The status and use of potable water efficient devices in the domestic and commercial environments in South Africa

WRC Project K5/1606

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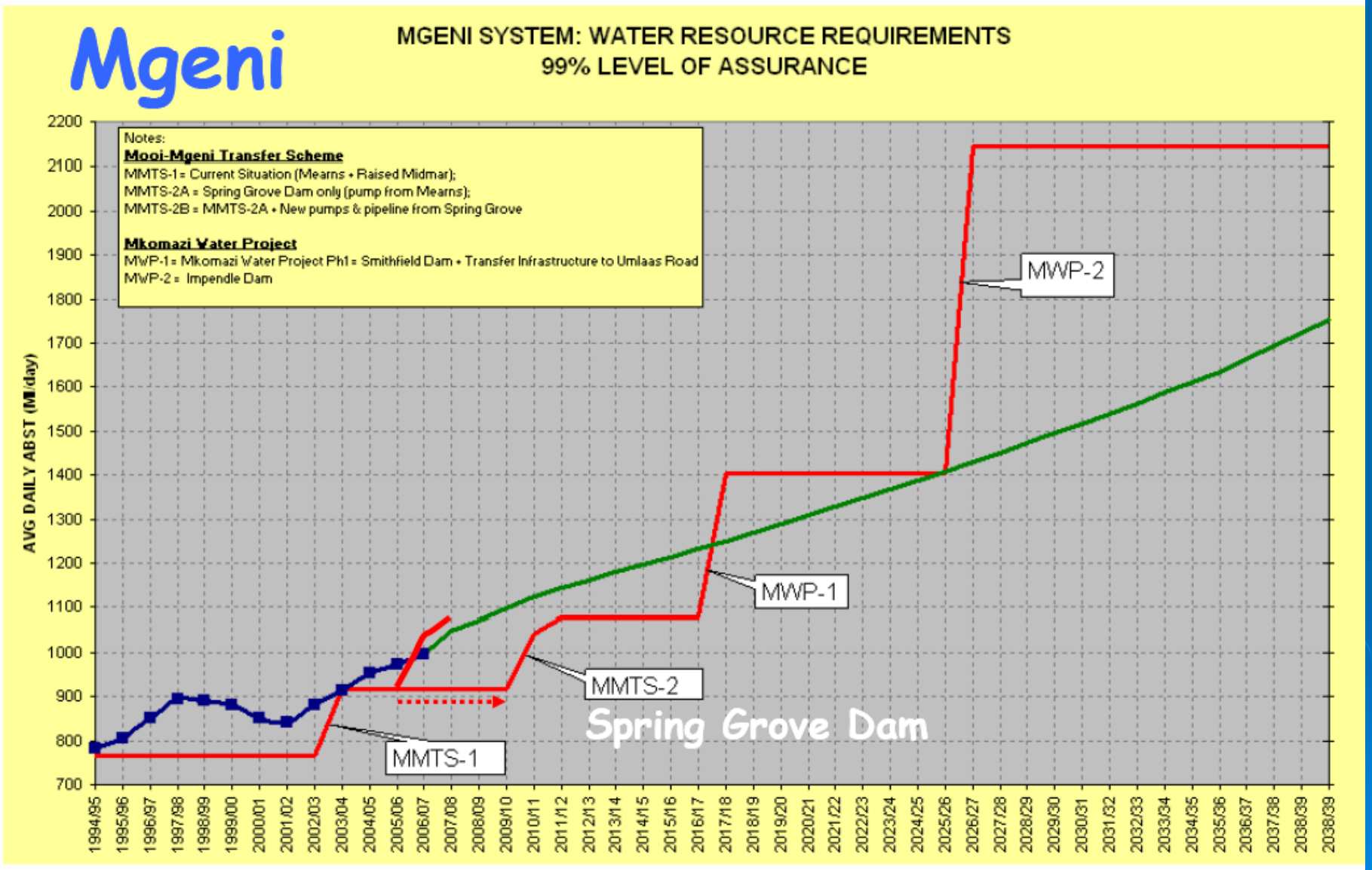
WRC
40 Year Celebration Conference
1 September 2011

Overview

- Why is efficient water use important?
- What are “water efficient devices” (WEDs)?
- WEDs in the water conservation context
- Some international experience
- SA policy on WEDs
- WEDs in the commercial environment in SA
- WEDs in the domestic environment in SA
- An assessment of the economics of WEDs
- Recommendations for WED uptake

Why is efficient water use important?



What are Water Efficient Devices?

Old style toilets with 13 and 18 litre flush cisterns

What are they not?

Examples of Water Efficient Toilet Devices

6/3 litre dual flush

4.5 litre flush

“Hippo Bag” displacement device

What are Water Efficient Devices? (2)

What are they not?

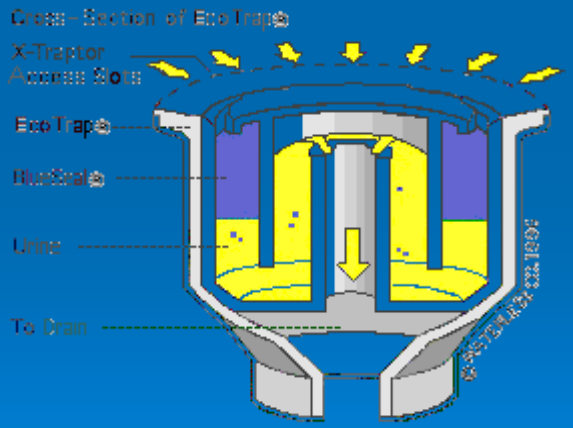
Automatic flushing urinals

Examples of Water Efficient Urinals

Addicom waterless urinals installed at a Johannesburg taxi rank

Examples of Water Efficient Urinals (2)

Sannitree Urinal
with “Ecotrap” seal



The Shower: One of the most effective and simple retrofits

Standard Shower

7.5 to 20.9 litres/min

Aerated shower

4.5 to 10.7 litres/min

An example of a *less* water efficient shower

The body massage shower

· shower with seven spray nozzles
· consumption 100 litres per minute?

