

WATER
SENSITIVE CITIES

PUBLIC

WATER STORAGE

USED FOR
FLUSHING

Changing the 150-Year Old Sanitation Paradigm

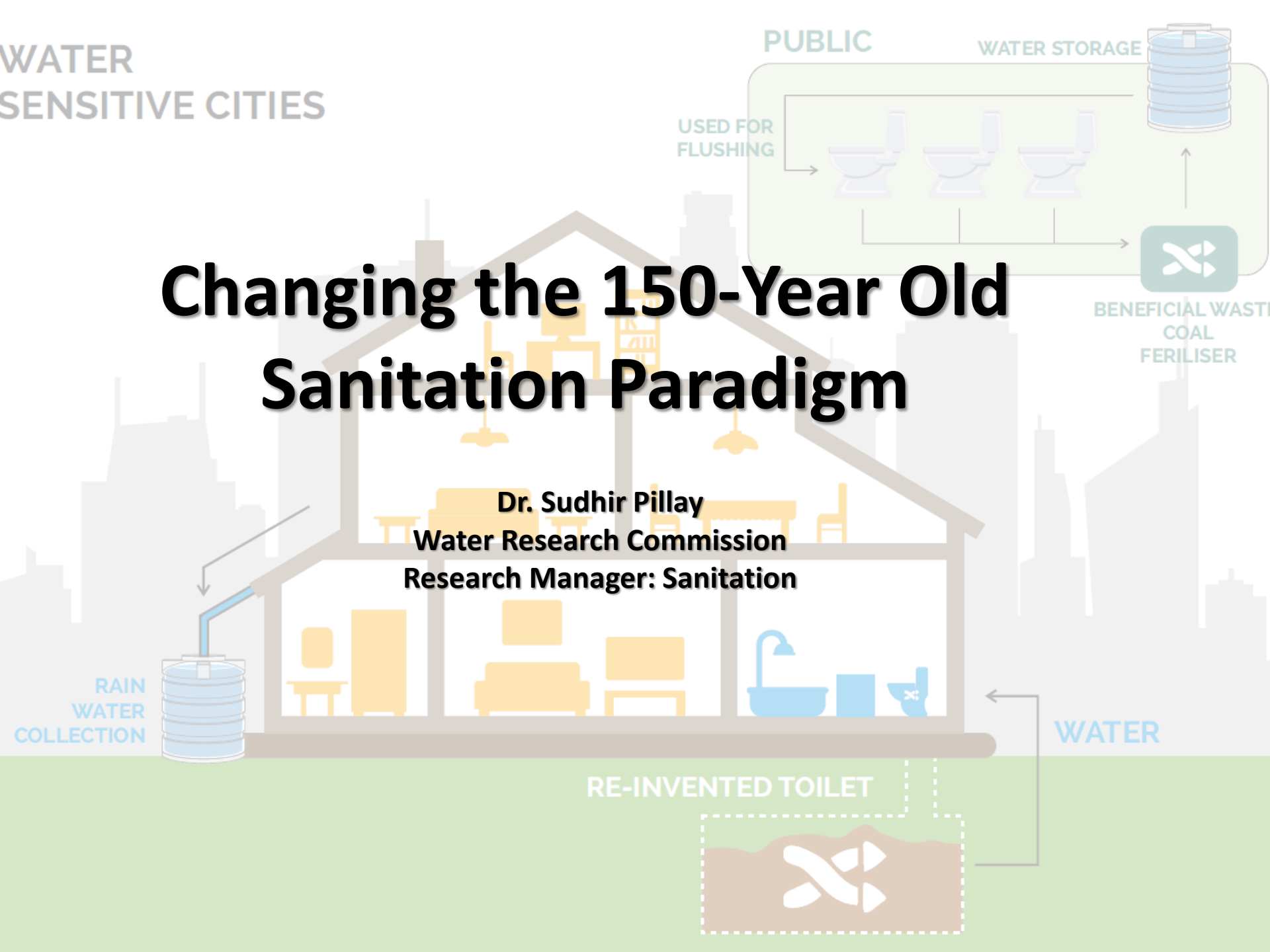
Dr. Sudhir Pillay
Water Research Commission
Research Manager: Sanitation

BENEFICIAL WASTE
COAL
FERTILISER

WATER

RE-INVENTED TOILET

RAIN
WATER
COLLECTION



What Are Our Challenges

***Why Do We Need a New
Model?***

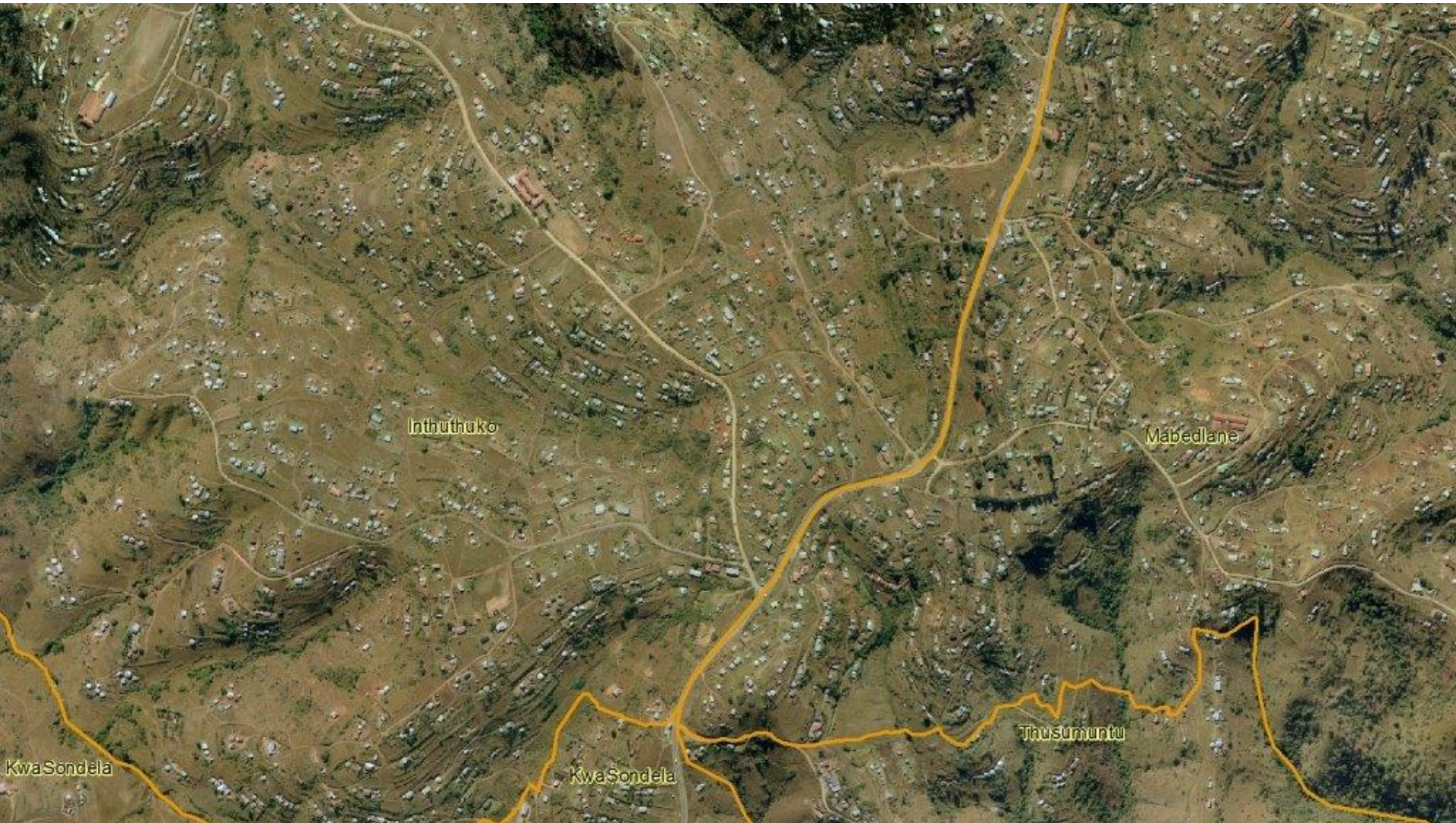
Challenges

- Water stress and water demand / availability
- Climatic variability
- Rapid urbanisation – Urbanisation trends high
- Mushrooming informal settlement – no formalised housing arrangements
- Confined to two engineering approaches
 - Latrines or Full Reticulated Waterborne
 - Both have well-known shortcomings

Changing Urban Landscape

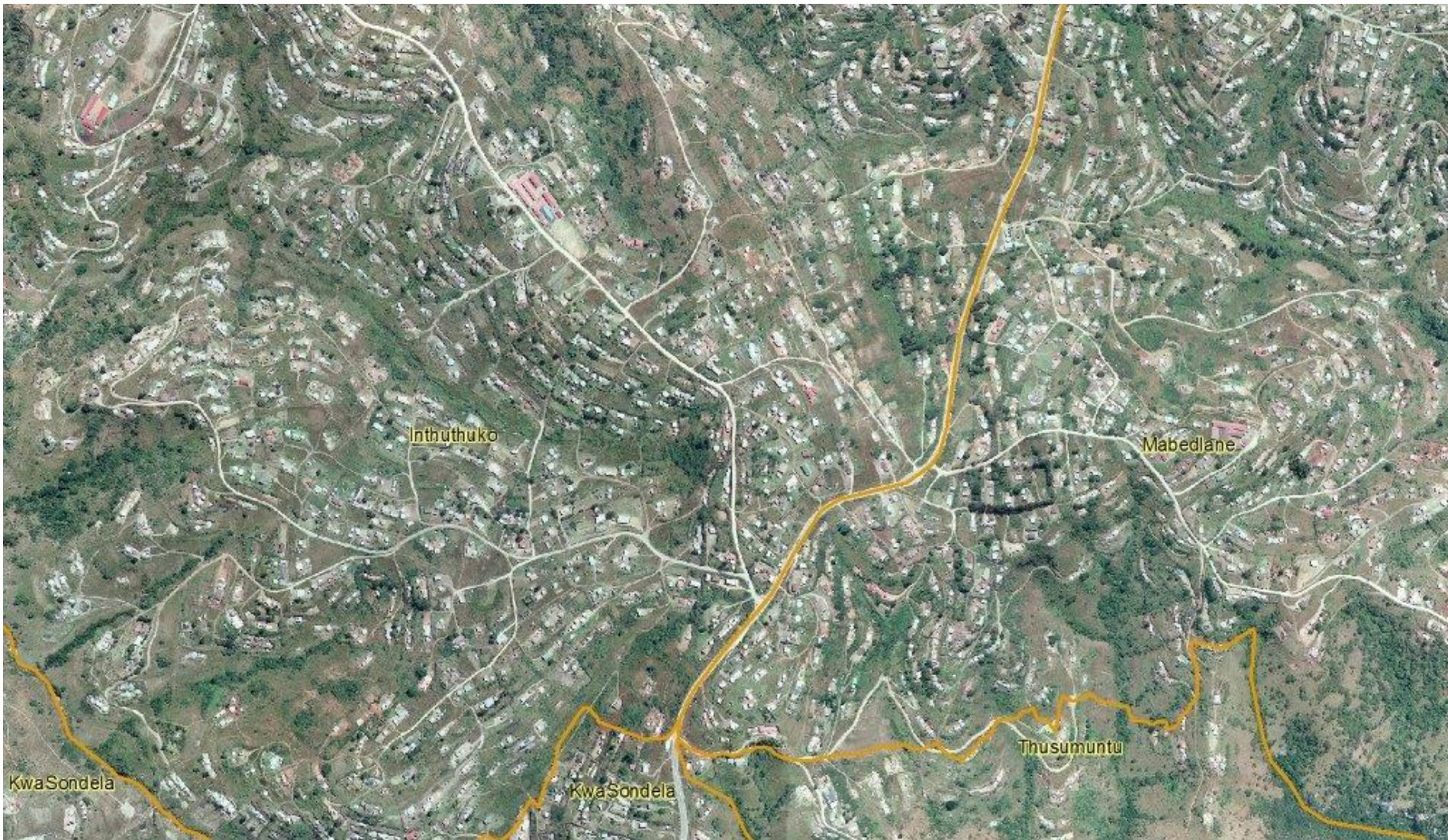


Urbanising Africa



Source: Neil MacLeod – former head of eThekweni Water & Sanitation

Urbanising Africa



Source: Neil MacLeod – former head of eThekweni Water & Sanitation

**Why Do We Need to
Provide Sanitation?**



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*Sanitation in the Middle Ages,
from an old wood cut*

