
SPAZA
International Year of
SANITATION 2008

AFRICASAN 2008
2nd African Conference on
SANITATION & HYGIENE

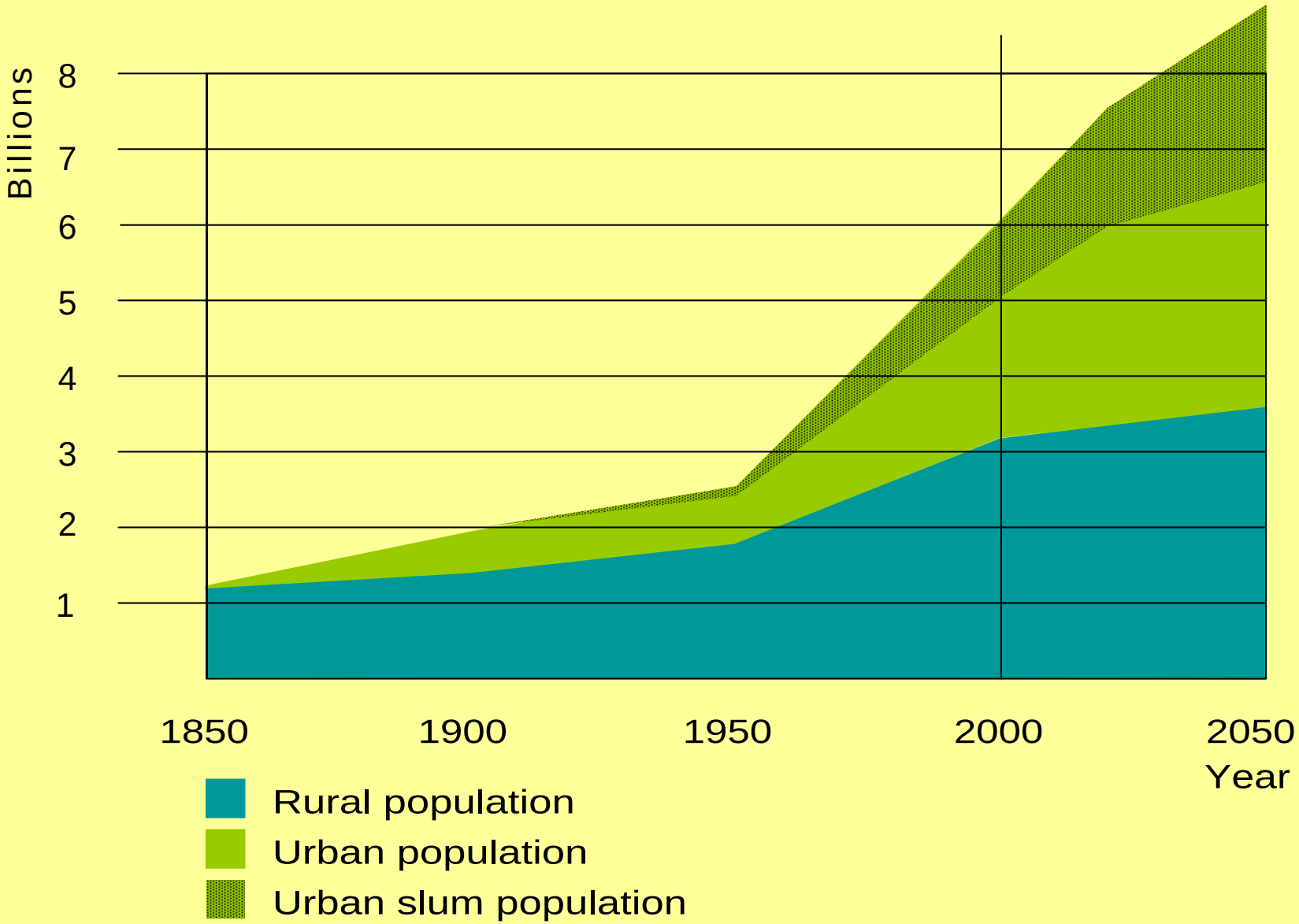
TECHNICAL SOLUTIONS FOR THE URBAN POOR

Going to scale with proven low-cost solutions

Duncan Mara
University of Leeds, UK

An urbanizing world

WORLD POPULATION, 1850-2050



With slums DISEASE – water- and excreta-related disease

Estimating the burden of disease attributable to unsafe water and lack of sanitation and hygiene in South Africa in 2000

Simon Lewin, Rosana Norman, Nadine Nannan, Elizabeth Thomas, Debbie Bradshaw and the South African Comparative Risk Assessment Collaborating Group

Objectives. To estimate the burden of disease attributable to unsafe water, sanitation and hygiene (WSH) by age group for South Africa in 2000.

Design. World Health Organization comparative risk assessment methodology was used to estimate the disease burden attri… fact… dist… esti… exp… and… path… the burden was assumed to be 100% attributable to exposure to unsafe WSH.

Setting. South Africa.