What are Water Efficient Devices? (4)

push button
demand tap

infrared
demand tap

tap aerator

A water efficient device is one which serves the same function as its traditional alternative, without any reduction in performance, while using less water.

A water efficient device is one which serves the same function as its historic alternative, without any reduction in performance, while using less water.

Not so efficient public standpipe, Edendale, Pietermaritzburg

South Africa is a world leader in the development, but not necessarily in the operation and maintenance, of water efficient public standpipes

The ultimate in water efficiency – a family well in Maputaland making use of the extensive shallow local aquifer. Zero wastage.

Pour Flush Toilet

– not just for Asians!

No plumbing, no wastage.

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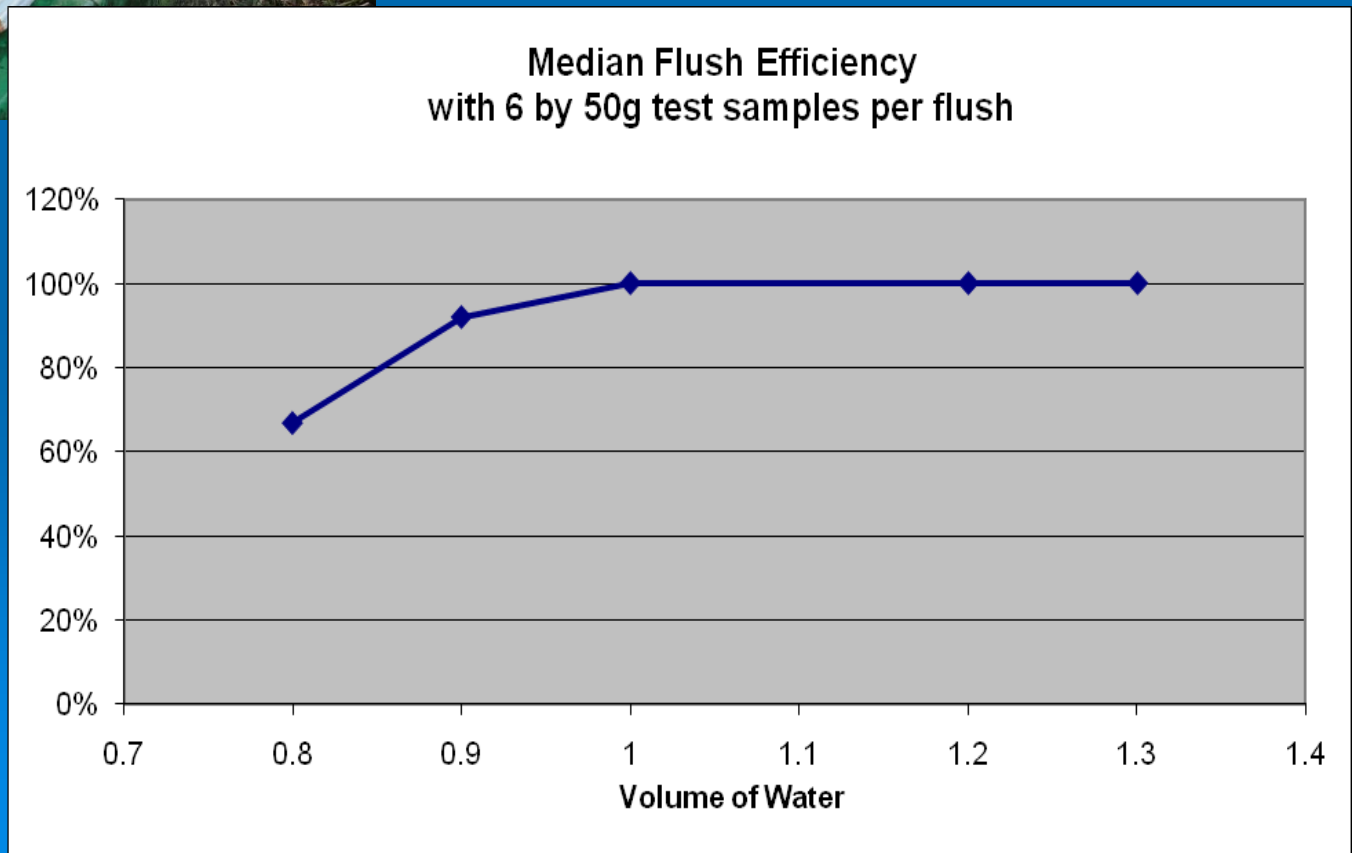
The WRC-PID pour flush prototype uses just 750 ml for the water seal, and flushes reliably on as little as one litre.



WEDs in the Water Conservation / Water Demand Management Context

WC/WDM strategies can be divided into four categories

1. Operational
2. Economic
3. Socio-political
4. Structural

Domestic demand (excluding leak repair!) *<u>can</u>* be reduced by 25% with the installation of water efficient devices.

[Note: But not so simple with existing housing stock!]

Some international experience

- Seattle, USA: Since 1982 the total water used has decreased by 20%, even as the population has increased by 23%.
- Los Angeles, USA: Toilet retrofit programme with $100 rebate incentive. Women's NGO provides guarantees for poor families leading to 50 000 retrofits and employment for 25 people
- Santa Monica, USA: Water use surveys, education, landscaping measures, toilet retrofits, interest free loans. Water use reduced by 14%
- Boston, USA: Multipronged strategy reduces water demand by 24% between 1987 and 1997
- New York, USA: Multipronged strategy reduces water demand 14% from 1991 to 1998.
- Windhoek – 30% *per capita* reduction in water demand 1975-2005

Australia Water Efficiency Labelling Standards (WELS) - introduced on voluntary basis in 1998.

From October 2003 labelling became mandatory for showerheads, washing machines, dishwashers and toilets.