Sanitation Provision Benefits

- Protect Human Health – Save Lives
- BMJ readers rated sanitation 1st place ahead of antibiotics
- Protect the Environment
- Poor sanitation has an affect on economy
- Children, Learners especially girls & special needs are adversely affected by poor sanitation

**Why Can't We Solve This?
Global Problem – Not only
South Africa**

Sanitation – Cinderella of Services

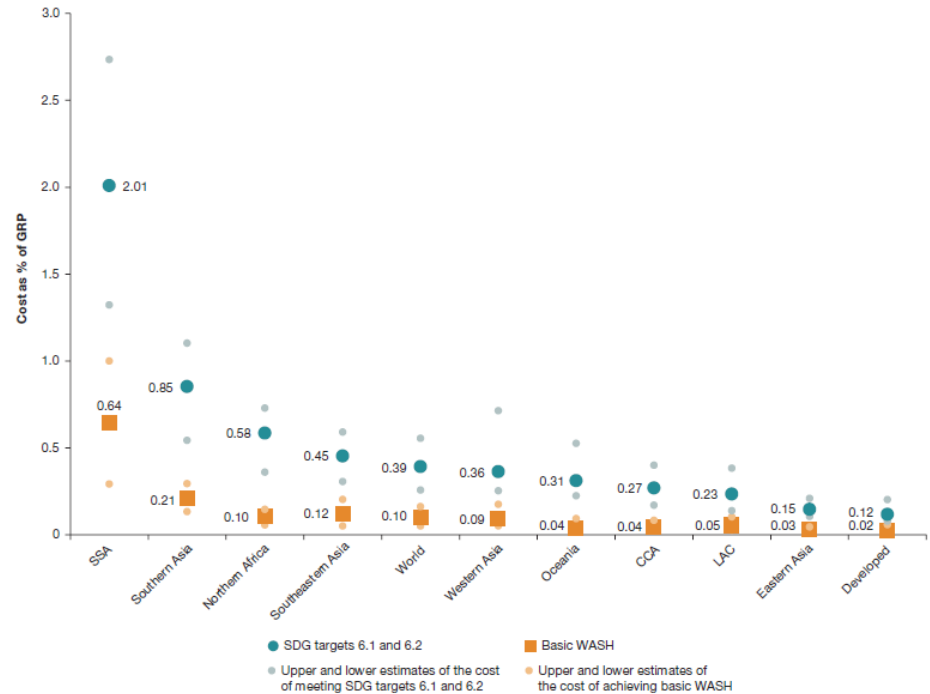


Sanitation Statistics - Africa



- Sanitation was the most off-track MDG
- Progress 24% to 30% access to improved facility from 1990-2015
- 70% of Sub-Saharan Africa lack access
- 19/27 highest OD countries in Africa
- Widespread OD countries have highest under-5 mortality, malnutrition and poverty
- Greater capital is needed for SSA due slow progress (WSP - Hutton & Varuhese, 2016)

FIGURE 2: WIDE VARIATION BETWEEN WORLD REGIONS IN CAPITAL COSTS AS A PROPORTION OF GROSS REGIONAL PRODUCT
 Costs of Basic and Safely Managed Services as Percentage of Gross Regional Product (GRP) by Region, with Uncertainty Range



Note: WASH = water, sanitation, and hygiene; SDG = Sustainable Development Goal; SSA = Sub-Saharan Africa; LAC = Latin America and the Caribbean; CCA = Caucasus and Central Asia. See table 2.2 for details on upper and lower values on variables varied in sensitivity analysis. Gross regional product is based on the aggregated GDP of countries in each region. An economic growth rate of 5 percent is assumed across all regions.

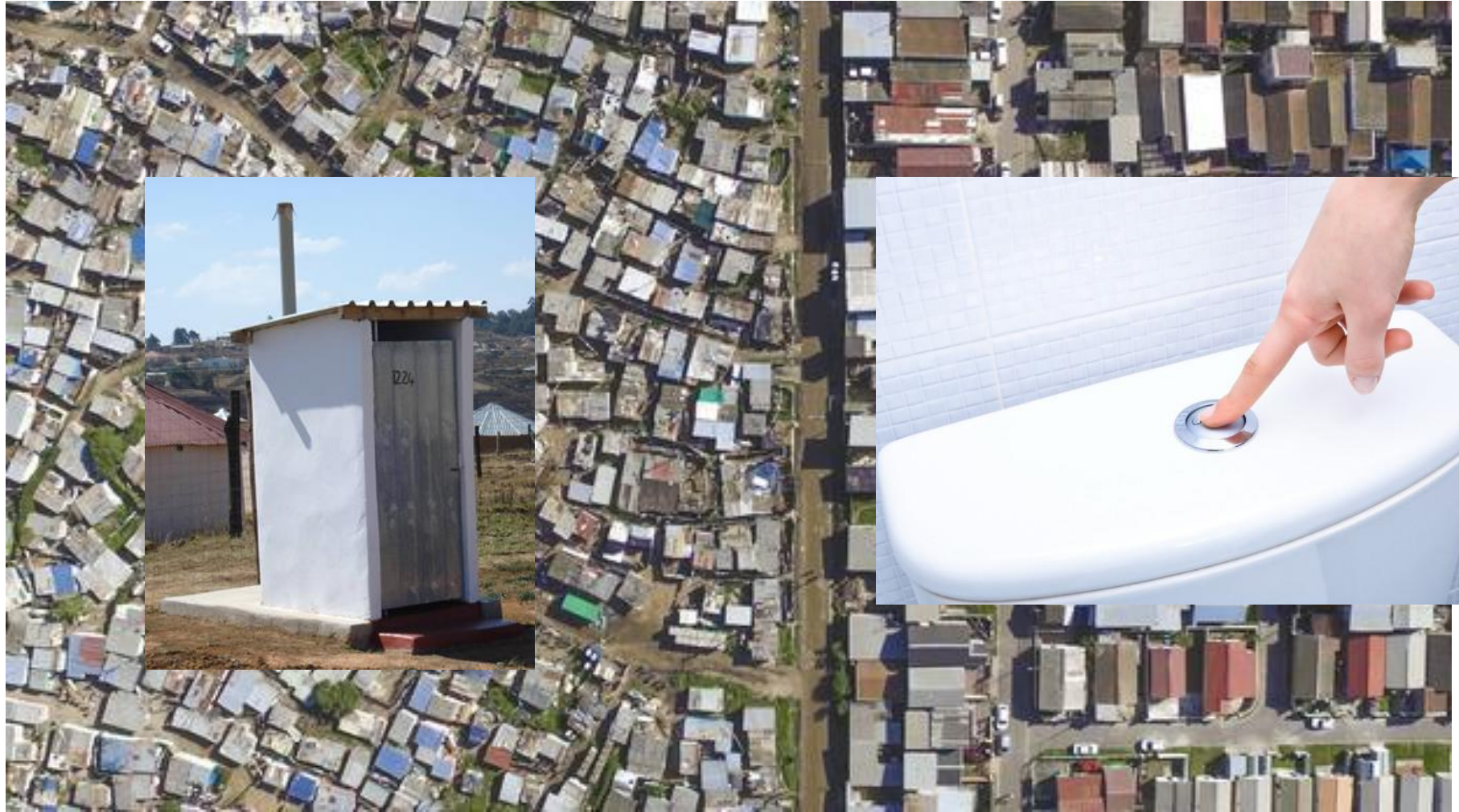
Source: WSP (2016)

Sanitation Makes Cents

“An overall estimated gain of 1.5% of global GDP and a US\$ 4.3 return for every dollar invested in water and sanitation services” (WHO, 2012 and 2017)

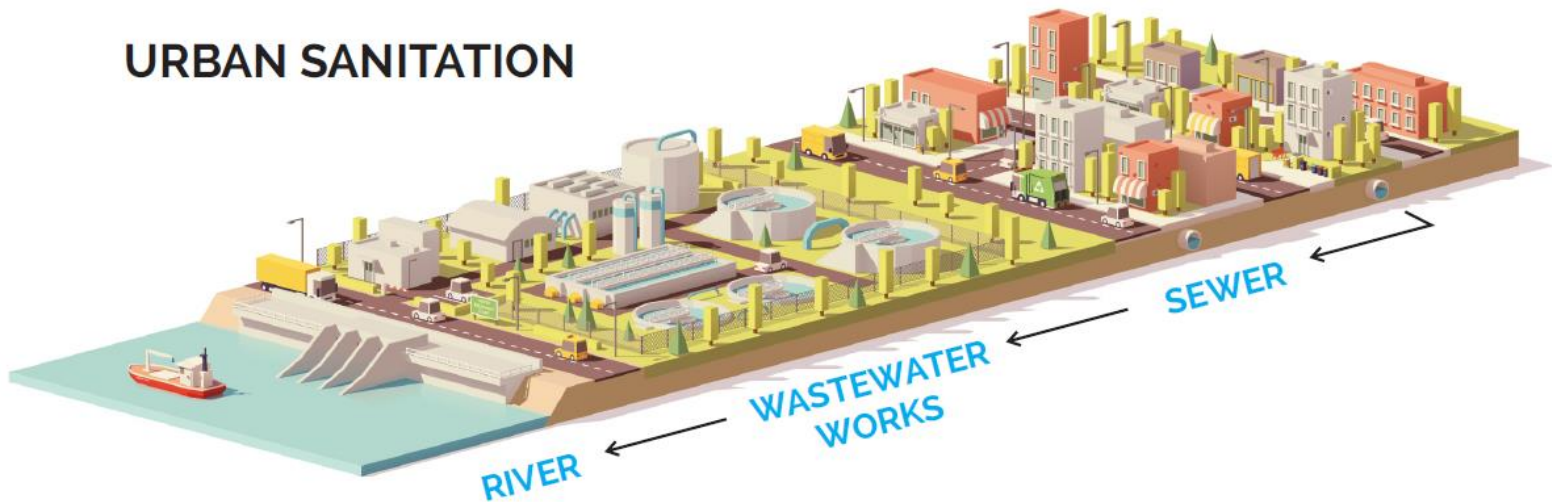
Limited Technical Options
We either flush or collect