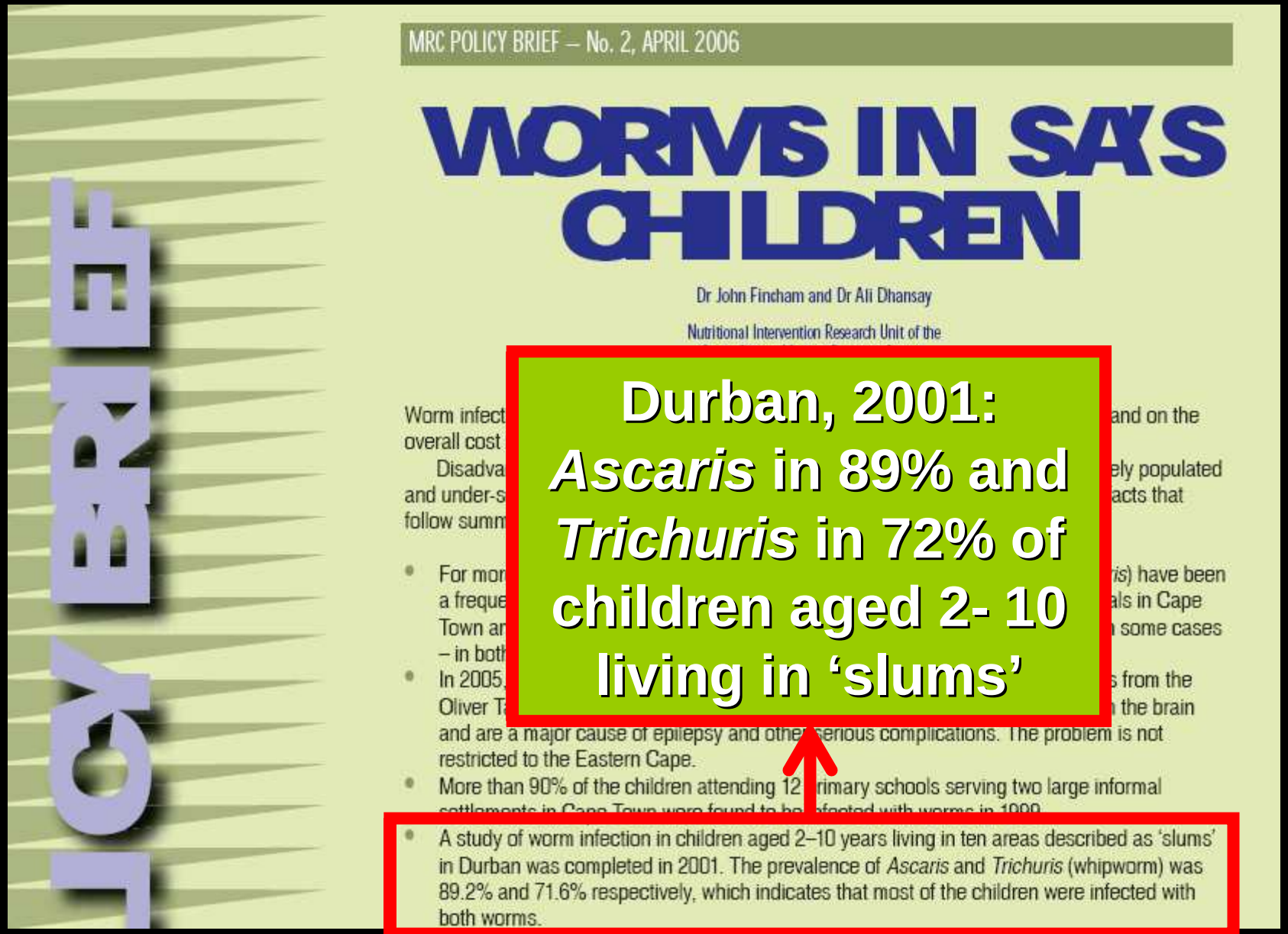
Outcome measures. Disease burden from diarrhoeal diseases, intestinal parasites and schistosomiasis, measured by deaths and disability-adjusted life years (DALYs).

Results. 13 434 deaths were attributable to unsafe WSH accounting for 2.6% (95% uncertainty interval 2.4 - 2.7%) of all deaths in South Africa in 2000. The burden was especially …erall, …% …or …y. …for disease in South Africa, especially in children under 5. High priority needs to be given to the provision of safe and sustainable sanitation and water facilities and to promoting safe hygiene behaviours, particularly among children.

S Afr Med J 2007; 97: 755-762.

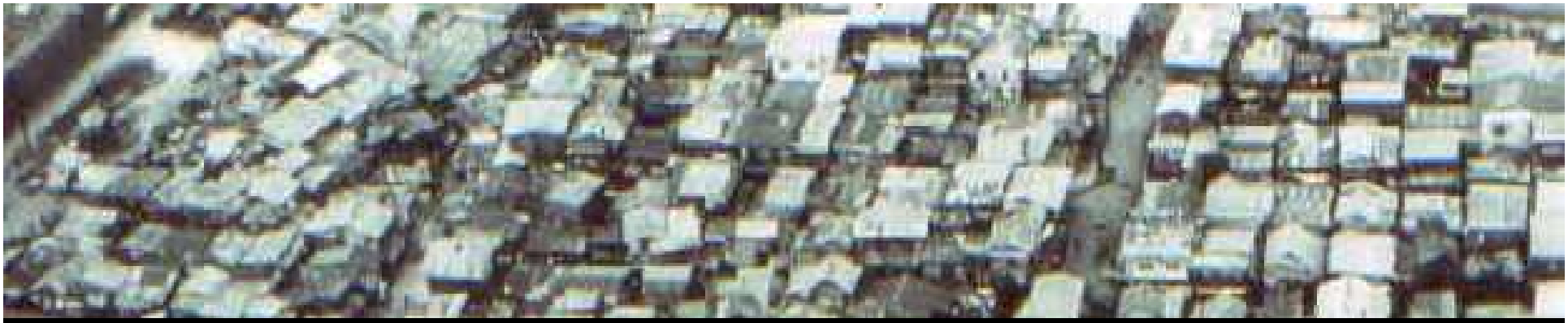
CHILDREN UNDER 5
Unsafe WSH responsible for
9.3% of deaths and 7.4% of disease burden

