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- The following was prepared by Dr. Jamie Bartram, Coordinator of Water, Sanitation, and Health at the World Health Organization. The presentation was given on March 16th, 2006, at the Carolina Environmental Program's 2006 Environmental Symposium: "Safe Drinking Water: Where Science Meets Policy"

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DRINKING WATER: WHERE SCIENCE MEETS POLICY

Water and Health in Developing Countries
and Disadvantaged Populations

Jamie Bartram and Bruce Gordon
Water, Sanitation and Health



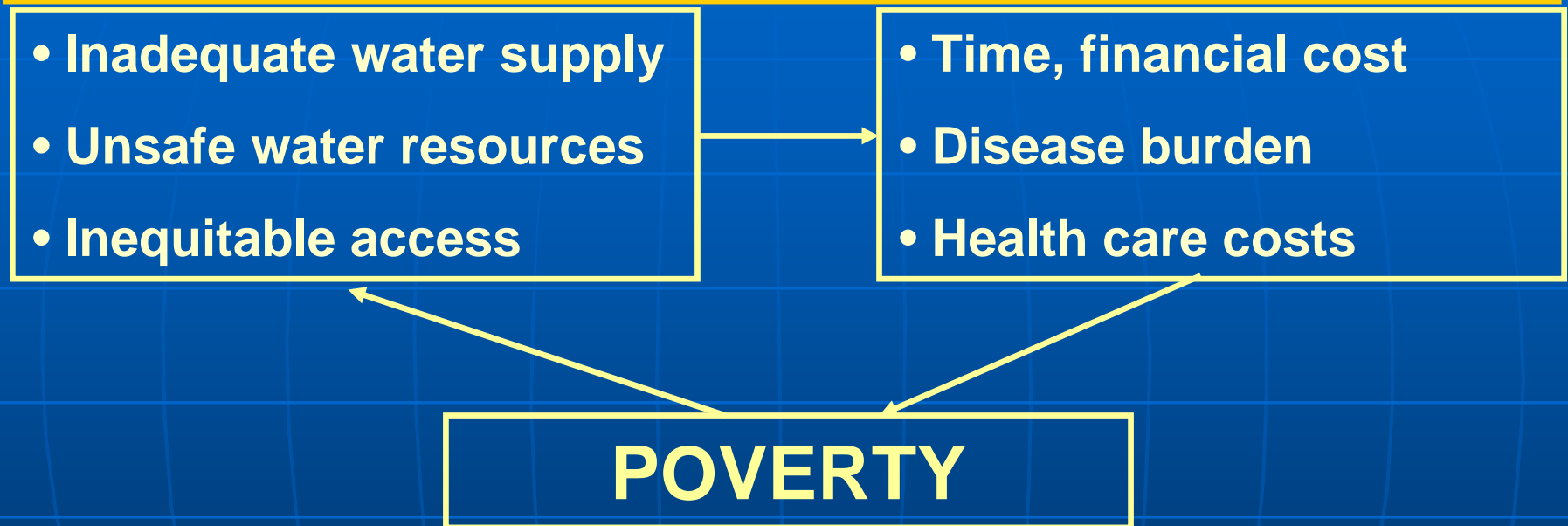
World Health
Organization

Overview

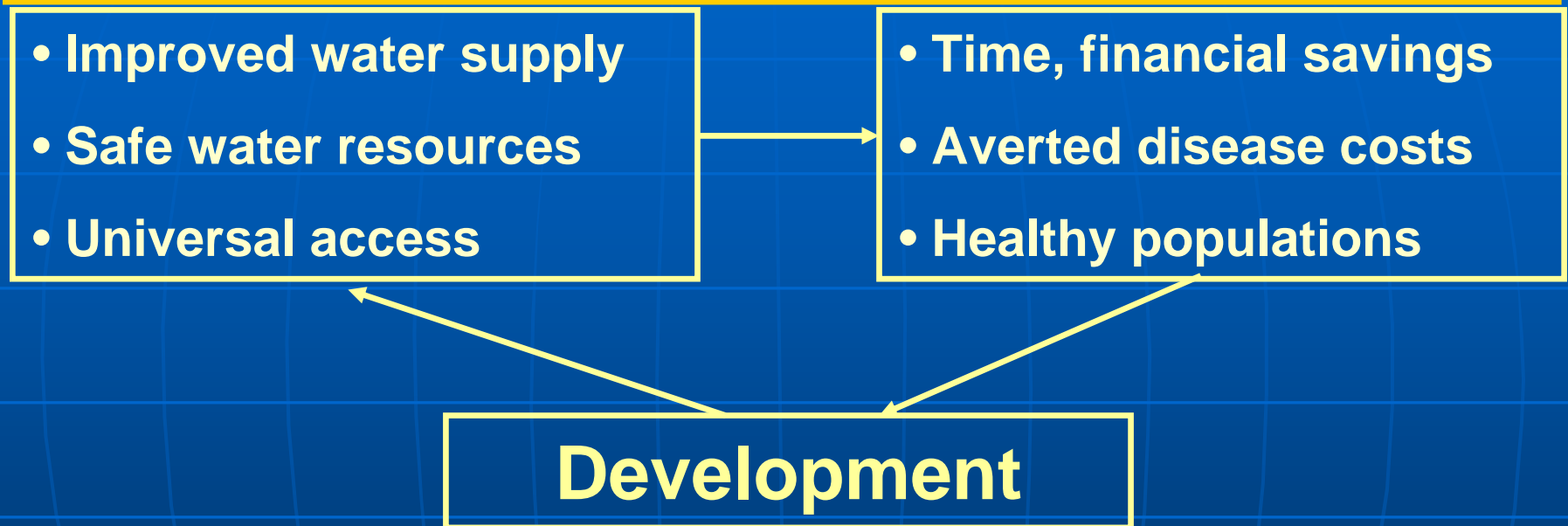
- Water, poverty and prosperity
- Water: a health concern?
- Who and where are the disadvantaged?
- Perspectives / trends
- Why invest in water and sanitation?
- How to respond?