Inequalities in our country



Binary Engineering Approach: Flush = “Gold Standard”

URBAN SANITATION

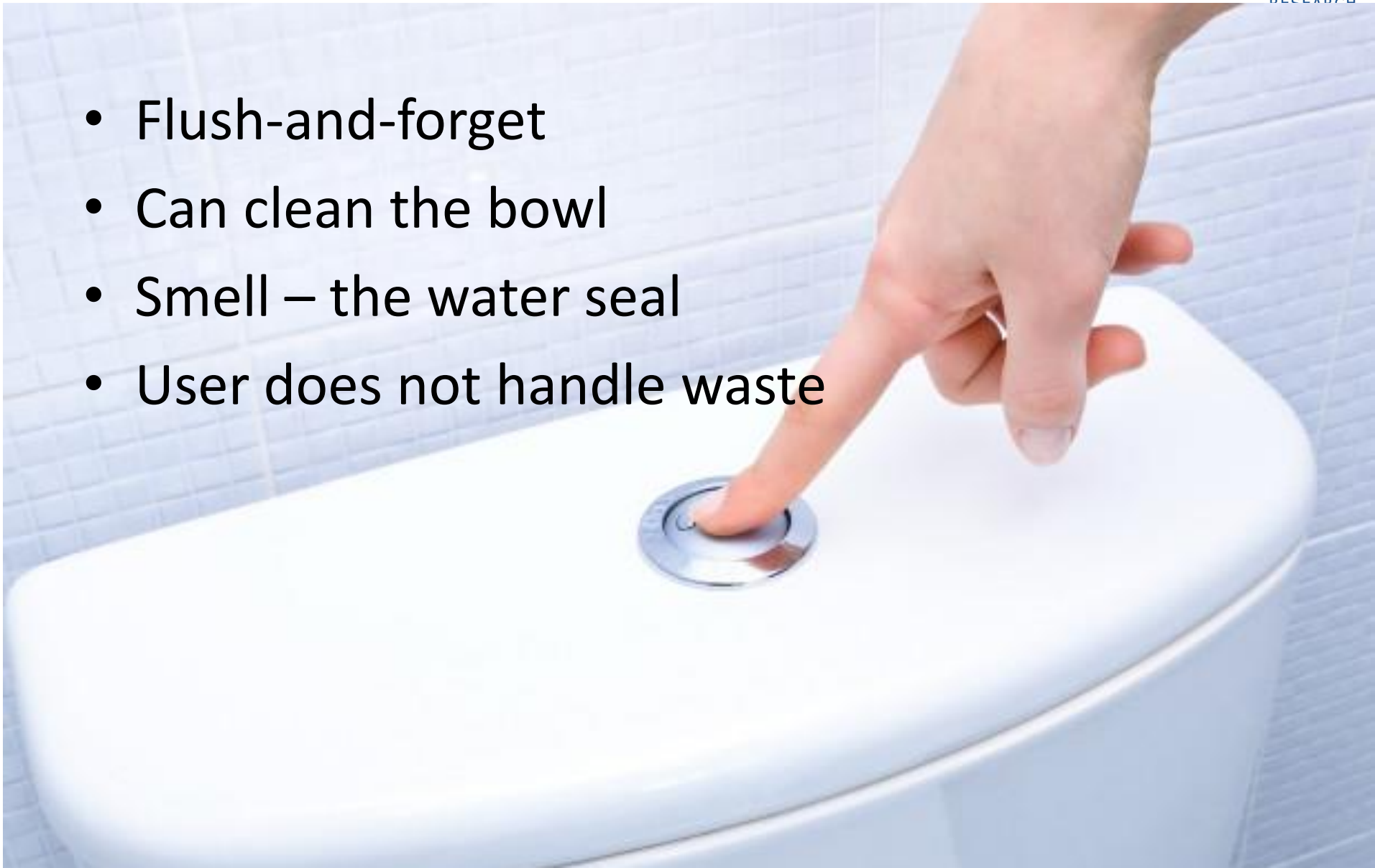


RURAL SANITATION



“Gold Standard”

- Flush-and-forget
- Can clean the bowl
- Smell – the water seal
- User does not handle waste



**Why Can't We Sewer the
Country?**

Full Sewers May Never Come

- CAPEX is high - sewer network is 5 to 50% higher than on-site alternatives
- Apartheid spatial geography – no sewers
- Requirement for water & energy
- Cost of service
- Capacity to deal with wastewater facilities

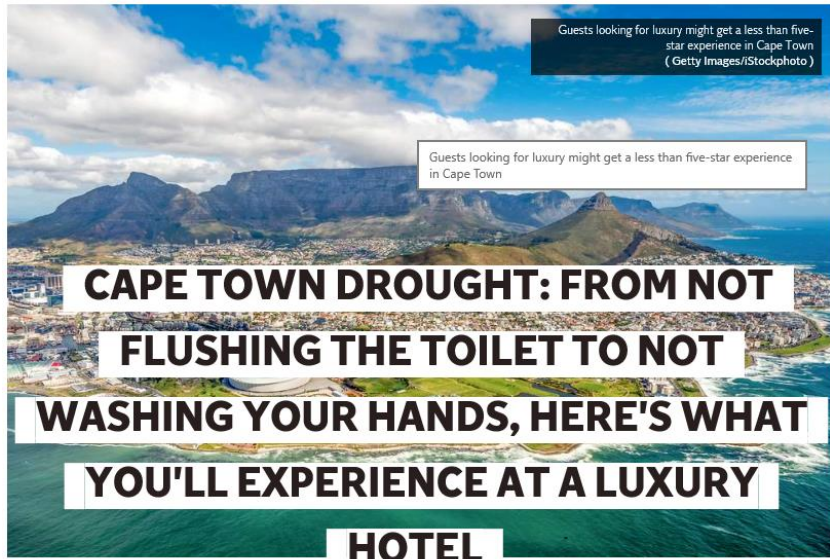


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Cape Town Drought 2017



INDY/LIFE INDYBEST LONG READS AIDSFREE INDY100 VOUCHERS
INDY/LIFE



Oil in the pool and toilet instructions that include 'if it's yellow, let it mellow': here's what to expect at Cape Town's finest hotels as Day Zero approaches

Helen Coffey | @LenniCoffey

Friday 2 February 2018 19:51 | 0 comments |



Like Click to follow The Independent Travel

Luxury hotels in Cape Town have had to bring in water-saving measures in response to **prolonged drought in the city**.

However, when *The Independent* got in touch with 10 four- and five-star



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Times LIVE

NEWS POLITICS SPORT TSHALIVE LIFESTYLE BUSINESS MOTORING MULTIMEDIA TIMES SELECT

SOUTH AFRICA

Flush with answers: WWF offers Day Zero toilet training

07 February 2018 - 09:25
BY TIMESLIVE

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Times SELECT Subscribe now

City engineers are working to ensure the sewerage system continues to function in order to protect the health of the public as well as the infrastructure.
Image: 123RF/Jaroonrat Vitoosuan

What to do when you can't flush the loo? That's the question tackled by WWF SA in this week's edition of its Wednesday Water Files, aimed at helping Capetonians to prepare for Day Zero.

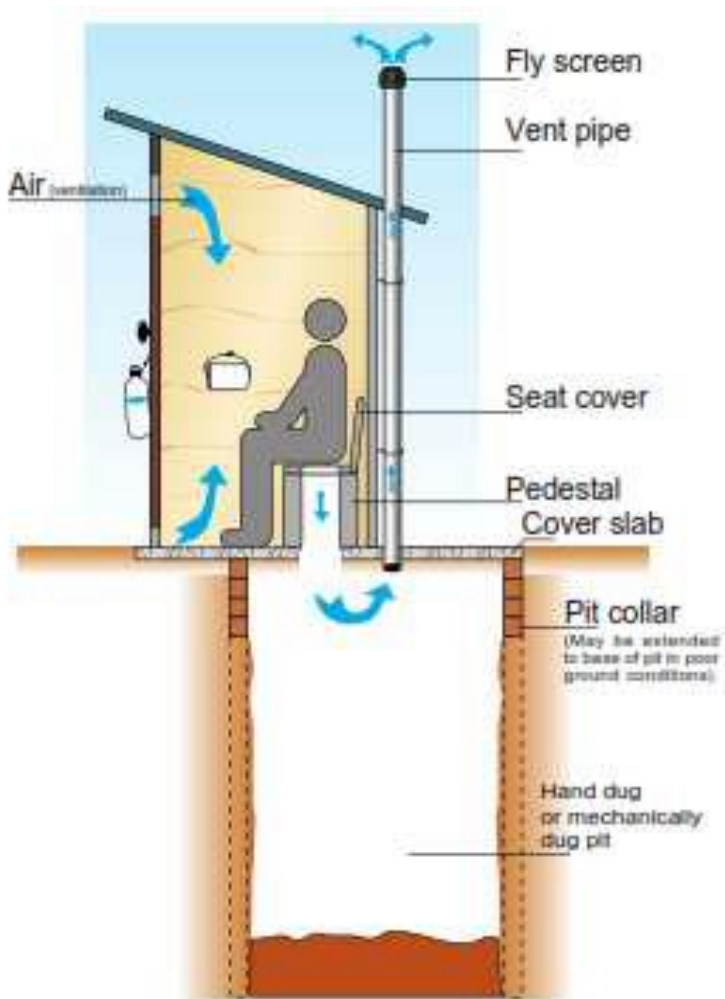
Here are its answers to some frequently asked questions.

Q: After Day Zero will I still be able to flush my toilet with rain water/greywater?

