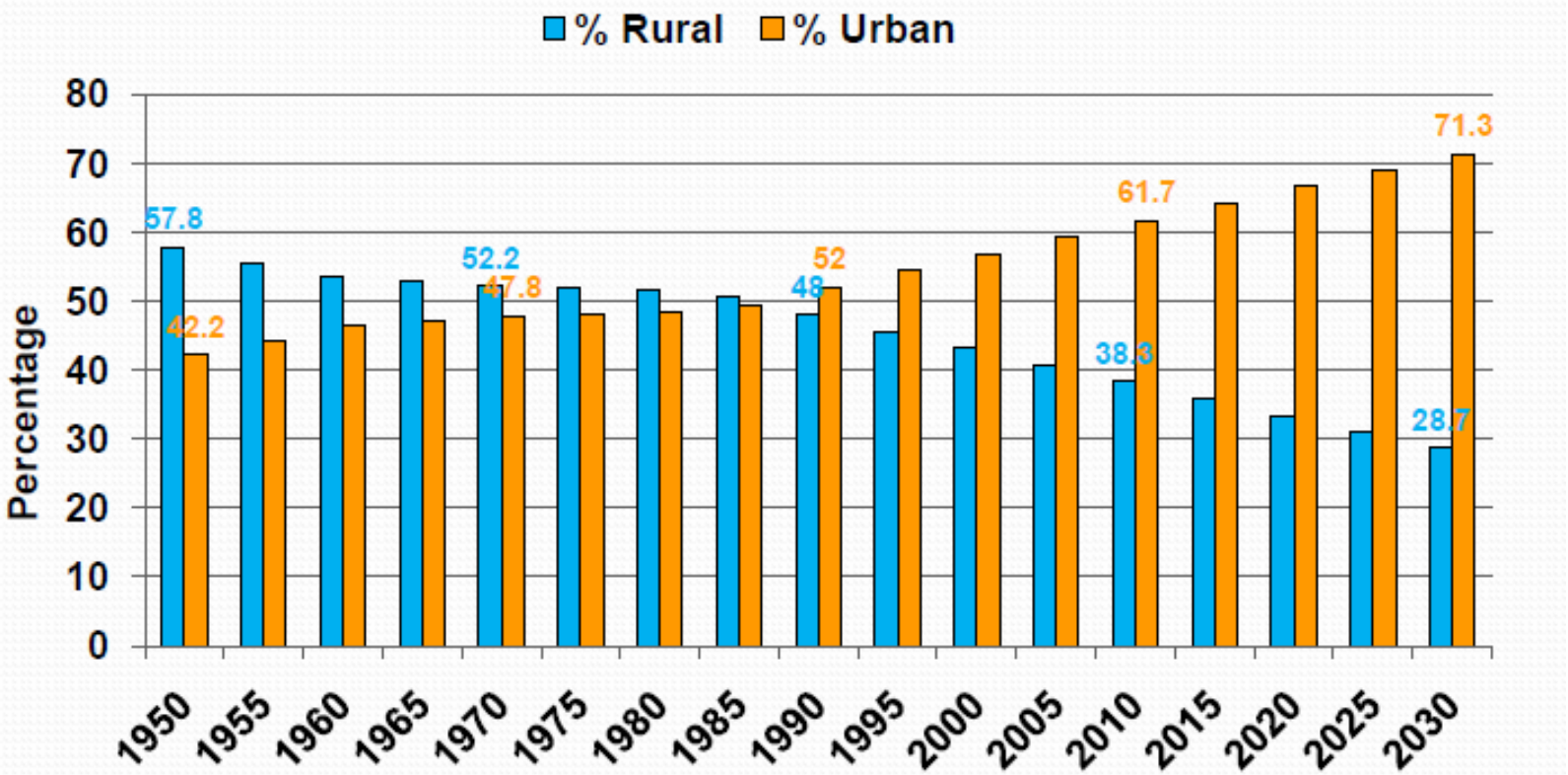
- Water-stressed country
- Rapid urbanisation
- Water services currently inadequate for a substantial proportion of the population
- Risk that economic development will be limited due to a shortage of water
- Increasing concerns about poor water quality downstream of urban areas
- Increasingly ‘hostile’ living conditions
- The threat of climate change