SA Policy on WC/WDM (which includes the promotion of WEDs)

- The National Water Act of 1998 requires the promotion of water use efficiency and effective management of water resources
- In 2004 DWAF published its *Water Conservation and Water Demand Management Strategy for the Water Services Sector*
- This strategy includes inter alia the objective to create a culture of Water Conservation and Water Demand Management *for all consumers and users.*
- DWAF has a directorate dedicated to water efficiency.
- DWAF has developed Model Water Services Bylaws which do contain general clauses relating to water efficiency. However, the specifics are left to each municipality to decide.

DWAF Model Bylaws

- Water conservation dealt with by the following:
  - Municipal consent new pipes and fittings
  - Standards pertaining to quality of fittings
  - Powers to prevent wasteful water use and impose water restrictions
  - Prohibitions on wasteful water use by consumers
    Requirement that the consumer ensure that any equipment or plant connected to a water installation uses water in an efficient manner.
  - Annual water audit required for users consuming more than 3 650 kilolitres per annum

Water Bylaws reviewed to date

- Model Bylaws
- Polokwane
- Cape Town (Sept 2006)
- Sol Plaatje (Kimberley) 2006
- Msunduzi (March 2005)
- Umhlatuze (Richards Bay) 2005
- Johannesburg (May 2004)
- Emfuleni (May 2004)
- Tshwane (November 2003)
- Ekurhuleni (March 2002)
- Mbombela (Nelspruit etc) post 1997
- eThekwini
- Nelson Mandela (post 1990)
- Bloemfontein (1975)
- Overstrand (Hermanus) June 1953

Cape Town

- Revised bylaws gazette in September 2006
- Provision made for water efficient devices in the following ways:
  - Public wash basins and showers fitted with demand type valves
  - Max flow rate basin taps: 6l/min
  - Max flow rate showerhead: 10l/min
  - Toilet cistern may not exceed 9.5l
  - No automatic urinals
  - Outside taps must be self closing

Water Bylaws and WED

- Limits on Shower flows becoming more common (Tshwane, Ekurhuleni, Cape Town, uMhlatuze, Emfuleni - all 10 litres/min)
- Old style automatic flushing urinals out (Tshwane, Ekurhuleni, Cape Town, uMhlatuze, Nelson Mandela)
- Limits to cistern capacity coming in e.g.
  - Cape Town 9.5 litres
  - eThekwini 9.5 litres
  - Nelson Mandela between 9.5 and 8.5 litres
  - Ekurhuleni 6 litres
  - uMhlatuze 6 litres
  - Emfuleni and Tshwane 9.0 litres

  (with dual flush/interruptible flush if more than 4.5 litres)

Water Bylaws - Penalties

- Model Bylaws recommend R2000 for first offence, R1000 per day for continued offence and R4000 for second offence
- Emfuleni: Domestic R4 000 + R2 000/day
  Commercial R40 000 + R20 000/day
- Polokwane R10 000 + R500/day
- Tshwane “up to R5000” + “up to R5000 per day”
- Ekurhuleni “up to R20 000”
- eThekwini R500 for first offence and R1000 for second
- uMhlatuze unspecified but “up to R50 per day” for continuation
- Mbombela “up to R300” and “up to R50 per day” for continuation
- Bloemfontein “up to R100” plus R4 per day.
- Hermanus: 50 pounds, and 1 pound per day for continued offence!
- Johannesburg. No offence.

Bylaws and Building Codes

- Municipal water bylaws would benefit from revised building codes
- Report 1999 interdepartmental task team set up to assist National Department of Housing : “National Norms and Standards in Respect of Permanent Residential Structures”
  - Plumbing fixtures to be in accordance with National Water Conservation Campaign, and must include “appropriate devices such as: water conserving taps, low rate shower-heads [and] dual flush toilets”

WEDs in the Commercial Environment in SA

- Hotels
- Airports
- Petrol stations
- Sports grounds
- Hostels
- Golf courses
- Shopping malls
- Prisons
- Hospitals

Hospitals

Hospital	Category	Annual Consumption (kl)	Area (m^2)	Water use m^3/m^2/annum	UK Bench mark
Chris Hani	Large acute or teaching hospital	1,203,324	222,496	5.22	1.66
Johannesburg	Large acute or teaching hospital	720,192	378,634	1.90	1.66
Private 3	Small acute or long stay hospital without personal laundry facility	13,716	5,188	2.64	1.17

Hospital water use

Guidelines (CSIR Red Book) for water consumption in hospitals is 300 litres/bed/day

Hospital	Monthly Consumption (kl)	No. of Beds	Occupancy %	Resi-dents	Staff	Use (litres)	Use (litres)	Use (litres)
						Per patient per day	Per bed per day	Per capita per day
Chris Hani	101,501	2,888	78	970	5,071	1501	1,172	402.6
Johannesburg	60,016	954	90	1,420	3,599	2,330	2,096	335.9
Prince Mshyeni	48,152	1,080	80	500	2,000*	1857	1,486	470.9
Manguzi	1,890	251		162	460	-	251	72.1
Private Hospital 1	4,043	260	60	0	555	864	518	187.1
Private Hospital 2	1,668	202	74	0	210	372	275	152.6
Private Hospital 3	3,927	230	75	0	505	427	569	190.7

Building / Institution	Water demands before and after the retrofits
Helderberg Municipality : Strand Main Building	250kl to 75 kl per month
Helderberg Municipality : Somerset West Library	80kl to 20 kl per month
City of Tygerberg : Slaney Centre	130kl to 30kl per month
President High School	1200kl to 200kl per month
University of Stellenbosch : Lydia Hostel toilets	50kl to 20kl per month
University of Stellenbosch : Irene Hostel toilets	550kl to 350kl per month
Mountain Breeze Caravan Park	220kl to 40 kl per month

(Source: http://www.webfoundry.co.za/wdm2/html/tips.html accessed 24 May 2006)