MOST READ

The Other Solution

Bottom-of-the-Rung

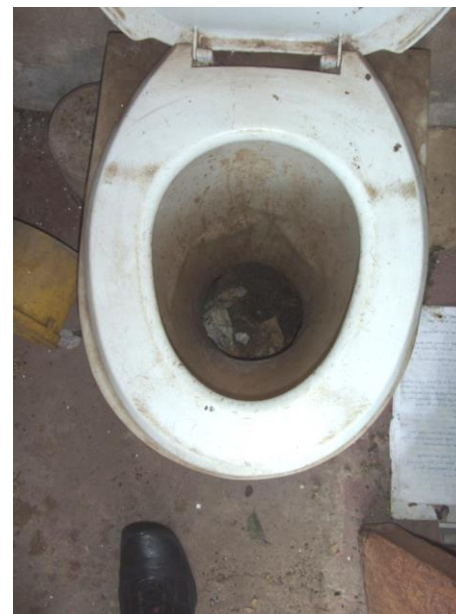
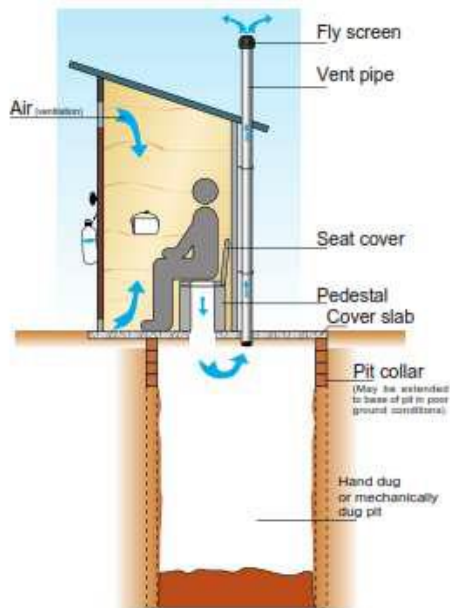


- ❖ Ventilated Improved Pit (VIP) latrine has been the government's minimum standard sanitation technology.
- ❖ Designed to reduce disease transmission and smells.
- ❖ Improve on stability of pit latrine structure.
- ❖ Has concrete slab and vent pipe
- ❖ Nearly 10% of South African population serviced by VIP toilets



Post Implementation Challenges

- ❖ Large infrastructure programmes to build VIP latrines in South Africa
- ❖ Around 30% of South Africans rely on VIP and derivatives
- ❖ Tipping point being reached – pits were filling but many municipalities did not O&M budget, policies & procedures for management
- ❖ SALGA (2009) survey showed 60% facilities conducting reactive maintenance while 40% had inadequate maintenance capacity.
- ❖ Limited technical know to empty & disposal pit contents





Mechanical emptying a problem!



Disposal can be a problem!

Access can be a problem!

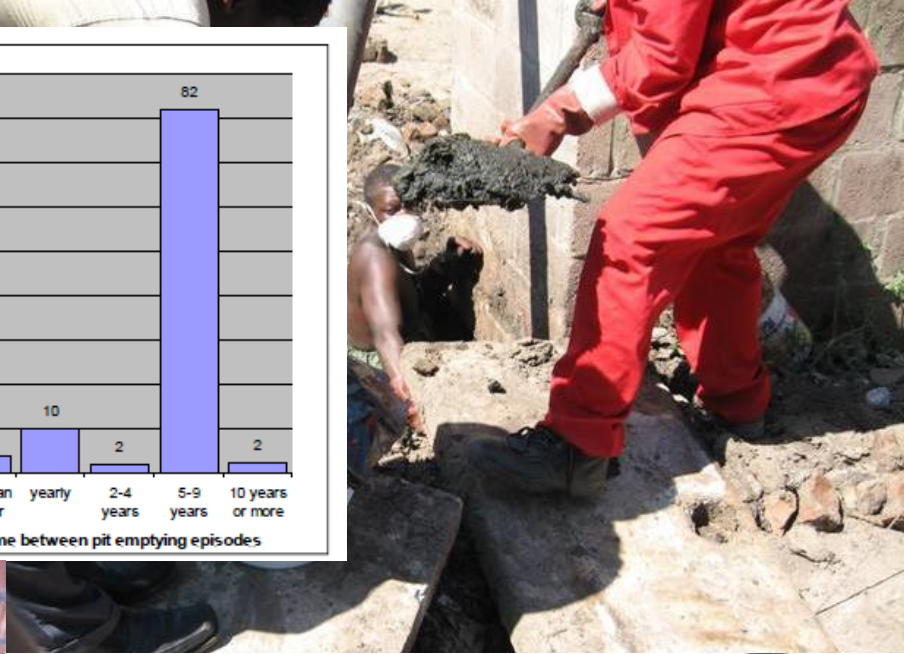
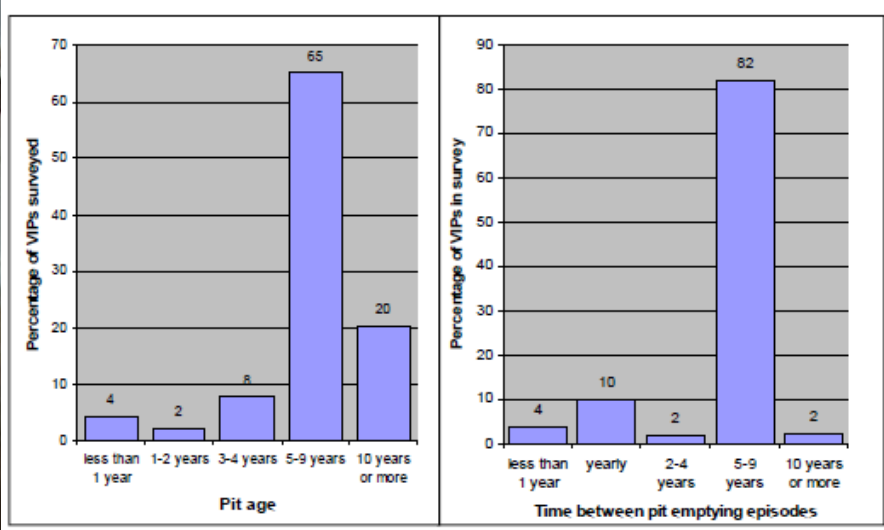
Dangerous



The Sludge Disposal Challenge

- Pits require regular emptying
- Contains pathogens
- Concentrated in nutrients
- Detritus
- Low biodegradability
- Landfill disposal (Class C)

Research in partnership with eThewkini and PRG UKZN dispelled myths that latrines do not fill



The Service Delivery Issue



IN DIRE STRAITS: Bulugha Farm School, situated just outside East London, is one such school that had to make do without proper toilet facilities. The school, which has 250 pupils enrolled, made use of a single pit latrine while other pupils were forced to relieve themselves in the bushes
Picture: MARK ANDREWS

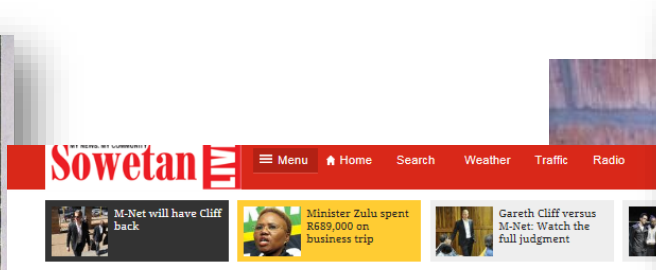
Commission set to investigate school sanitation problem

By ZISANDA NKONKORE
Education Reporter

THE Human Rights Commission (HRC) is to investigate schools in the Eastern Cape after it was found that

"Given the billions of rands made available to fund Eastern Cape education every year, it is unacceptable that almost one in five of the 5 694 public schools doesn't have the most basic facilities

lets at the school since it was built.
"This really affects us negatively because even the six pit toilets we have are not in a good condition and some of them should not even be in use," Maki said.



We were sick of poor sanitation: SJC

By Sapa | Jul 25, 2014 |

Social Justice Coalition (SJC) members refused to leave the Cape Town civic centre last year because they wanted to make a statement about poor sanitation in a magistrate's court heard on Thursday.

"Members had felt frustrated because we had been engaging with the city for two years," SJC general secretary Phumeza Mlungwana testified.

"The decision was that we needed very strong action to get the mayor's attention."

Mlungwana and 20 other members were arrested in September last year after singing and dancing at the stairs of the Cape Town civic centre without giving the city notice. Some of them had chained themselves to the stair railings, forming a human chain.

They had wanted to speak to mayor Patricia de Lille about the frustration at the city's perceived inaction over proper sanitation in informal settlements like Khayelitsha.

They were charged with convening a gathering or alternatively, convening or attending a prohibited gathering.

The group pleaded not guilty on the basis that their actions were not criminal.

Their lawyer Michael Bishop had applied for them to be discharged on Thursday, but this was refused.

Mlungwana said the SJC had fought tirelessly since 2008 to promote rights envisaged in the Constitution, accountability and active citizenship.

They decided to focus on sanitation after receiving numerous complaints about a lack of maintenance and consultation.

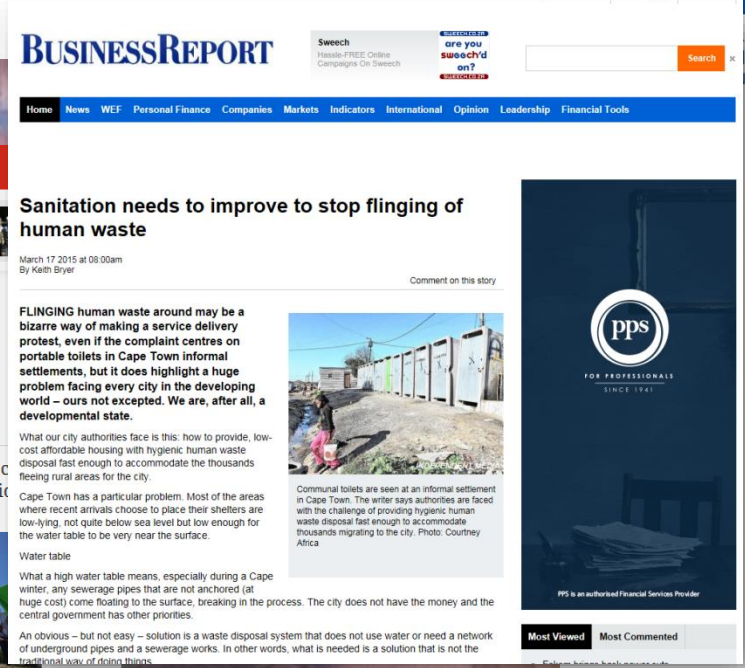
The SJC had been excited when De Lille committed to a janitorial service for informal settlement toilets at a sanitation summit in 2011.

Mlungwana said the implementation failed because of a lack of policy. The city eventually started stalling and "playing hide and seek".

The SJC's executive council decided last year that they would go to the civic centre and not leave until they had handed over a letter of demands.

"We chose 15 people because we didn't want to apply for the picket and wanted to stay within the law," Mlungwana said.

She will resume her testimony on October 7.



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Sanitation needs to improve to stop flinging of human waste

March 17 2015 at 08:00am
By Keith Bryer

Comment on this story

FLINGING human waste around may be a bizarre way of making a service delivery protest, even if the complaint centres on portable toilets in Cape Town informal settlements, but it does highlight a huge problem facing every city in the developing world – ours not excepted. We are, after all, a developmental state.

What our city authorities face is this: how to provide, low-cost affordable housing with hygienic human waste disposal fast enough to accommodate the thousands fleeing rural areas for the city.

Cape Town has a particular problem. Most of the areas where recent arrivals choose to place their shelters are low-lying, not quite below sea level but low enough for the water table to be very near the surface.