***SAMJ*, August 2007**

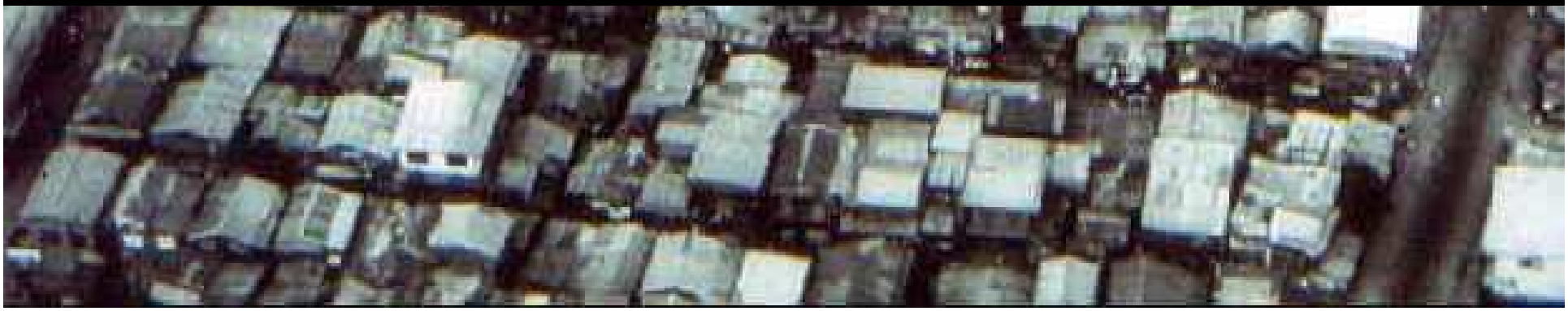

MRC POLICY BRIEF – No. 2, APRIL 2006
WORMS IN SA'S CHILDREN
POLICY BRIEF
Dr John Fincham and Dr Ali Dhansay
Nutritional Intervention Research Unit of the
Durban, 2001:
Ascaris in 89% and
Trichuris in 72% of
children aged 2- 10
living in 'slums'
A study of worm infection in children aged 2–10 years living in ten areas described as 'slums' in Durban was completed in 2001. The prevalence of Ascaris and Trichuris (whipworm) was 89.2% and 71.6% respectively, which indicates that most of the children were infected with both worms.

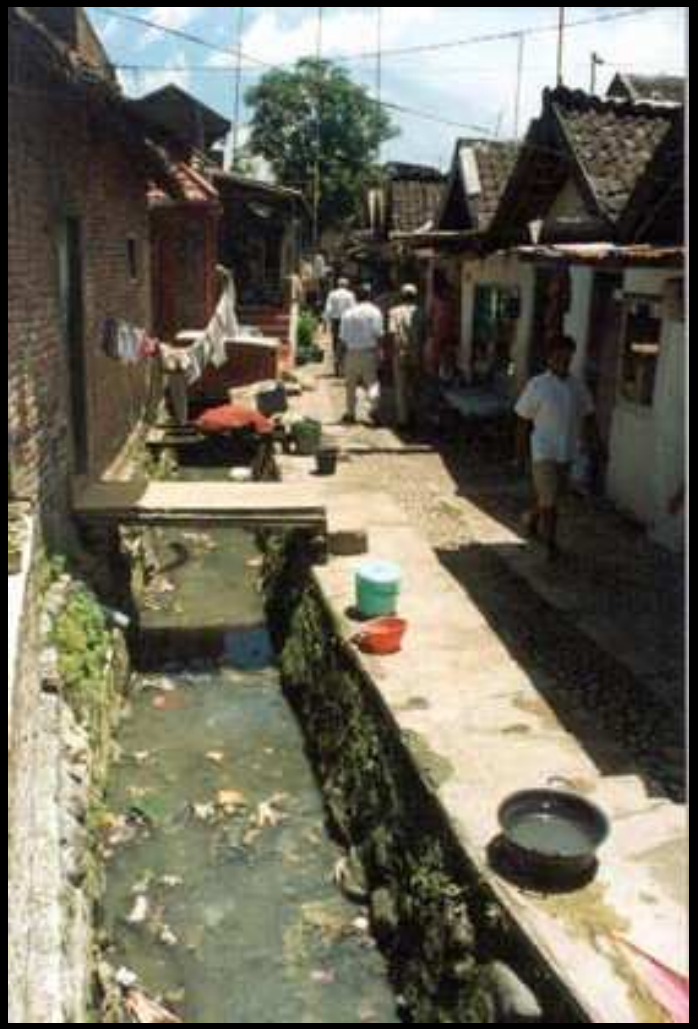
Urban / Periurban Sanitation

- What are these ‘proven low-cost’ sanitation solutions?
- Are they applicable at scale in Africa?



High-density low-income urban areas





Periurban areas: inadequate sanitation

Open stormwater drains (if there are any) receive raw wastewater discharges

Simplified sewerage

Rigorous hydraulic design based on:

- **a minimum sewer diameter of 100 mm**
- **a minimum tractive tension of 1 N/m^2**
- **a minimum value for peak wastewater flow of 1.5 litres/second**

➢ **This results in a minimum gradient of 1 in 200, and a 100 mm dia. sewer being able to serve 234 households of 5 people with a water consumption of 100 litres/ person day (or 10 people @ 50 lpd).**

“Small flows flow better in small pipes”