South Africa's impending water 'crisis'



"…the availability of water of acceptable quality is predicted to be the single greatest and most urgent development constraint facing South Africa" (Scholes, 2001)

Urbanisation in South Africa



‘Future proofing’ cities (Wong, 2012)

- Resilient (coping capacity), liveable (comfort capacity) and sustainable (carrying capacity) cities
- Blue / green corridors integral elements of city’s drainage infrastructure for flood conveyance
- Influence of socio-technical dynamics
- Managing stormwater as a resource
- Enhancing water-energy-waste nexus
- Multi-functional infrastructure will be hybrid between centralised and decentralised - to meet basic needs and enhance aspirational needs

Design principle – “keep water in the town / city”

Water Sensitive Urban Design (WSUD)

A multi-disciplined approach to urban water management that aims to unite the engineering concept of Integrated Urban Water Management (IUWM) with the planning concept of Urban Design with a view to creating what has been termed 'Water Sensitive Cities' where the most efficient and effective uses of water are central considerations. *'WSUD integrates the social and physical sciences'* (Wong & Ashley, 2006)

Water sensitivity

- Water is a finite and vulnerable resource
- Access to water is a basic human right
- Management of water should be based on a participatory approach
- Water to be recognised as an economic good
- Water is essential to sustain the natural environment
- ‘Waterscapes’ make cities more ‘liveable’
- An essential component of ‘Green Infrastructure’

WSUD brings ‘water sensitivity’ into urban design

WSUD principles / strategies

1. Sustainable water supply options
   - *Water Conservation / Demand Management*
   - *Alternative water sources, e.g.: rainwater / stormwater harvesting, ground water, aquifer storage*
2. Wastewater minimisation
   - *Water recycling*
   - *Use of treated wastewater*
   - *Quality improvement – 'fitness for purpose'*
3. Stormwater management
   - *Sustainable Drainage Systems (SuDS)*
   - *Enhancement of amenity and biodiversity*
4. Modelling

The professional team

Professionals	Expertise and knowledge base
Architects	Infrastructure conceptualisation and structural aesthetics
Botanists	Vegetation sciences and plant biology
Civil Engineers	Infrastructure design and management
Clients	Conceptual specifications and appointments
Climatologists	Climatology issues and concerns, and 'climate change'
Economists	Funding, fiscal viability and investment opportunities
Engineering Geologists	Engineering geology and earthwork requirements
Environmentalists	Environmental impacts and protection
Epidemiologists	Water-borne diseases, and related health provisos
Freshwater Ecologists	Urban river restoration, rehabilitation and remediation
Geohydrologists	Urban groundwater use and requirements
Geomaticians	Spatial data acquisitioning and spatial data management systems
Historians	Site heritage and historical significance
Landscape Architects	Urban vegetation and exterior landscape aesthetics
Social Anthropologists	Local cultural studies and social impact assessments
Urban Planners	Urban layouts and land-use requirements
Zoologists	Wildlife biology and habitat requirements

The SWITCH project

‘Sustainable Water management Improves Tomorrow’s Cities Health’ (SWITCH):

- EU FP6, € 23M = R250M, 5 years
- Innovation in the area of sustainable urban water management
- 33 partner institutions in 15 countries
- 12 demonstration cities

Moving cities towards the IUWM paradigm using a model of stakeholder engagement that actively encourages active experimentation with new innovations and methodologies (i.e. the ‘Learning Alliance’ approach)

SWITCH project examples

Belo Horizonte – LA generated high level of impact and visibility, WSUD concepts now clearly recognised in the city

(Image courtesy of SWITCH © Alison Duffy)

Accra – improved links and communication between stakeholders in the water sector and provided a platform for strategic planning

Alexandria – well-functioning LA resulted in changes in decision-making towards integrated water management