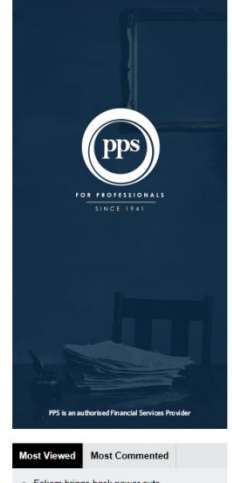
Water table

What a high water table means, especially during a Cape winter, any sewerage pipes that are not anchored (at huge cost) come floating to the surface, breaking in the process. The city does not have the money and the central government has other priorities.

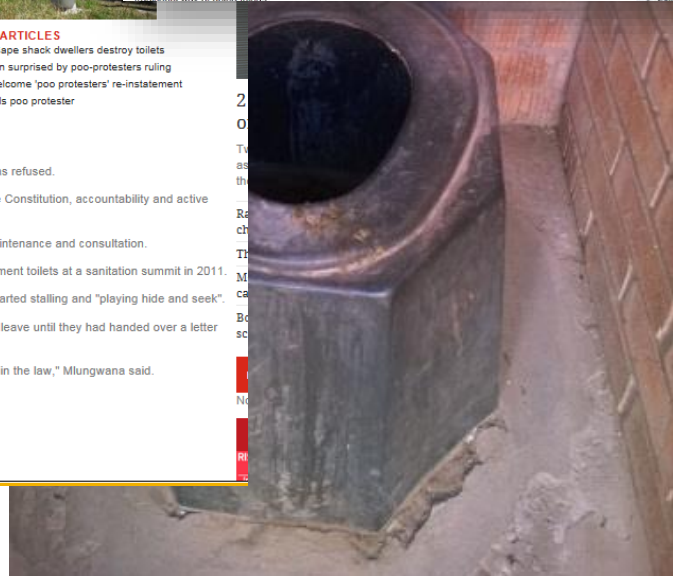
An obvious – but not easy – solution is a waste disposal system that does not use water or need a network of underground pipes and a sewerage works. In other words, what is needed is a solution that is not the traditional way of doing things.



Communal toilets are seen at an informal settlement in Cape Town. The writer says authorities are faced with the challenges of providing hygienic human waste disposal fast enough to accommodate thousands migrating to the city. Photo: Courtney Africa



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The Safety Challenge



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CHILD (3) DIES AFTER FALLING INTO PIT TOILET IN LIMPOPO

It's understood the incident occurred on Wednesday while the child was visiting a relative's home in Moletjie Ditenteng.



TIMELINE



Section 27: Ramaphosa's stimulus package far from good enough

2 months ago

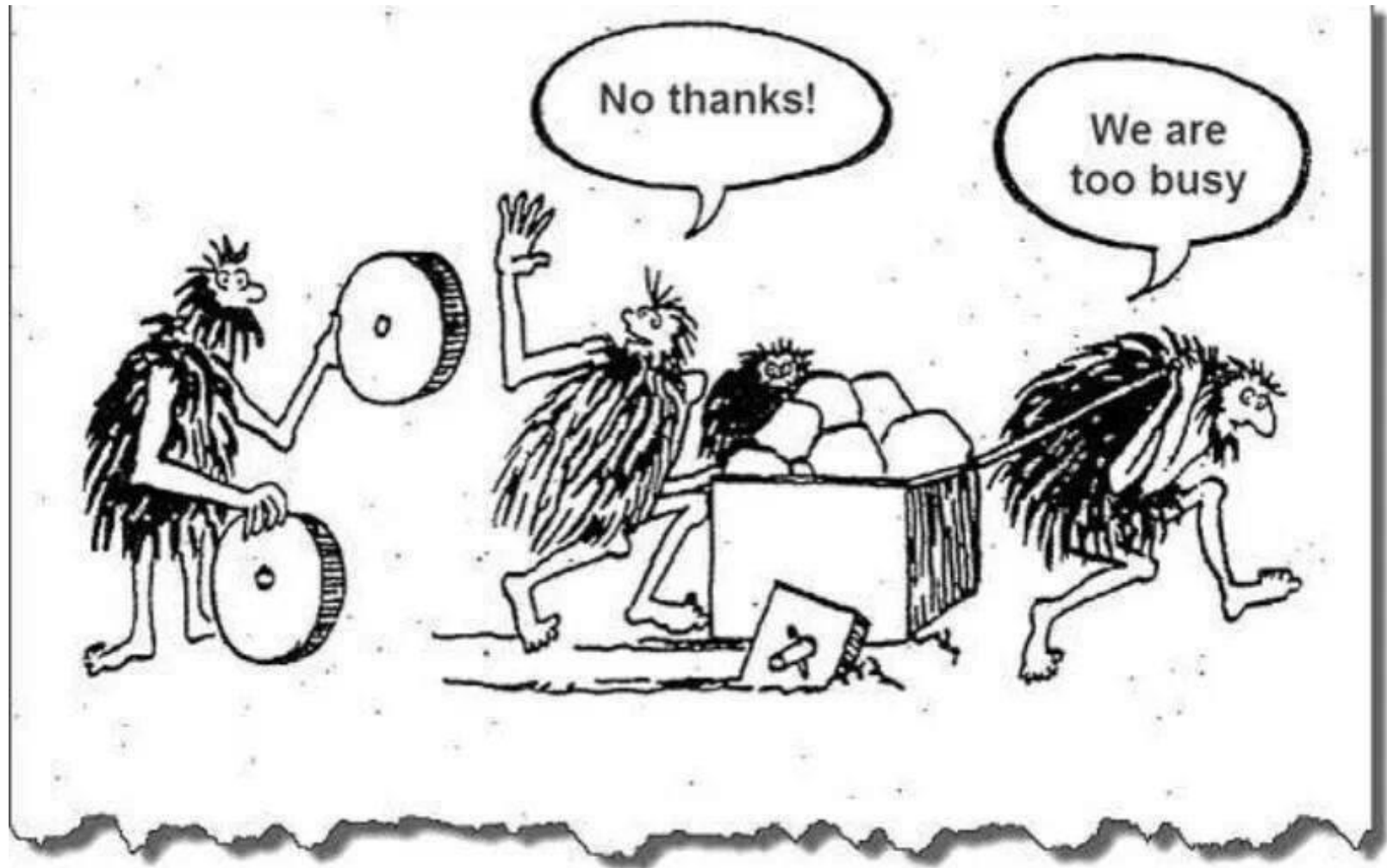


What about Cleaners & Emptiers?

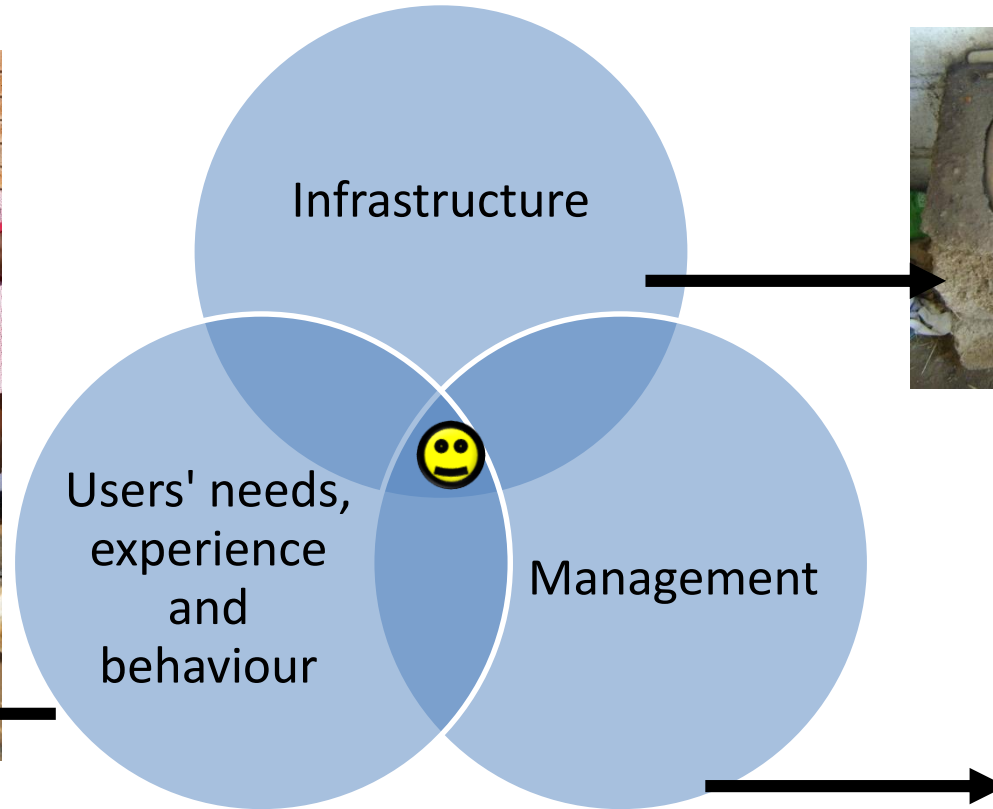


We Need to Innovate

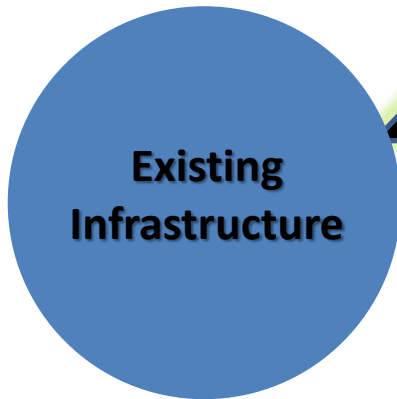
Addressing the Challenges Through Innovation



Sustainable Sanitation



WRC Strategic Programme



New Management Approaches

- New O&M models
- Training Sanitation Supply Chain
- Sanitation as Business Approach

Technology Upgrades

- Latrine upgrades
- Beneficiation of waste

Bridging & Technological Approaches

- Decentralised WWTWs
- Low Flush Toilets
- Beneficiation of waste streams

Game changing technology

- Off-grid, no / low water, beneficiation of waste, commercial business model

New Toilet Options

Current Binary Technology Paradigm

Conventional WWTW

Conventional linear design approach
Full flush is “gold standard”
Resource intensive (Capital, Sewers, Water, Energy, etc.)
Challenging to meet urbanisation & pop growth
Expensive & beyond reach of developing countries
Established technologies (discharge regulations, guidelines, policies, etc.)