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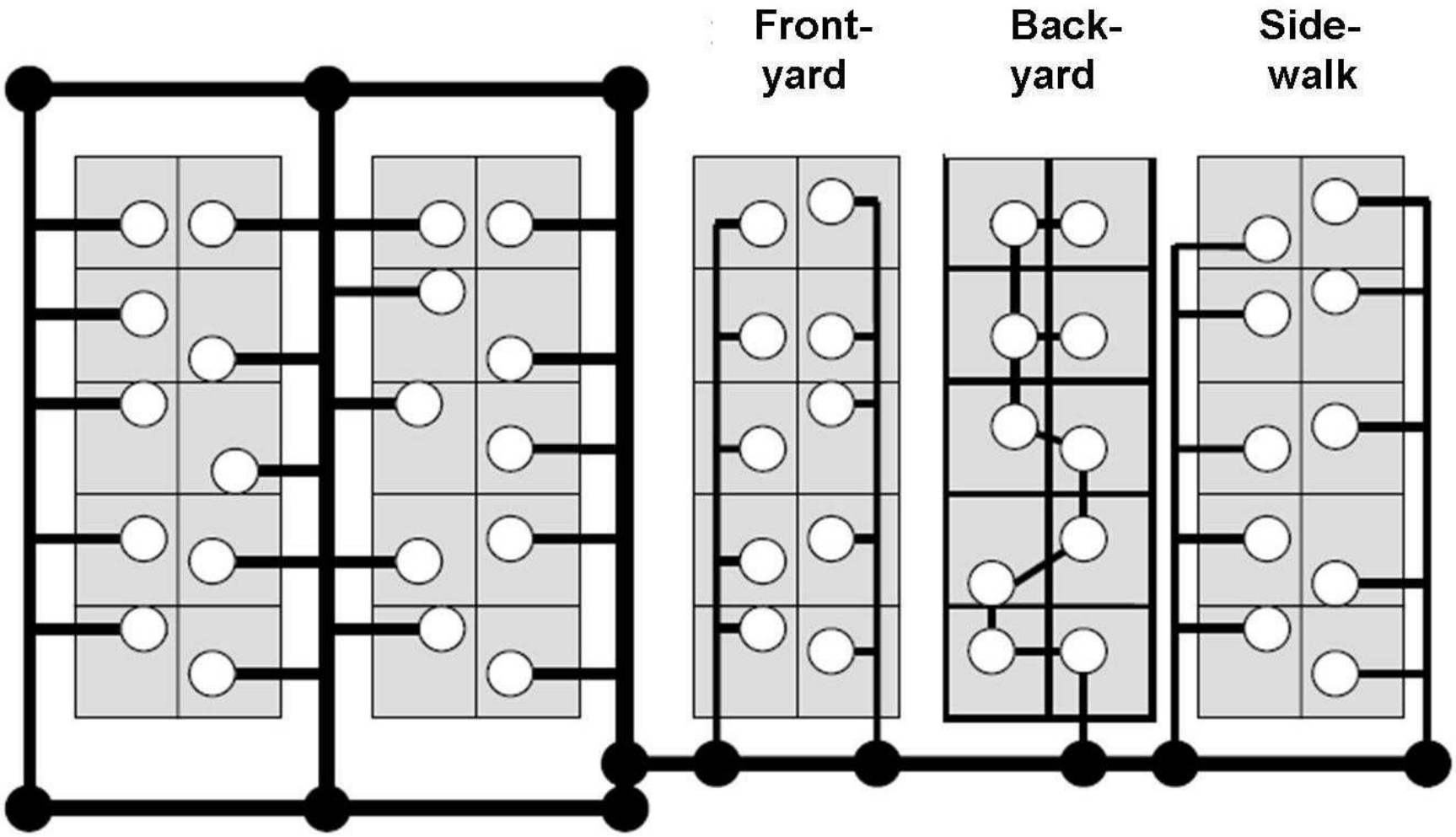
CONVENTIONAL SEWERAGE

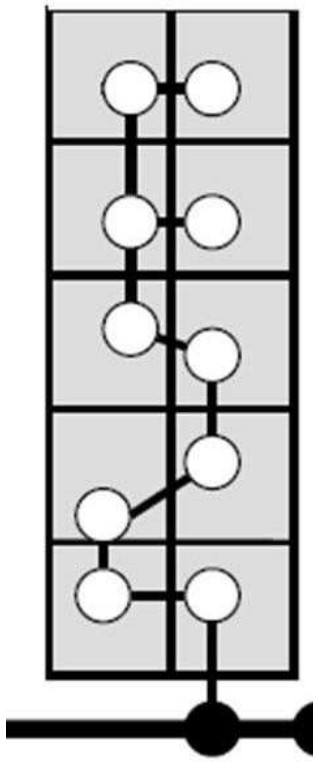
SIMPLIFIED/ CONDOMINIAL SEWERAGE



Best option
in
poor areas

SIMPLIFIED/ CONDOMINIAL SEWERAGE

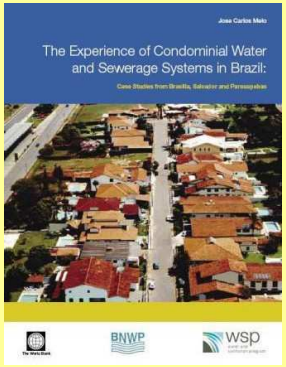
Back-yard



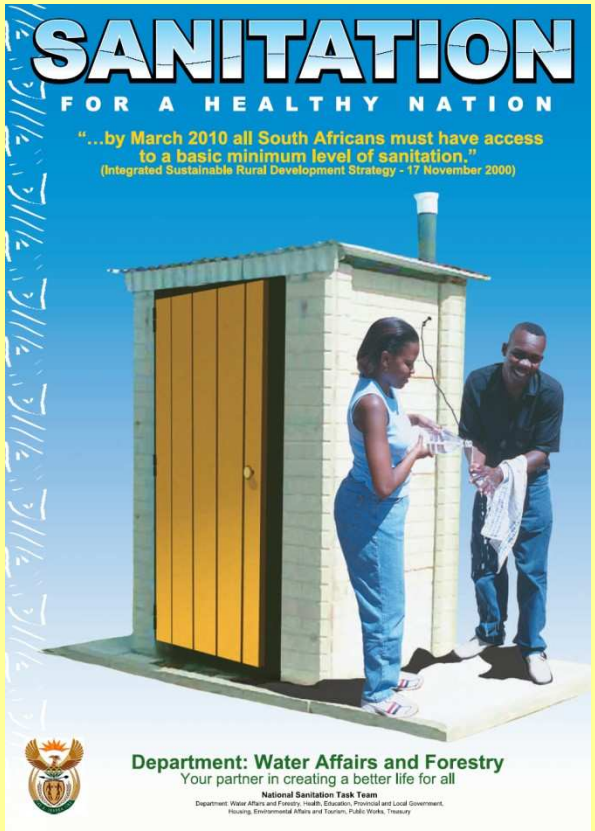
Comparative costs (1997 US$) of conventional and condominial sewerage in Parauapebas, Pará, north Brazil