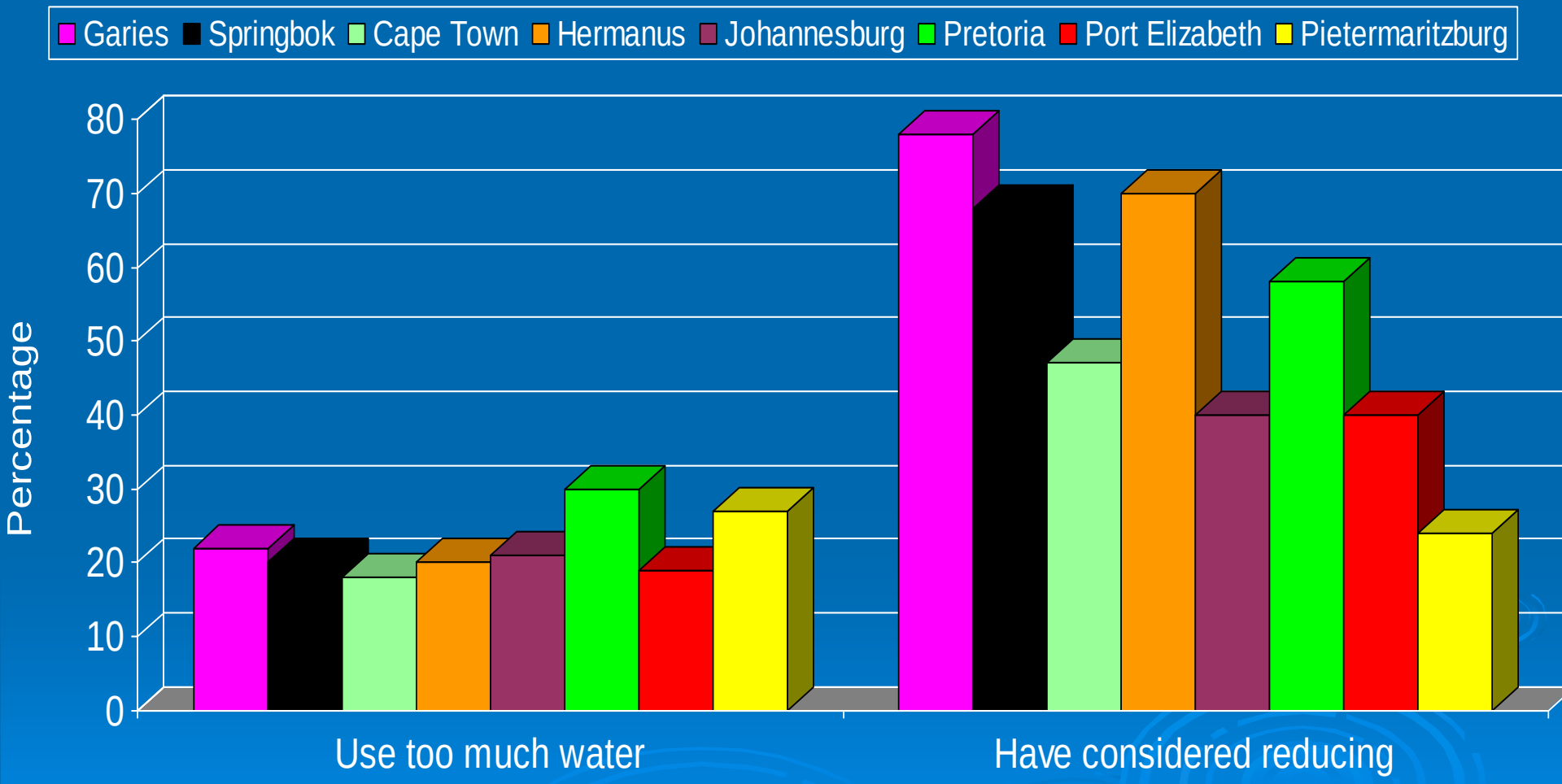
Domestic survey of knowledge of and attitudes to WEDs

- Attitudes towards water use and water conservation (inside & outside the home)
- Knowledge of water efficient devices
- Uptake of water efficient devices
- Reasons given for low uptake of devices
- Potential to improve uptake of water efficient devices

Sample size

City / Town	Sample Size
Durban, KZN	240
Pietermaritzburg, KZN	94
Cape Town, Western Cape	250
Hermanus, Western Cape	50
Johannesburg, Gauteng	272
Pretoria, Gauteng	145
Port Elizabeth, Eastern Cape	149
Garies, Northern Cape	40
Springbok, Northern Cape	47
Polokwane, Limpopo	141
Total	**1 428**