Urban Water Management in Singapore

The four ‘taps’

In a bid to ensure water security, water supply in Singapore is now being diversified. Currently (2013):

1. Imported water from Malaysia (40%)
2. Water harvesting from the local catchments (35%)
3. Treated effluent (NEWater) (15%)
4. Desalinated water from the sea (10%)

The objective is to minimise/eliminate 1. – so as not to be reliant on Malaysia for this critical resource

FOR THE LIFE OF THE RIVER

Singapore formulated its
to national development
of economic developmen
progress and environmen
Many of the systems in pl
envisaged some 30 years
framework was establish
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"It should be a way of life to keep the water clean, to keep every stream, every culvert, every rivulet, free from unnecessary pollution... In ten years, let us have fishing in the Singapore River and fishing in the Kallang River. It can be done."

Minister Mentor Lee Kuan Yew
Then Prime Minister February 1977


McDonald's

gallerySIX

Clean water, clean air and clean, green land – these are the components that make Singapore a livable, dynamic city, with an environment all can enjoy.

In 2004, PUB launched the 3P Partnership to engage key stakeholders in caring for Singapore's waterways: Public (Government), Private (Businesses) and People (Communities).

Today, public agencies, households, businesses and industries are adopting responsible environmental practices in energy use, water conservation and waste management. With more people and organizations caring for Singapore's environment, this drive has become a joint effort that includes people from all walks of life.

People who enjoy and care for the environment are the same people who transform and sustain it

And it all begins with a single individual
You.

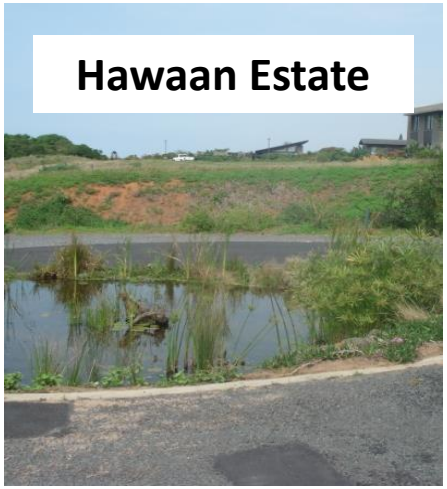
Key challenges for South Africa

- Equity – ‘green’ projects vs. in-situ upgrade
- Mitigation – reduce energy and carbon use
- Uncertainty – flexible solutions
- Adaptability – account for constraints and build capacity

vs.

The good…


eThekwini Green
Roof Pilot Project


Hawaan Estate


DEADP rooftop
(Cape Town)


Century City


Grand Parade

The bad…

http://rwrant.co.za/2010/03/21/aerial-view-of-cape-town-city-bowl/

http://www.allposters.com/-sp/Aerial-View-of-Johannesburg-City-Centre-Posters_i3027843_.htm

And the ugly…

How does RSA get there?