Item	Conventional sewerage		Condominial sewerage	
	Total cost	Cost per connection	Total cost	Cost per connection
Excavation	263,000	39	186,000	28
Inspection chambers	181,000	27	85,000	13
Sewers	185,000	28	102,000	15
Total	629,000	**94**	373,000	**56**

***Source*: Melo (2005):**

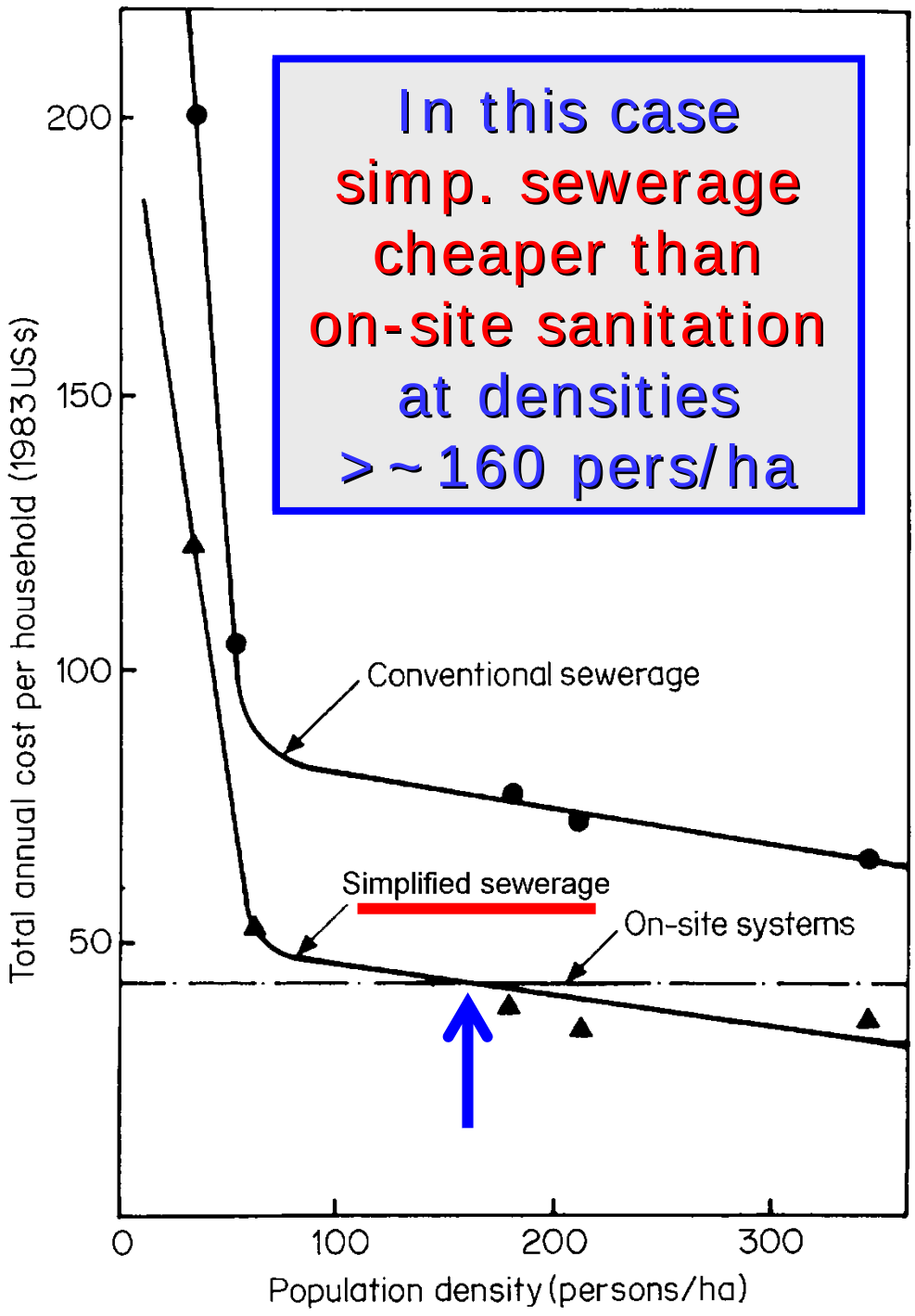


Costs in South Africa, 2002



Sanitation technology	Construction cost (ZAR)
Simplified sewerage	2500- 3000
EcoSan toilet	3000- 4000
Conventional sewerage	6000- 7000

Average exchange rates in 2002:
ZAR 1000 = USD 87 = EUR 100



Natal, Northeast Brazil, 1983

Simplified sewerage: Monthly cost to householder

State of Rio Grande do Norte in northeast Brazil, January 2008:

Minimum water tariff:

BRL 18.10 (USD 10.00)

35% surcharge for simp. sew.

BRL 6.34 (USD 3.50)

(1.7% of minimum wage)

Reduced min. water tariffs:

‘popular’ housing: BRL 11.51

‘social’ housing: BRL 3.65

No expensive manholes!