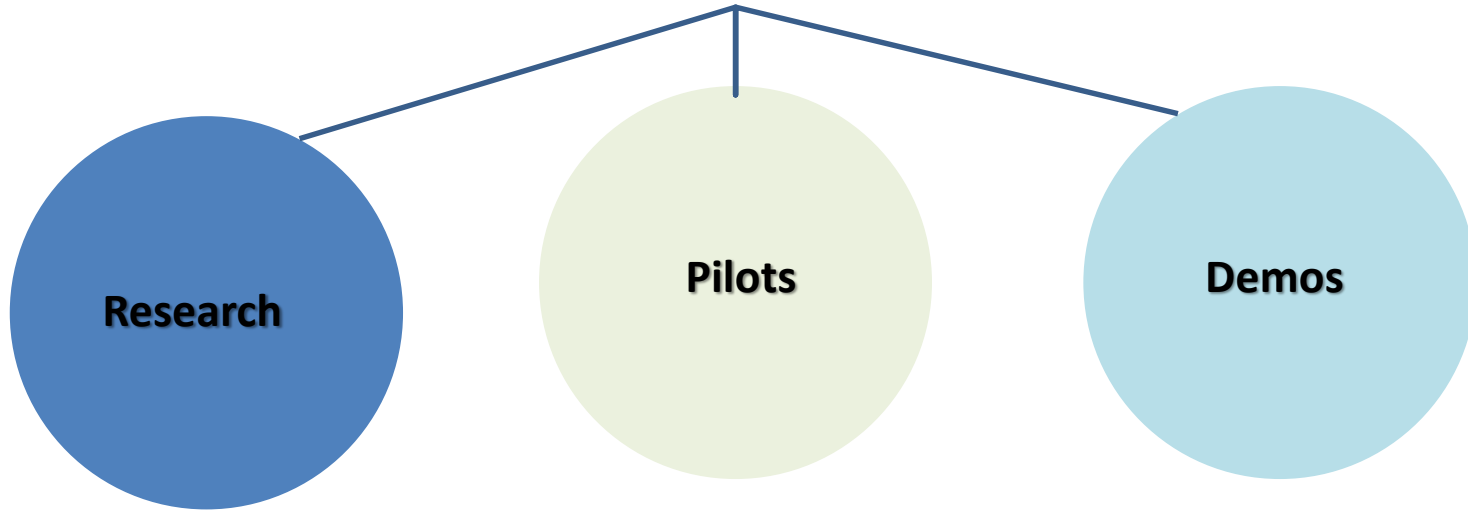
On-Site Sanitation

Most prevalent tech in SSA
Viewed as “temporary” solution
Less resources
Can be scaled at urbanisation rates
5-50% cheaper (than activated sludge)
Faecal Sludge Management – lack of policies & standards, disposal routes unknown, O&M overlooked.



Solution???

WRC RDI Programme



Pour Flush Technology

Completed
installation – note
no cistern, no
water connection =
no 24/7 leakage
1-2 Litres / Flush
NO USER OVER PIT
DESIGN



Splitter box to
enable usage of
two leach pits



Leach pit – easy
access for
emptying



Flush testing to
international MAP
protocol

Low Flush Application



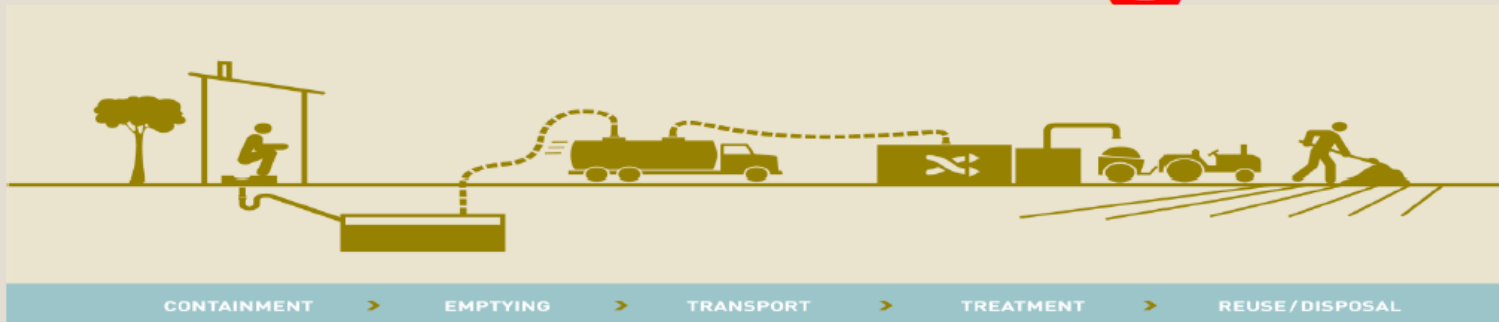
Re-Invented Toilet Applications



- No need for sewers
- Limited or no constant water supply
- Potential for beneficiation of streams

Eliminating sludges at source – MAJOR ALLEVIATION

Game Changers



Sanitation Value Chain



Bill Gates tells CNN how he plans to reinvent the toilet

TECHNOLOGY / 9 NOVEMBER 2018, 7:30PM / SUPPLIED



Bill Gates. Photo: AP

Field Testing in SA

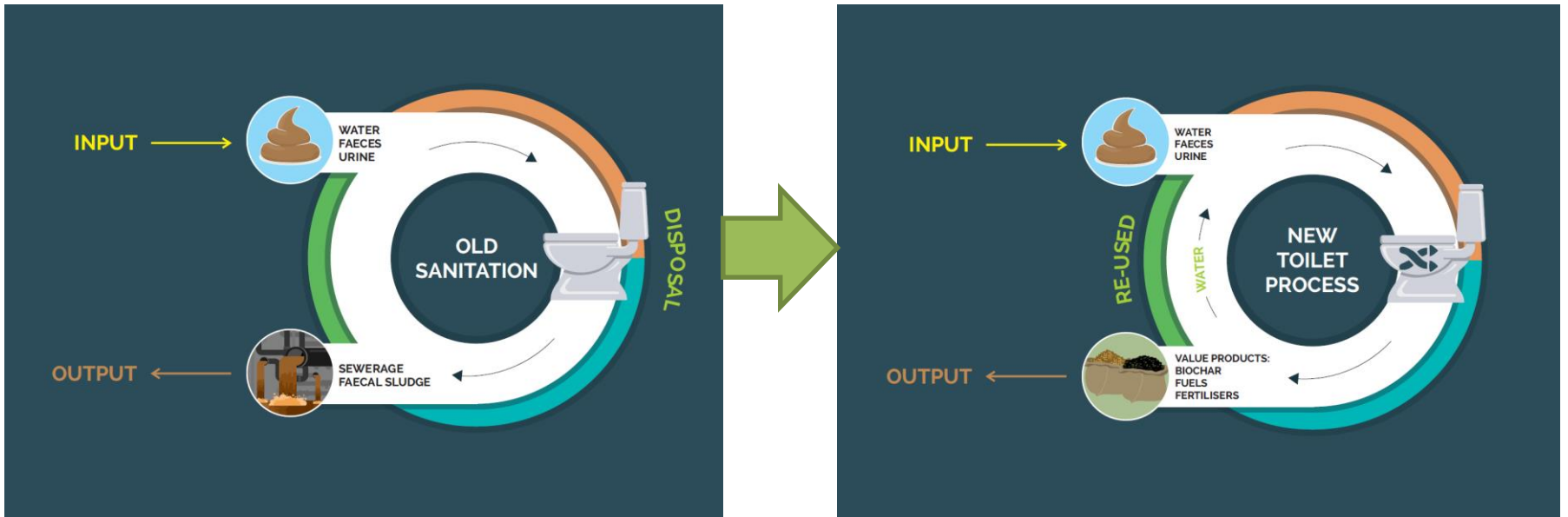


Enabling Drivers for Uptake

- DWS Sanitation Policy 2017
- DTI IPAP Water Chapter 2017
- ISO / SABS for Non-Sewered Sanitation
- Policy and Regulatory Guidelines

**It is also a Water
Management Strategy –
Preparing for Future**

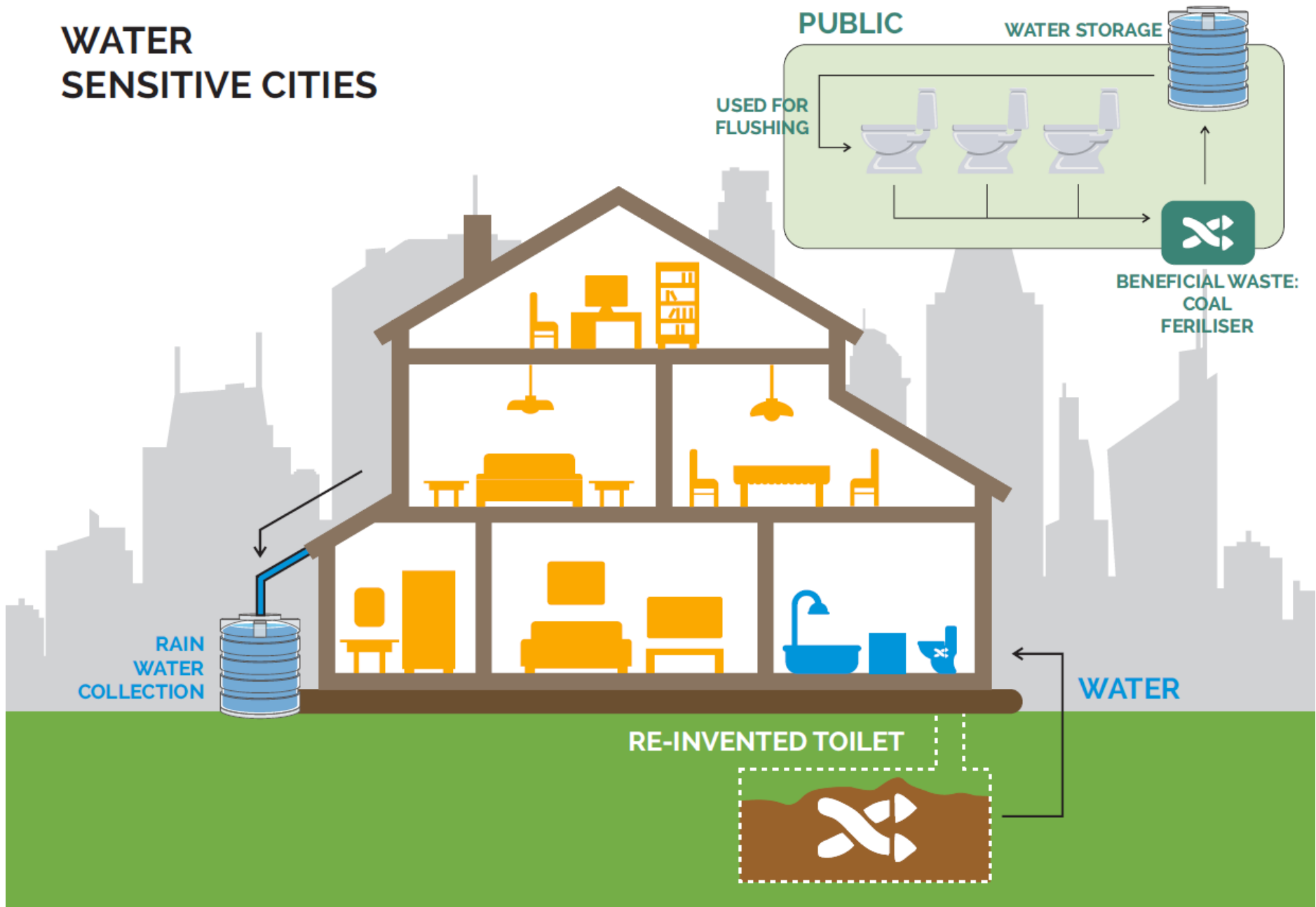
New Sanitation Models



New Supply Chains



WATER SENSITIVE CITIES



Managing What We Have Better

National SFD Initiative

- Emanti to develop SFDs for “volunteer municipalities” in SA
- Emanti working with, and drawing on the lessons of:
 - eThekweni Water and Sanitation (EWS)
 - SuSANA (SFD tool)
 - CSE (partner of WRC)
- 8 SFDs developed to-date