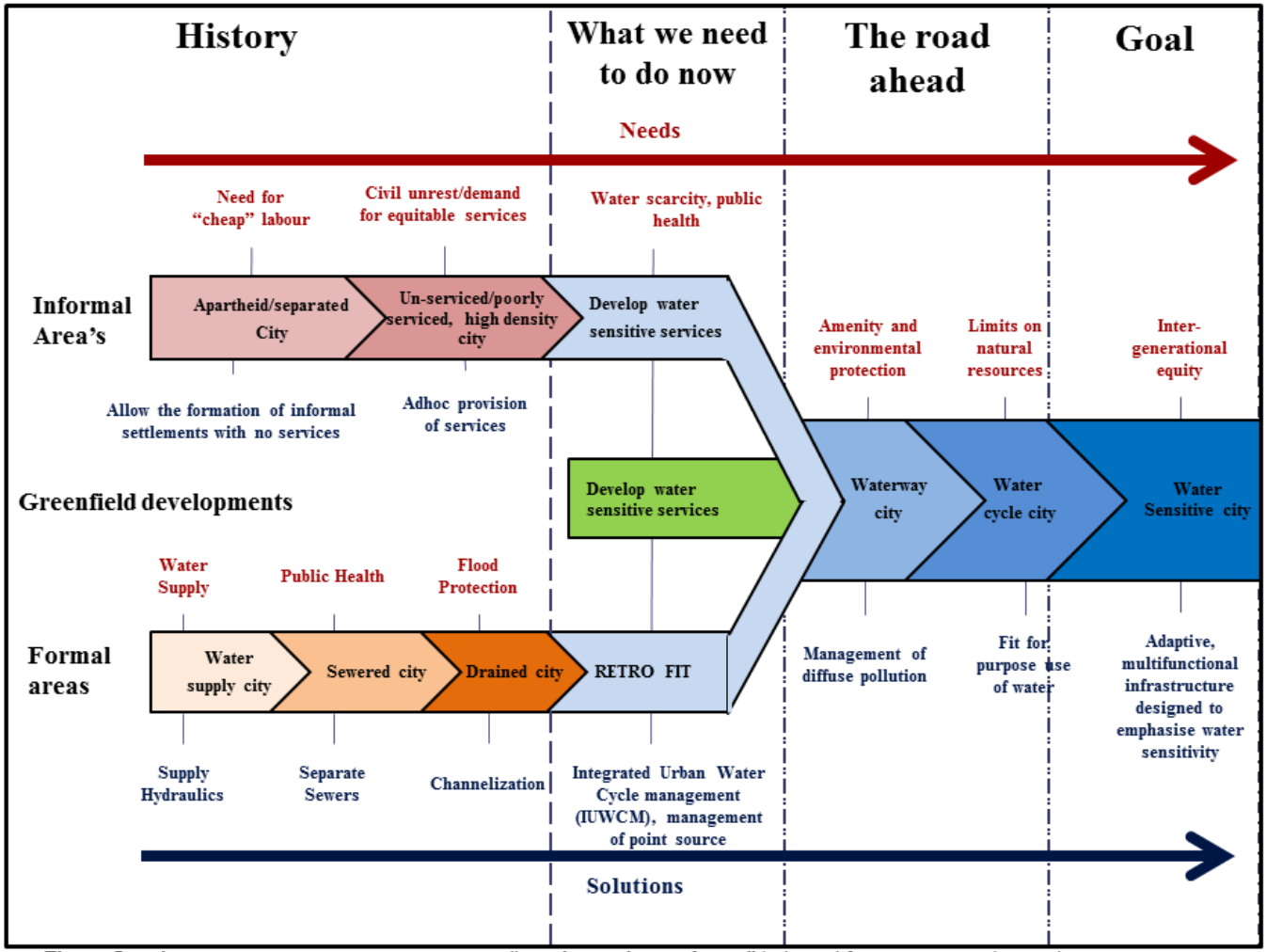


Figure 5: SA's transition to Water Sensitive Cities: *"Two history's, one future"* (adapted from Brown *et al.*, 2008)

Way forward – ‘agents for change’

1. Strategic planning i.r.o. design / regulatory framework / policy
2. Presence of a coordinating body
3. Reliable science and research
4. Evidence base (data gathering) – in respect of ‘risk’
5. Environmental expectations
6. Presence of WSUD champions
7. Strategic funding and incentives

Impact of research

This research is intended to:

- Promote sustainable development solutions
- Inform policy and decision making
- Empower communities, and
- Ultimately lead to empowerment and redress

We have to change the way we manage our water before we completely destroy our environment – and ourselves with it…

International network

In no particular order:

- Ecofutures, Honley, UK
- Pennine Water Group, University of Sheffield, UK
- Water@Leeds, University of Leeds, UK
- GRAIE, INSA de Lyon, France
- CRC for Water Sensitive Cities, University of Monash, Melbourne, Australia
- University of Copenhagen, Denmark
- Federal University of Minas Gerais, Belo Horizonte, Brazil

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For more information, see www.wsud.co.za

Questions?

Thank you for your attention. Any questions?