Plastic sewer junction

O&M: water-jet unit

Simplified sewerage:
A little known fact

In part of Orangi (Karachi, Pakistan) Brazilian-style simplified sewerage was installed for a minority community which obtained its water supply from public standpipes (only 27 litres/person day). Cost in 1986: USD 45 per household. **So on-plot water supply not essential.**

Simplified sewerage:
Another little known fact

In Brasília the water & sewerage company installs simplified sewerage in poor areas and also in non-poor, including very rich, areas (using front-yard or sidewalk sewers, with a higher surcharge on the water bill)

Brasília: a very rich area...

... being served with simplified sewerage

CAESB, the water & sewerage company for Brasília and the Federal District, basically asked itself:

If condominial sewerage works well in poor areas, shouldn't it also work well in non-poor areas? ***Answer: Yes.***

The next question is:

As condominial sewerage works well in both poor and non-poor areas, should we ever use conventional sewerage in urban housing areas? ***Answer:*** NO.

Simplified sewerage:
Institutional acceptance

In many cities and towns in developing countries there are some sewers and thus some local knowledge of sewerage.

Conservative engineers can accept simplified sewerage simply because it is sewerage, especially when they understand its rigorous hydraulic design basis

Periurban Sanitation Planning

If simplified sewerage, then local water & sewerage agency should interact with the beneficiary communities to inform them what is going to happen, how they should operate the system (no garbage disposal), what to do when problems occur, how much the monthly water bill would increase, and, if necessary, offer low-cost loans (to be repaid through the monthly water bill) to install household toilets **– and, of course, no connection fees (too anti-poor).**

Low-cost combined sewerage

- Often cheaper in areas subject to **annual flooding** than simplified sewerage and stormwater drainage
- Good examples from small low-income coastal towns in the state of Rio de Janeiro, Brazil (where they by-pass the wastewater treatment plant during floods)

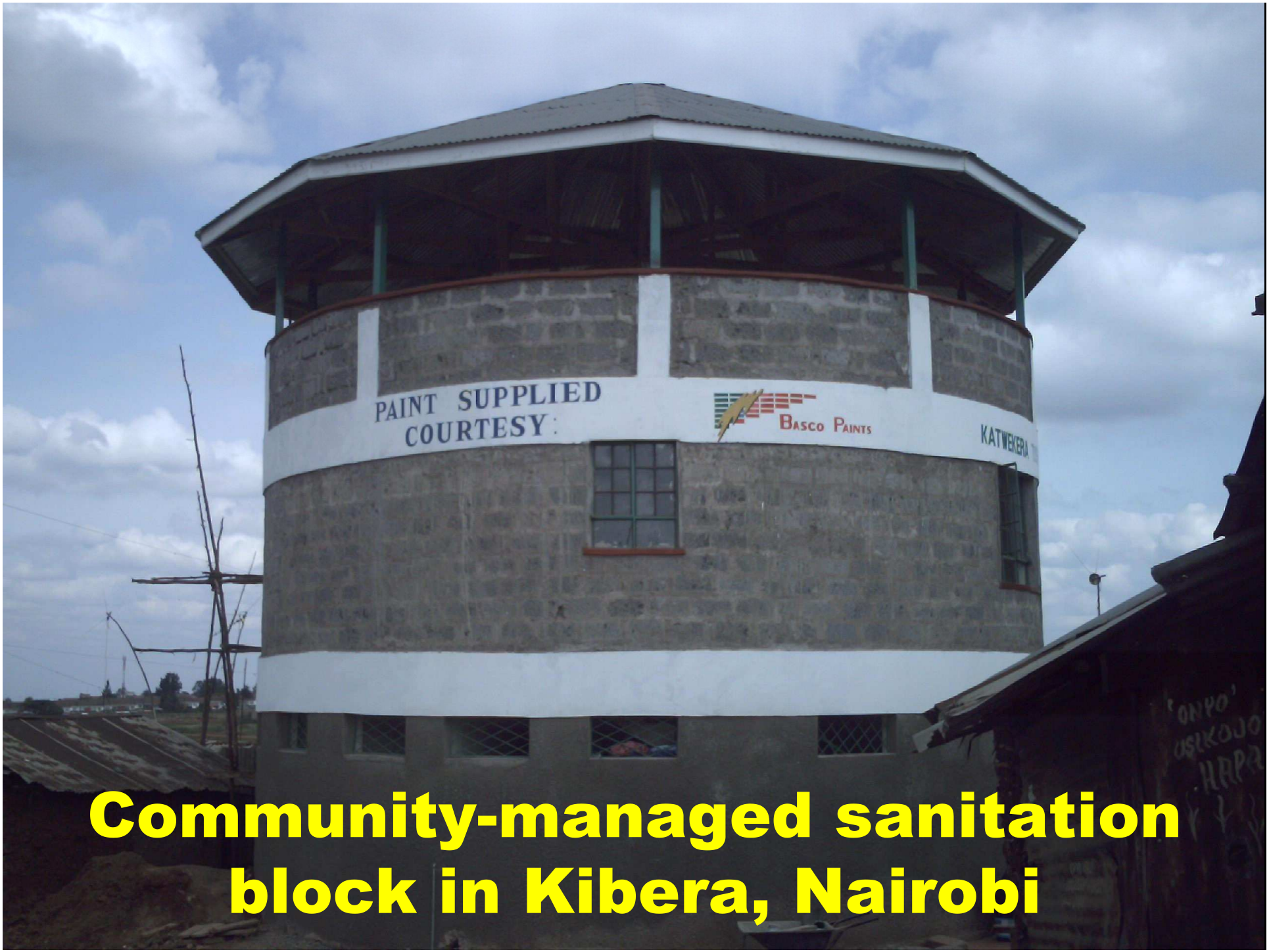
Sanitation in high-density periurban areas unable to afford simplified or low-cost combined sewerage