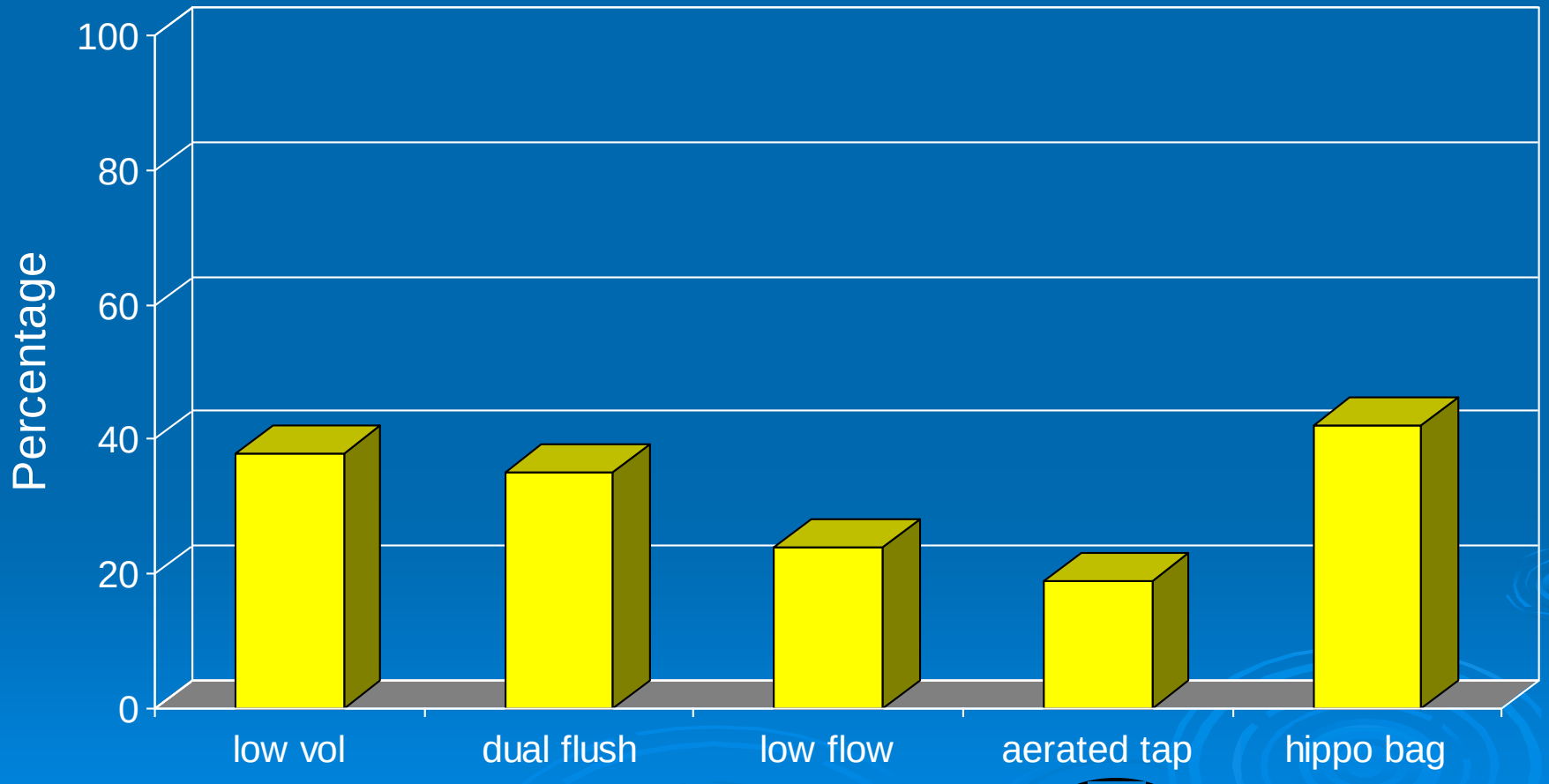
Attitudes to water conservation



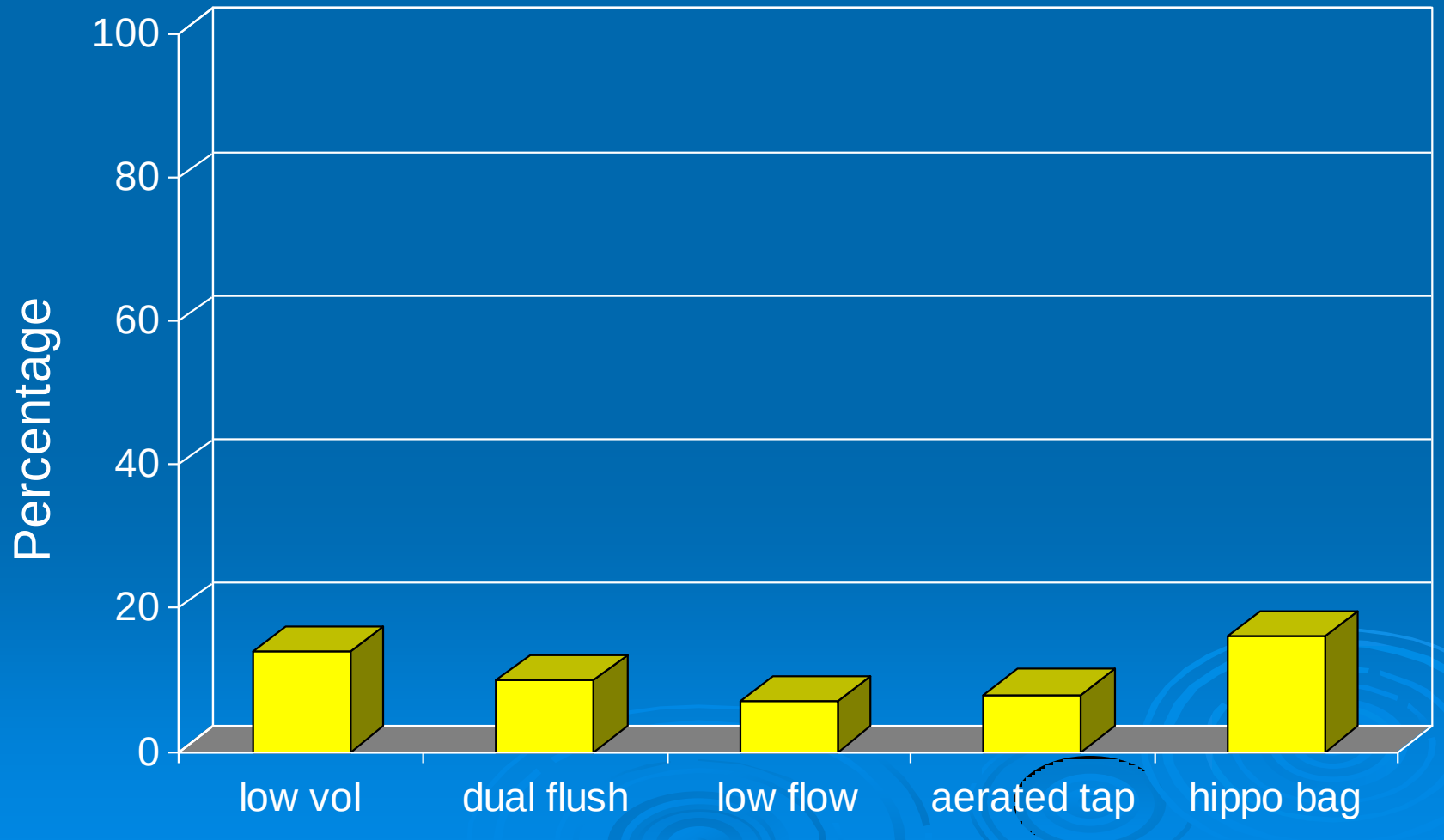
Comparison of average water use and attitudes towards water conservation