FSM5

Introduce SFDs to the sector/
Sensitise the sector and municipalities about SFDs to get buy in

Prepare to meet participating municipalities and develop SFDs

Conduct site visits and on site municipal interactions

Develop SFD Report

1. Securing “Volunteer Municipalities”

- Launched via profiling and introductory Master Class workshops (Eastern Cape, Kwa-Zulu Natal)
 - Two-day programme
 - Sector stakeholders (e.g. DWS, COGTA, SALGA, WRC, consultants, municipalities)
 - Technical aspects of SFD, hands-on/role-playing exercises
- Commit a willingness to participate (burdened municipal environment)



2. SFD Development – “Harnessing a Co-Create Approach”

Data Harvesting

- Harvest existing data (e.g. WSDP, IDP, STATSA, DWS, NT, etc.)
- Check (i) if data collected online is correct/appropriate, (ii) data gaps/availability
- Preliminary municipal engagements, including logistical arrangements

Site Visit & Assessment

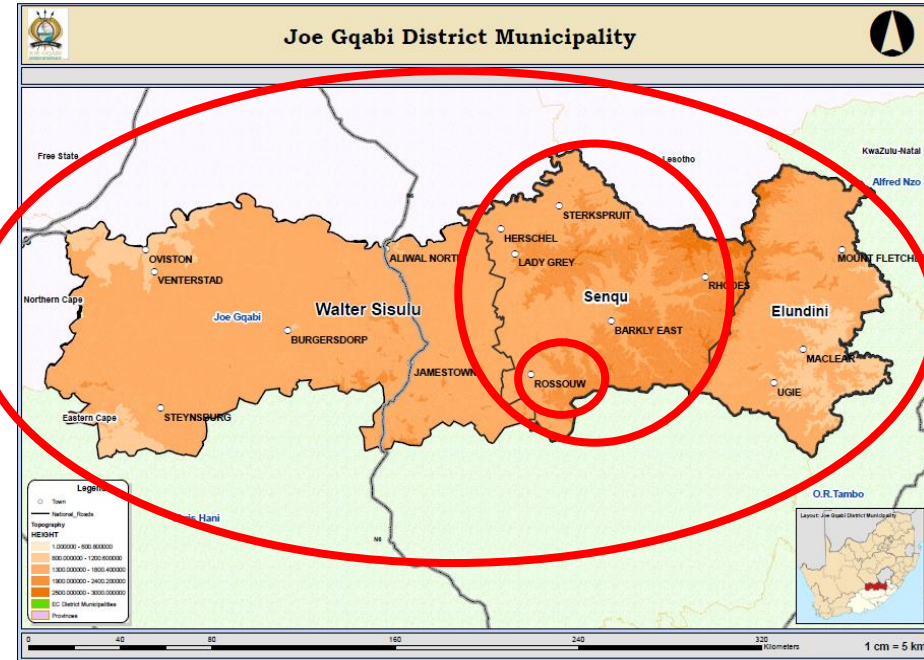
- Introductory Municipal presentation - *setting the SFD scene*
- Municipal status review/discussion, including presentation of "current view"
- Site selection and on-site assessment with municipal team
- Crafting the SFD graphic (1st order) and discussion
- SFD training and skills transfer to municipal team
- Actionables for joint completion of SFD

Reporting

- Iterative interactions with municipality to close data/information gaps
- Development of draft report
- Submit draft report for review, amendments/additions by municipal team
- Finalise report on feedback received

3. Engaging with “Municipal Realities”

- Allow flexibility within area selection
 - Data availability
 - Areas with challenges
- Site visits crucial
 - Confirm terminology alignment/system understanding
- Data collection gaps commonplace
 - If you don't get data there and then, its difficult afterwards
 - Access to all stakeholders a challenge



So does SFD meet South African municipal requirements?

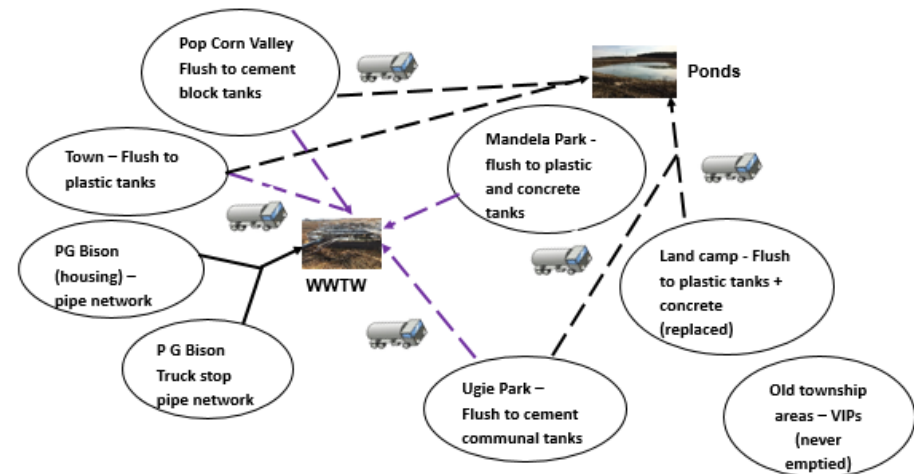


**Largely YES,
HOWEVER..**

**municipalities tabled the
need for an SA Municipal
SFD Report that supports
and guides remedial action**

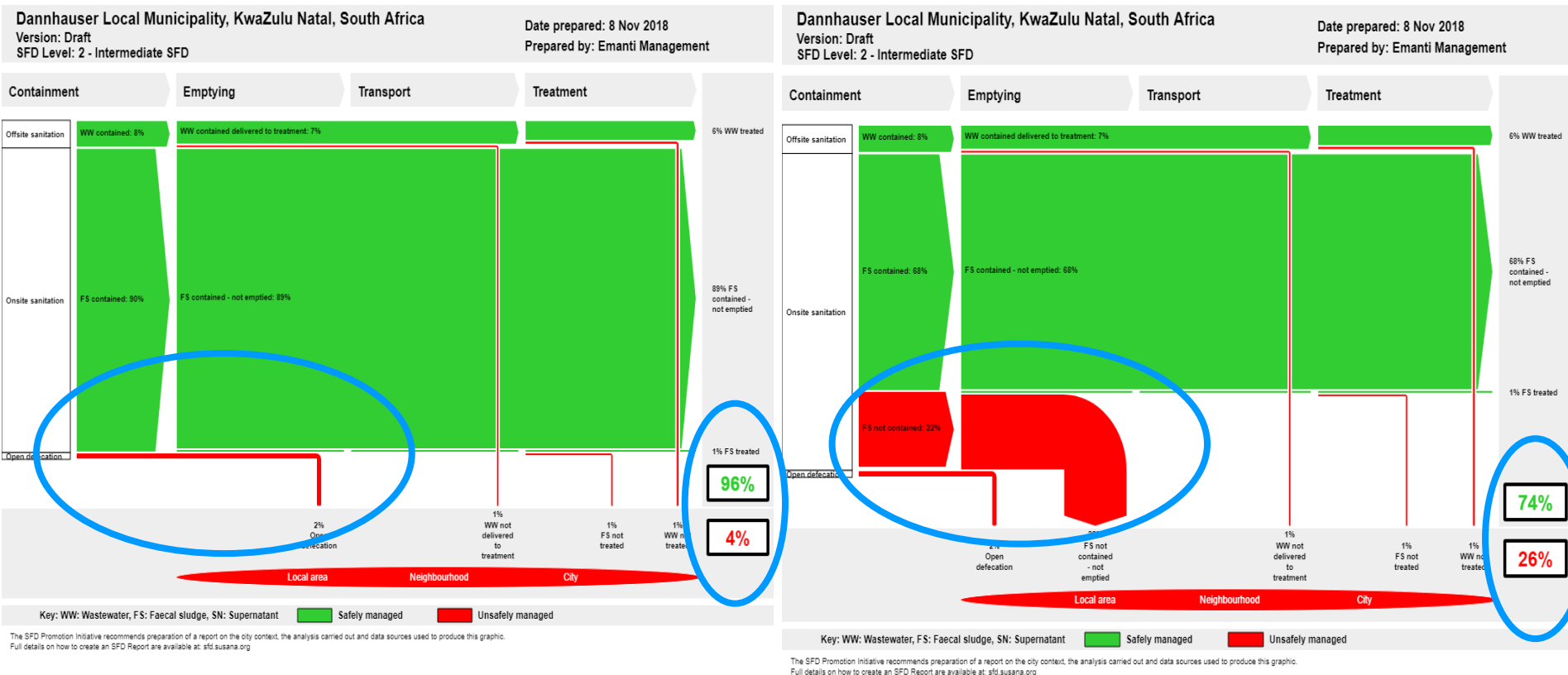
4. SO WHAT?

- Initiate and guide remedial actions within the municipality and its decision making structures
- Hence, included for municipal benefit:
 - Flow diagram
 - Wastewater sludge status and compliance
 - Current SFD and possible future scenario (e.g. without VIP emptying programme initiated)
 - HR, WCDM aspects
 - Remedial Action Plan



Municipal SFD Report: Adaptations

- Project a Future scenario – e.g. no VIP emptying strategy/plan



- Wastewater sludge status/compliance – include “off-site sanitation treated effluent compliance” calculation

Remedial Action Plan

- Need to plan and motivate

- Keep simple

- Why?
- What?
- Who?
- When?
- How much?

Shit/Excreta Flow Diagram Action Plan						
<i>Name of System/ Municipality</i>						
<i>Date:</i>						
1. Containment	Status	Comments and Current Interventions	Agreed Action	Responsible Person (Who)	Completion Date (When)	Proposed Budget
2. Emptying	Status	Comments and Current Interventions	Agreed Action	Responsible Person (Who)	Completion (When)	Proposed Budget
3. Transport	Status	Comments and Current Interventions	Agreed Action	Responsible Person (Who)	Completion (When)	Proposed Budget
4. Treatment	Status	Comments and Current Interventions	Agreed Action	Responsible Person (Who)	Completion (When)	Proposed Budget
5. Reuse	Status	Comments and Current Interventions	Agreed Action	Responsible Person (Who)	Completion (When)	Proposed Budget

- Link to, for example, REVAMP Tool and FSM Toolbox

Way Forward

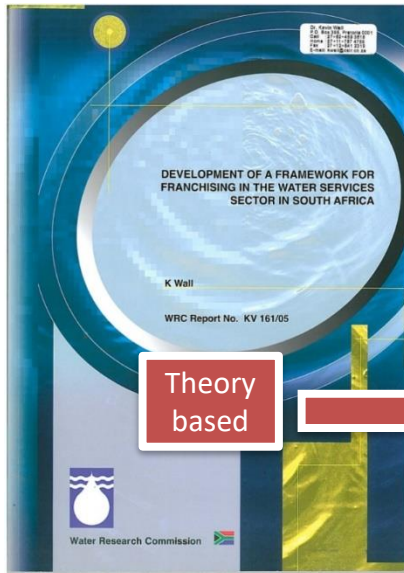
- Continue to refine SA approach
 - Test and amend with SA sanitation stakeholders
 - Collaborate with international SFD stakeholders
 - Alignment to international SFD (as far as possible)
 - SFD tool amendments?
- How do we get SFDs to more municipalities?
 - Understanding international funding mechanisms
- Develop a regional/national SFD
- Support SFDs updates to track renewed status
 - Otherwise, how do we know if we are making a difference?
 - Internal tracking ?
 - External monitoring ?