- By definition on-site sanitation is too expensive (simplified sewerage cheaper)

➢ Possibly the only solution:

'SPARC-style' community-designed, built & managed sanitation blocks

SPARC: Society for the Promotion of Area Resource Centres, an Indian NGO (www.sparcindia.org)



Community-managed sanitation block in Kibera, Nairobi

Community-managed sanitation block in Kibera, Nairobi

Biogas generator

Biogas generator

Low(er)-density low-income urban areas

– *i.e., on-site sanitation cheaper than simplified sewerage*

Low(er)-density urban areas

Sanitation solutions:

- Alternating twin-pit VIP latrines
- Alternating twin-pit pour-flush toilets
- Urine-diverting alternating twin-vault ventilated improved vault (VIV) latrines ("UD-VIVs" or "eThekwini latrines")
- EcoSan systems - if that's what the users want (eThekwini latrines are easily convertible to EcoSan operation)

Financing: microcredit? subsidies?

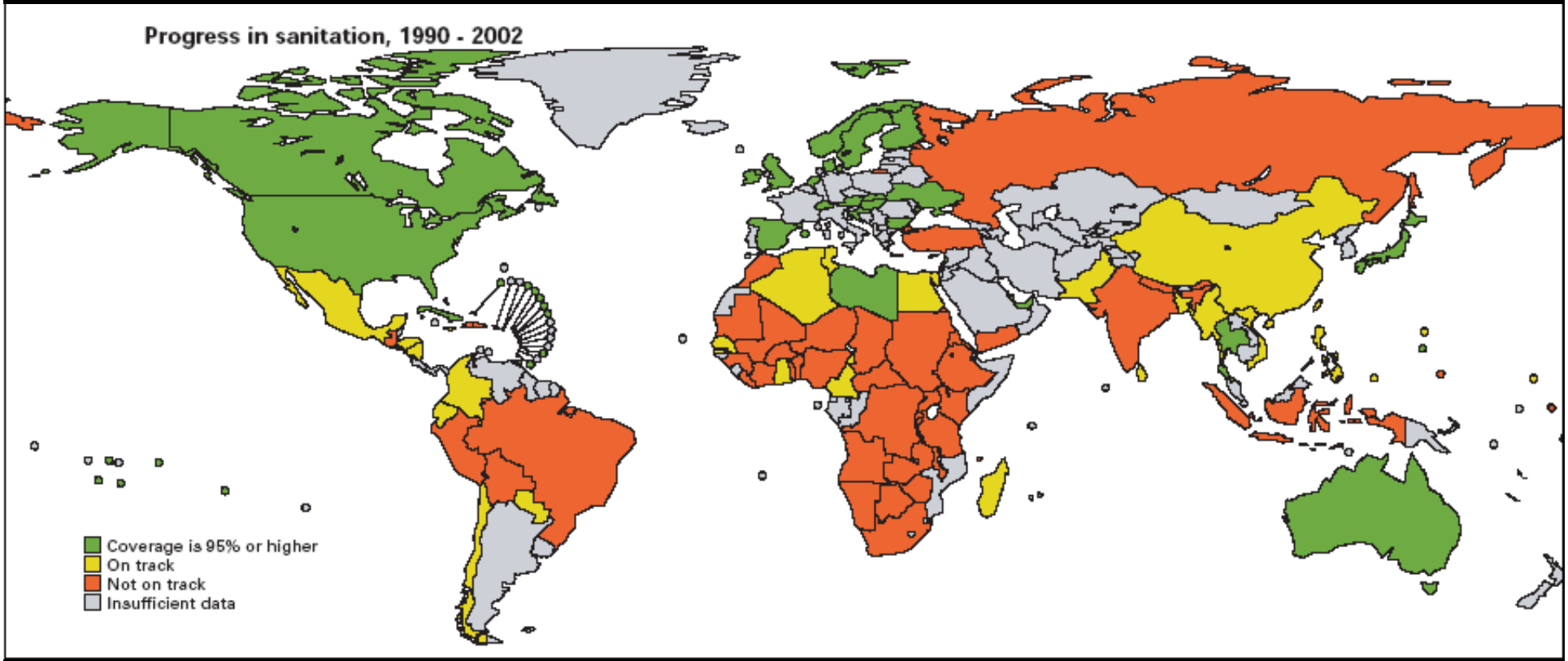
If individual household on-site systems unaffordable, then:

‘SPARC-style’ community-designed, built & managed sanitation blocks

Something very important for

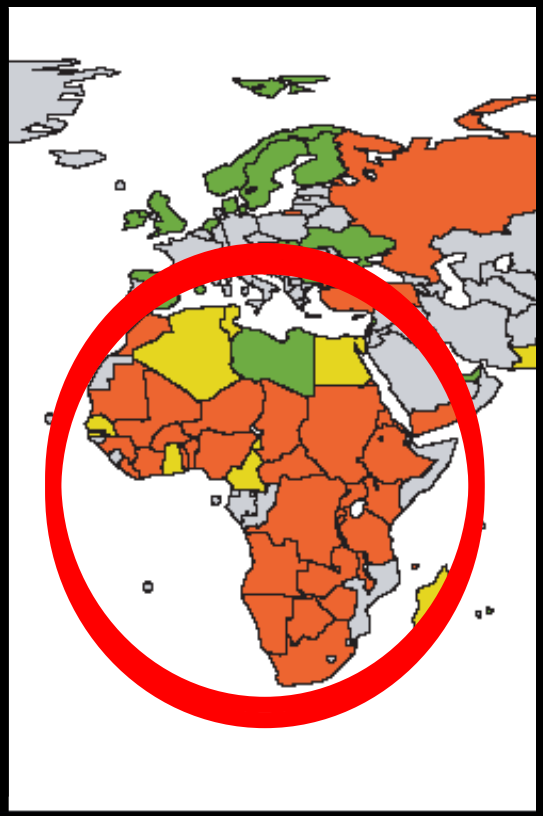
Change outdated sewerage design codes and sanitation regulations/bye-laws to permit use of pro-poor sanitation systems

Achieve Sanitation MDG?