Suburb	Oct 2004 avg (kl)	Jan 2005 avg (kl)	% of h.holds who think they use too much water	% of h.holds who have considered reducing consumption
Durbanville	44.07	30.86	4	39
Fish Hoek/ Simon's Town	23.43	17.24	9	39
Hout Bay	44.73	30.87	10	48
Khayelitsha	16.47	15.15	33	50
Mitchell's Plain	17.87	17.40	17	48

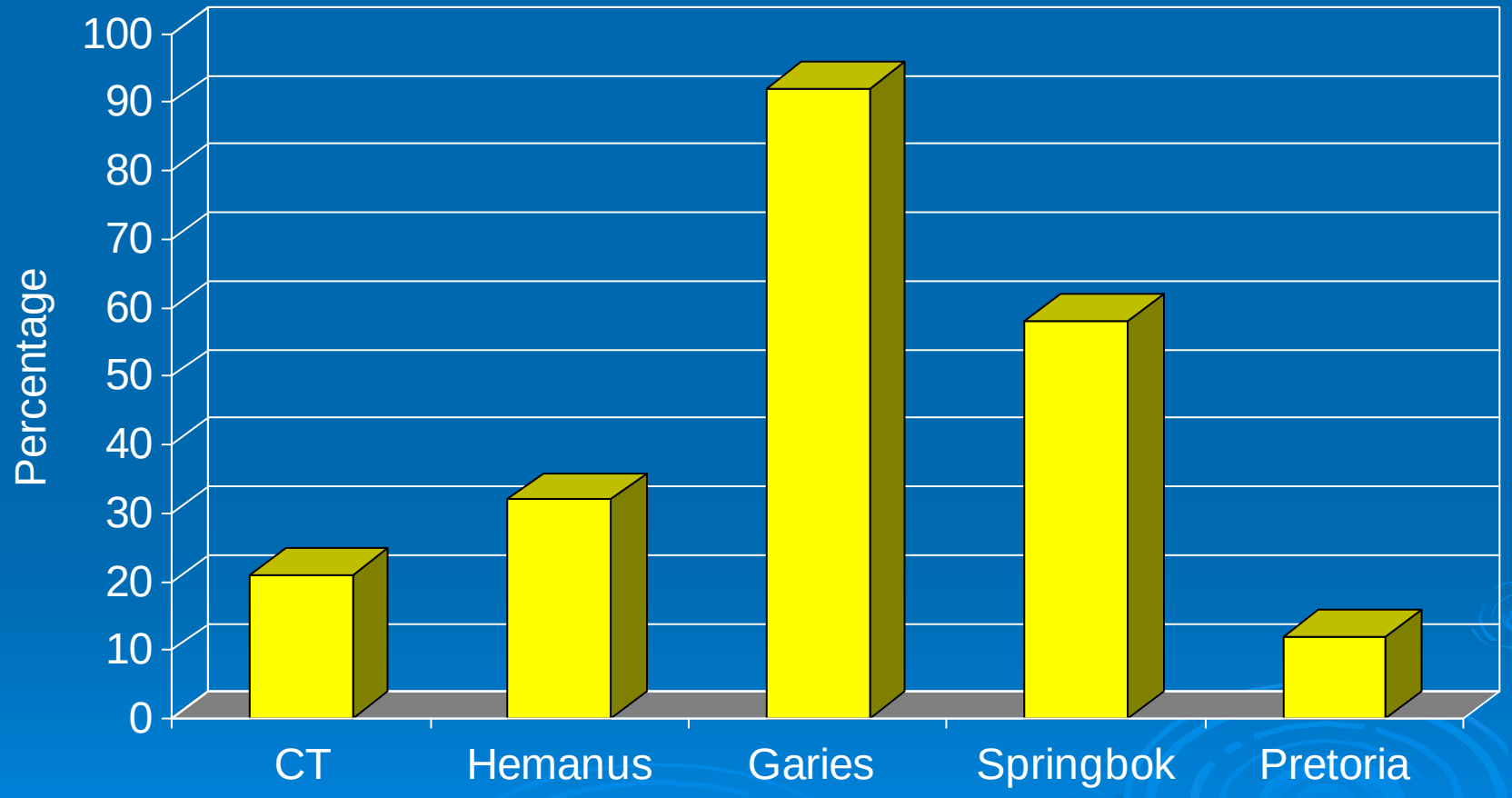
Knowledge of water efficient devices (all sites)