Management of Existing (and Future) Infrastructure

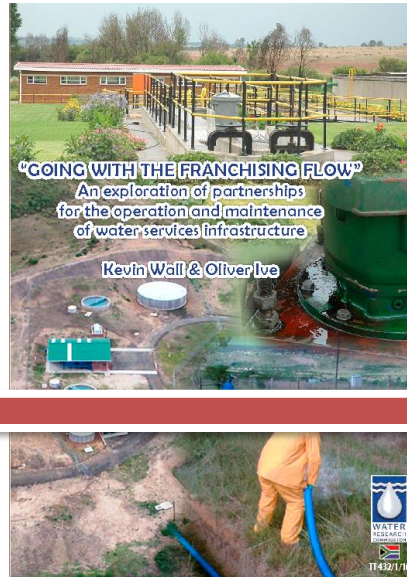
Social Franchising

Development of a Framework for Franchising in the Water Services Sector in South Africa
Kevin Wall, 2005

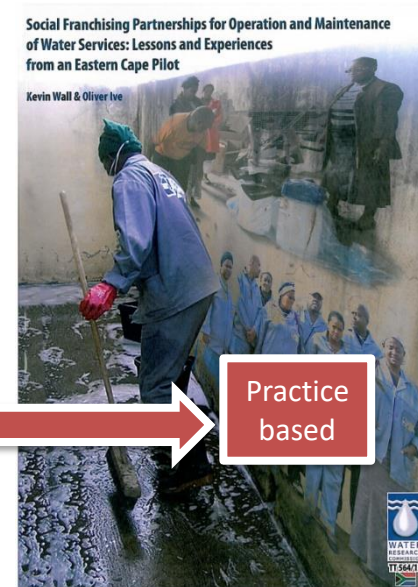


Theory based

“Going with the Franchising Flow” An Exploration of partnerships for the operation and maintenance of water services infrastructure
Kevin Wall & Oliver Ive, 2010




Social Franchising Partnerships for Operation and Maintenance of Water Services: Lessons and Experiences from an Eastern Cape Pilot
Kevin Wall & Oliver Ive, 2013



Practice based




Social Franchising Demos in E. Cape





WIN-SA
WATER INFORMATION NETWORK
- SOUTH AFRICA -

"Making knowlege work for us"



LESSON
SERIES
August 2013

SOCIAL FRANCHISING PARTNERSHIPS FOR O&M
OF SANITATION & WATER SERVICES
Lessons and Experiences from an Eastern Cape Pilot



WATER
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ACHIEVEMENTS OF THE PILOT

Significant achievements of the pilot project between 2009 and 2012 include:

- Water and sanitation facilities at 400 schools were serviced.
- Learners (especially the girl learners) at the 400 schools, who now have access to clean and hygienic toilets, have benefited tremendously.
- Six emergent franchisee micro-entrepreneurs were established and supported.
- A training programme was developed, consisting of: at the start of the pilot, a formal training course for all the prospective franchisees selected; on-site mentoring; regular get-togethers, report backs and sharing of experience; and ad hoc training.
- Operational methodologies for school and household situations have been developed.



Franchisees at work - digging holes for new toilets.

- More than 20 sustainable jobs and more than 50 part-time informal employment opportunities have been created.
- A public-private partnership, supporting job creation and the establishment and nurturing of emergent micro-entrepreneurs, has been created.
- The concept of social franchising partnerships for the operation and/or maintenance of sanitation and water services infrastructure has been shown to work successfully in two different situations (that is, routine servicing of schools sanitation facilities and for Amatole District Municipality (ADM) , household sanitation facilities, the toilet type in both cases being VIPs).

Furthermore, the programme continues to establish and support locally-based small enterprises for the provision of appropriate and locally-based service solutions. It is creating jobs and entrepreneurial opportunities, and up-skilling rural people through facilitating

* The extent of the DoE's satisfaction with the performance of the franchisor and franchisee small enterprises can be gauged by its publicly stated commitment to progressively roll this approach out to all of its schools (approximately 6000 in number) in all of the education districts of the province. The extent of the ADM's satisfaction can be gauged by its subsequent appointment of the franchisees to undertake further work on household toilets, and its stated willingness to make further appointments.

Butterworth Pilot Key Statistics:

- 400 schools
- Six microenterprises
- Training provided
- 70 jobs (50 part-time)

East London Demonstration

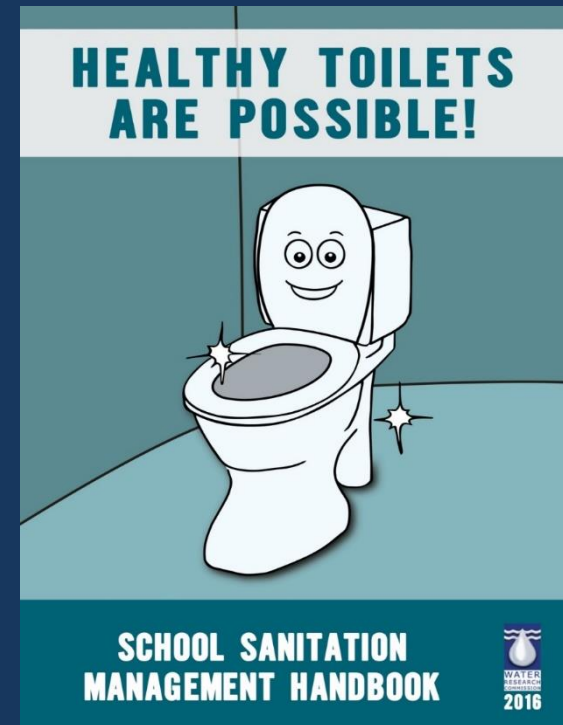
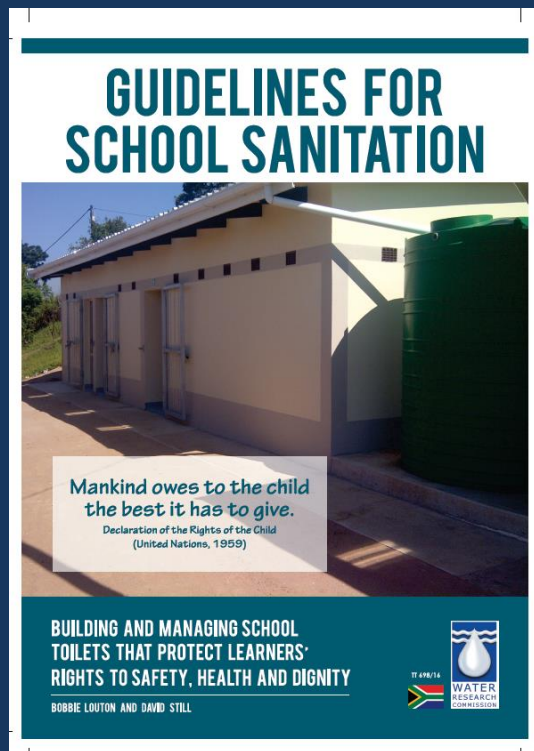
East London Key Statistics:

- 302 schools
- 302 Sanitation Clubs & Hygiene Campaigns
- 90,000 students
- Five microenterprises (4 female)
- Training provided
- 70 jobs (50 part-time)
- Pilot conversion of sludge to bio-char (charcoal substitute)





WRC's Guideline for School Sanitation and School Sanitation Management Book









CLEANING THE SCHOOL TOILETS AFTER BREAKS

PREPARING FOR CLEANING



PUT ON YOUR SAFETY EQUIPMENT IN THIS ORDER



Prepare a 20 litre bucket of water. Add 200 ml Jik.
Prepare a 10 litre bucket of water. Add enough soapy cleaner to make bubbles.

	OUTSIDE TAPS Wipe with a wet Jik cloth.
	INSIDE TAPS AND BASINS Wipe with a wet Jik cloth.
	DOOR HANDLES, FLUSH HANDLES AND LOCKS Wipe with a wet Jik cloth.
	TOILET SEATS AND RIMS Wipe with a wet Jik cloth AFTER other surfaces.
	SCRUB INSIDE PEDESTAL with soapy cleaner and a brush.
	PICK UP RUBBISH and put in bins. SWEEP with broom. MOP with Jik cleaner.

FINISHING UP






	RINSE the cleaning cloth, mop and bucket at a drain and DRY in the sun.
	DO NOT pour cleaning water into the toilets.

CLEANING THE SCHOOL TOILETS AFTER SCHOOL


PREPARING FOR CLEANING

PUT ON YOUR SAFETY EQUIPMENT




Prepare Jik solution and soapy solution.

	Scrub these surfaces with a brush and soapy solution, and wipe with a cloth: OUTSIDE TAPS, INSIDE TAPS AND BASINS, DOOR HANDLES, FLUSH HANDLES AND LOCKS
	SCRUB INSIDE PEDESTAL with soapy cleaner and a brush. For flush toilets, flush and add some Jik to soak until you are done. Then flush again.
	EMPTY RUBBISH BINS.
	SWEEP with broom. MOP with Jik cleaner.
	RESTOCK soap and toilet paper dispensers.

FINISHING UP

	MAKE A FRESH BUCKET OF JIK SOLUTION and leave the mop and cloth to soak overnight. DRY in the sun in the morning.
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EXTRA CLEANING ONCE A WEEK

	WALLS Scrub with cleaning brush and soapy solution wherever they look dirty.
	WINDOWS AND SILLS Wash with a wet cloth.
	BINS Scrub with Jik solution.

Turning Theory into Practice

School Management Model

- Emphasis on the importance of sanitation as part of school life
- Provides the knowledge and expertise to be able to assess, plan, develop tools, implement, monitor and evaluate independently
- Provides financial planning for sanitation services
- WRC piloted at 8 schools with KZN DBE
- FMCG Company saw potential – extended pilot to 150 schools & provides cleaning supplies



Though some HSOs were unwilling to make room for the toilets in their cleaning duties, some schools did effectively adjust to the new programme with success.





What key drivers lead to an enabling environment where effective management of school toilets can take place?

BEFORE AND AFTER PHOTOS

Windows



Doors



Corridors



Hand Washing Basins





BEFORE



AFTER

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