Achieve Sanitation MDG?

Are all these ‘proven low-cost’ sanitation solutions applicable at scale in Africa?



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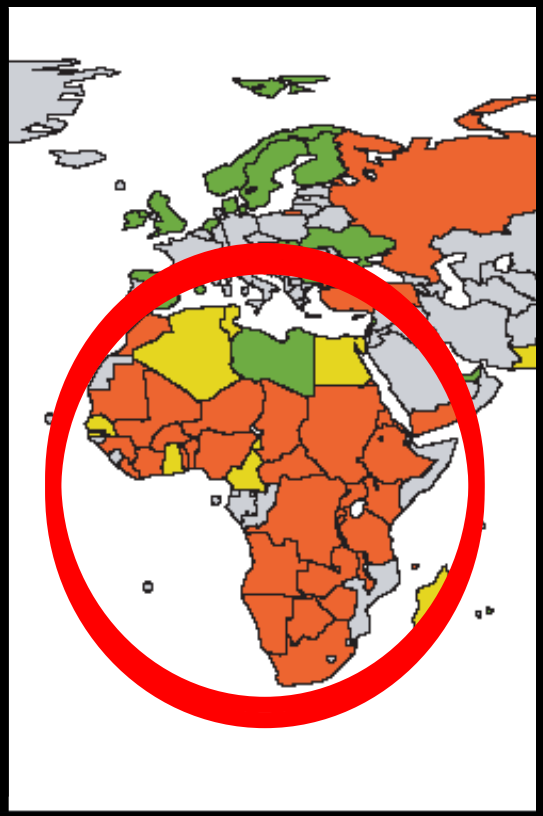
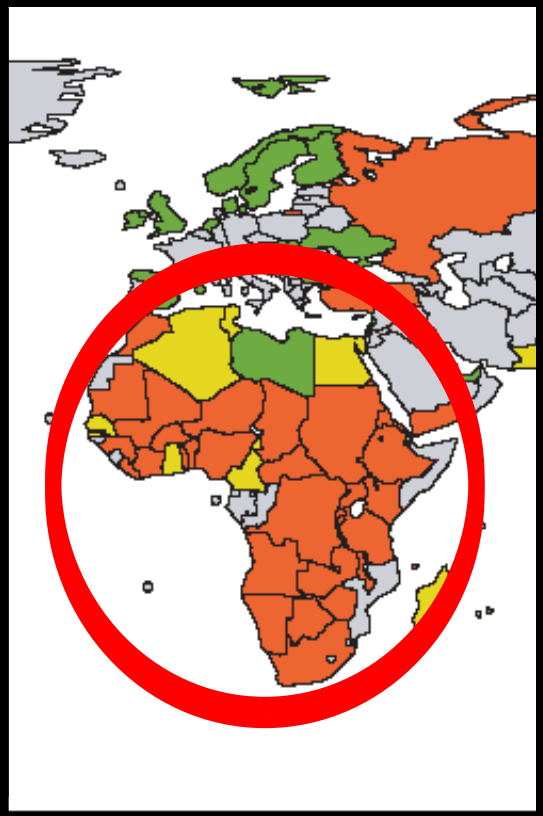


YES

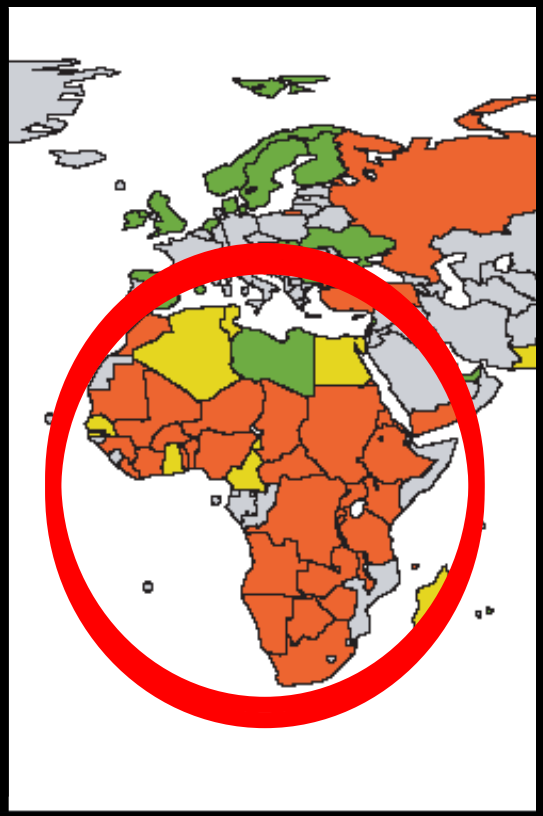
Achieve Sanitation MDG?



HOW?

Achieve Sanitation MDG?

Money
Political commitment
Knowledge



HOW?

No substitute for knowledge!

- We have to get knowledge of **all** appropriate sanitation technologies to those in Government, but also ***and more importantly*** to those in <u>local</u> government
- This is a **MAJOR** challenge for the

Barbara Ward

We must help the poor to stop ‘defecating themselves to death’

International Year of SANITATION 2008

International Year of SANITATION 2008

You have this opportunity to "get your act together".

*****Don't squander it!*****

International Year of SANITATION 2008

Thank you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