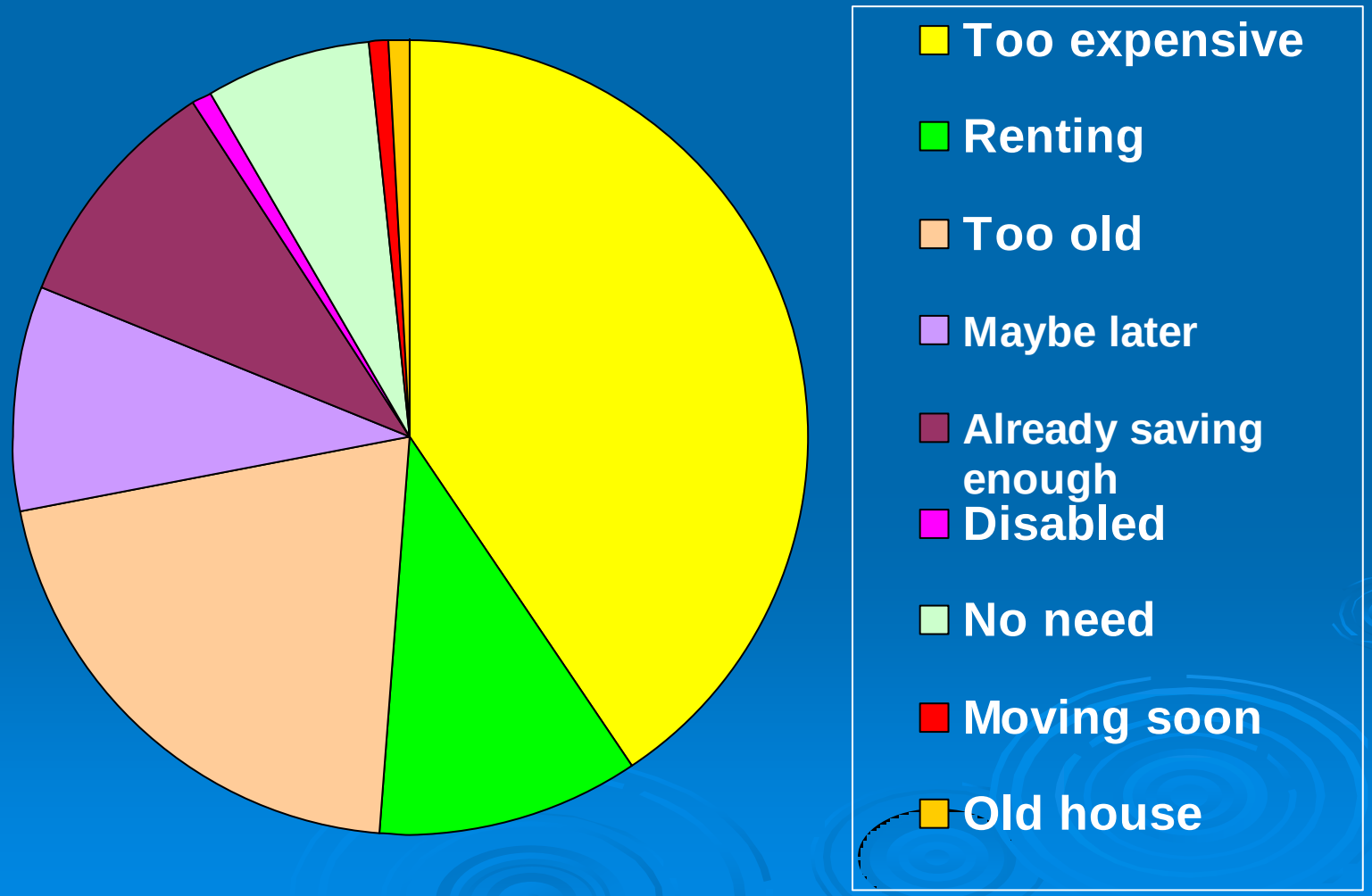
Uptake of water efficient devices (all sites)



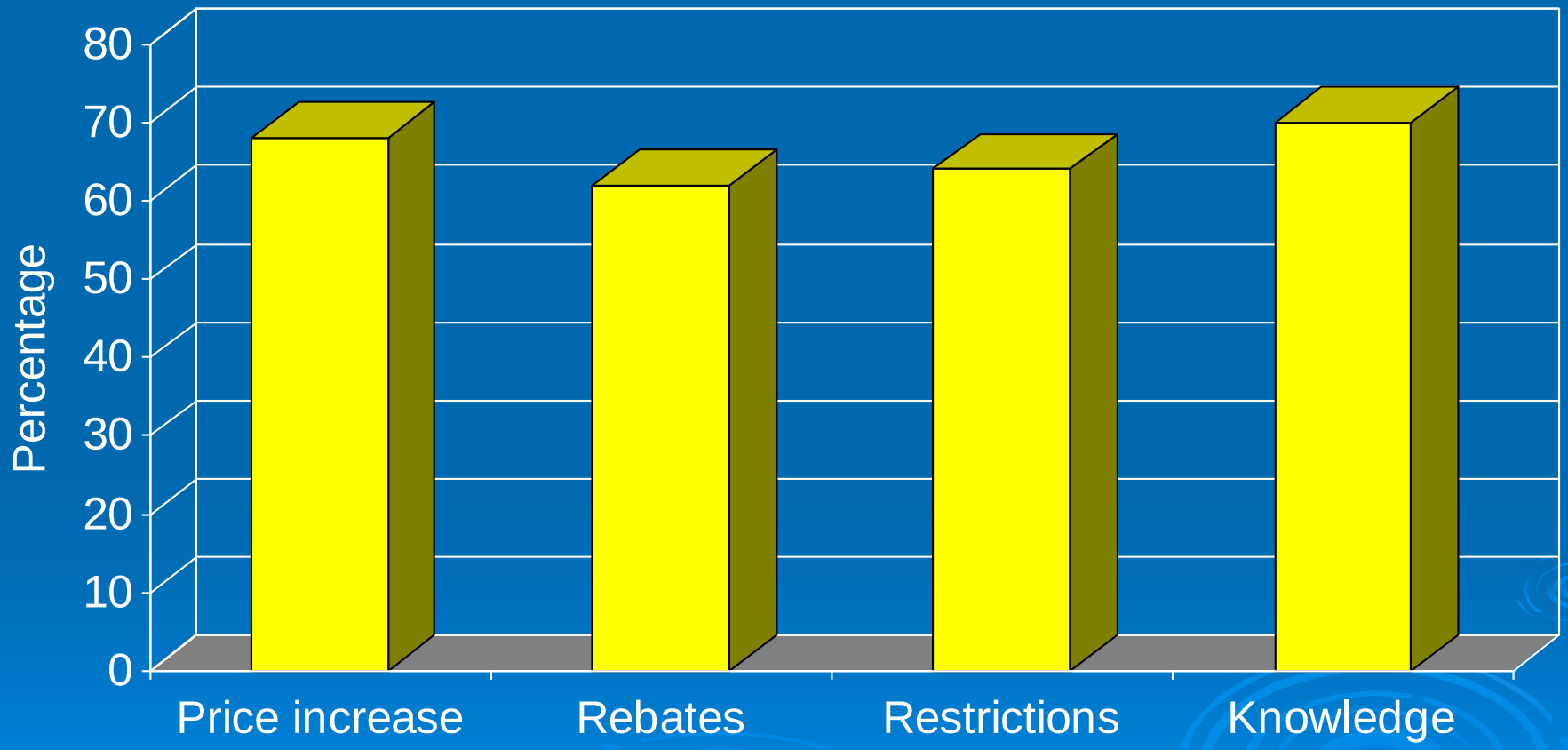
Percentage of households that harvest rainwater



Reasons given for low uptake of devices (Cape Town)



The role of incentives in improving the uptake of water efficient devices (indoors)

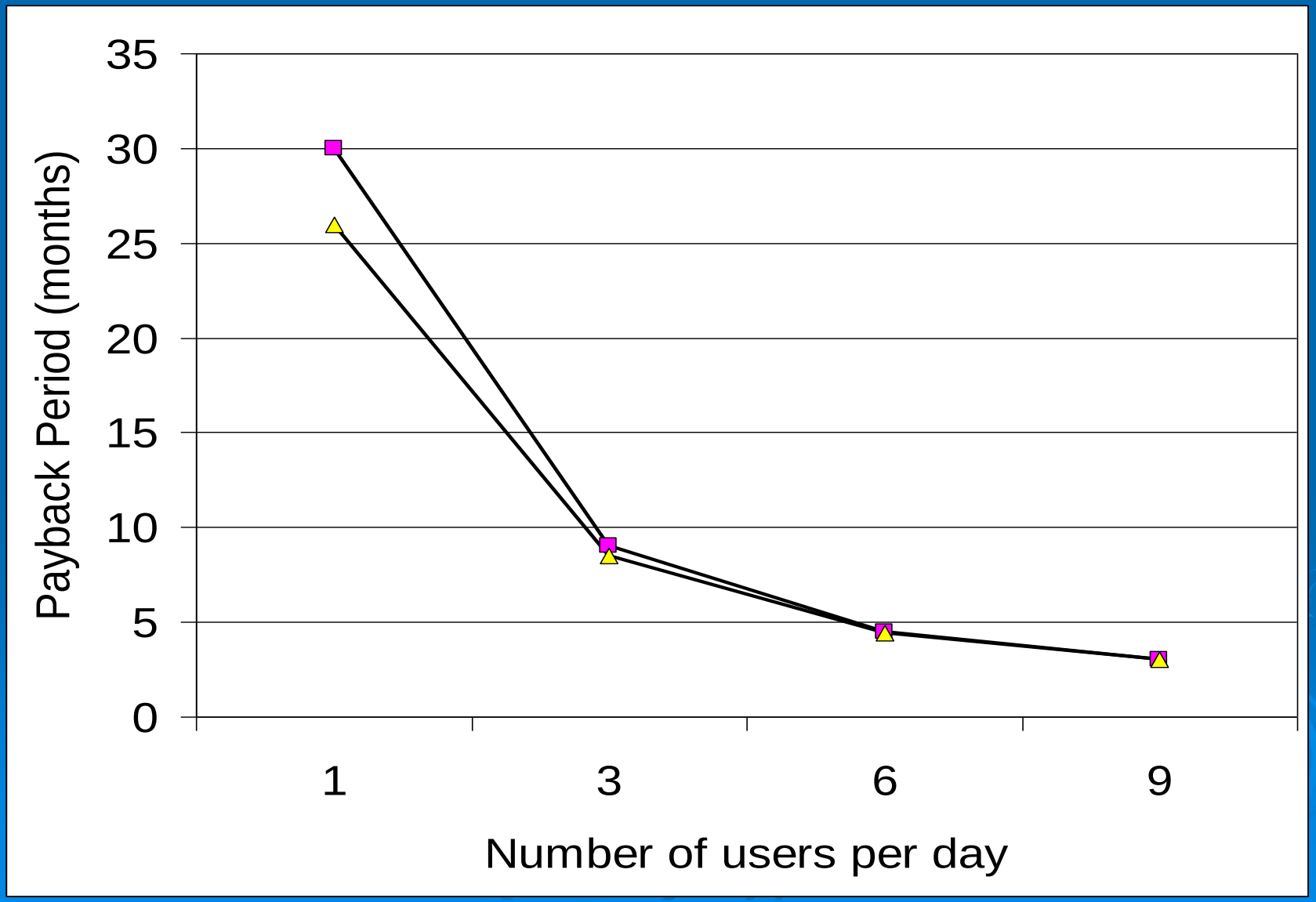


Economics of Water Efficient Devices

- More affordable to fit as standard than retrofit, nonetheless:

Item	Cost	Interest Rate	No. Users	Payback Period	Interest Paid
6/3 Dual Flush Cistern (upscale)	**R2000**	10%	4 8 12	156 months 54 months 33 months	R1579 R495 R299
6/3 Dual Flush Cistern (economic)	**R1000**	10%	4 8 12	54 months 25 months 16 months	R247 R108 R70
Aerated Shower Rose	R300	10%	1 3 6 9	30 months 9 months 4.5 months 3 months	R39 R12 R7 R5
Hippo Bag	R10	10%	2 4	2 months 1 month	N/A N/A

Comparative payback period: R300 Shower Installation Retrofit



Survey of architects and QS es

- Requirements for WED need to be in the building code.
- SA has developed very powerful databases for finding and specifying products. Once there is a national standard for water efficiency for a product, that standard can be incorporated into the search engines, *but not before*.

Recommendations for WED uptake
- both carrot and stick are needed

- Government must lead by example!
- SA needs a labelling system for WEDs
- SA needs a nationally sponsored public education campaign regarding WEDs
- Information on WEDs must be easily obtainable
- Retrofit programmes with rebates (where appropriate) should be encouraged
- Bylaws must include WED provisions
- Bylaws must have teeth (i.e. real fines)
- Bylaws must be enforced
- Building codes and bylaws must converge

Moving to water efficiency requires changes at many levels, from national to local to domestic. It is no quick fix – the change will take decades. We are twenty years behind the leaders, and there is no more time to lose.

Acknowledgements:

Nick Walker, Su Erskine, Derek Hazelton

Jay Bhagwan – WRC Research Manager
Water Use and Waste Management