Water, poverty and prosperity

WSH = disease and poverty



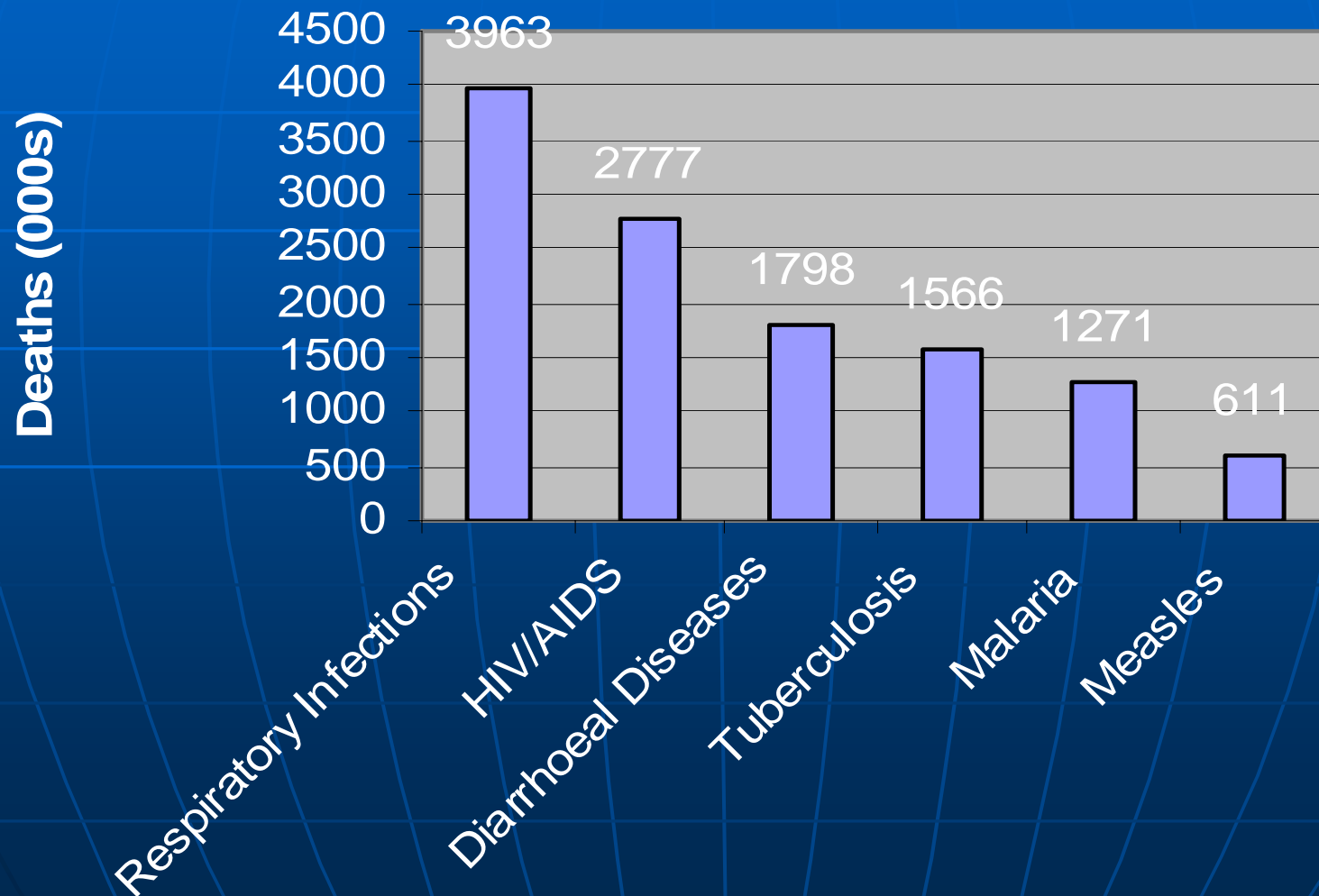
WSH = a motor for development



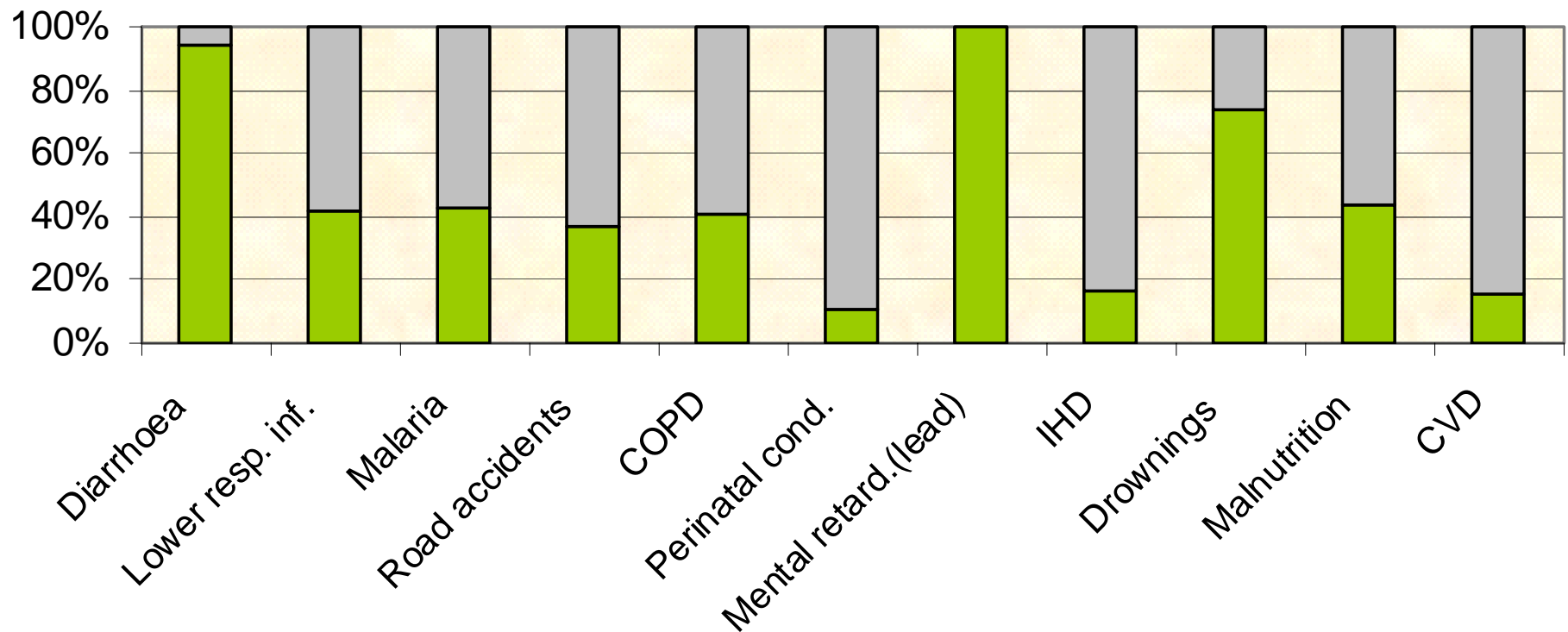
Water: A health concern?

Leading Causes of Deaths from Infectious Diseases

2004 World Health Report



Percentage of disease that could be prevented by modifying the environment (top 10 environmental contributors to total disease burden)



 **Environmental fraction**

COPD: Chronic obstructive pulmonary disease

IHD: Ischaemic heart disease

CVD: Cerebrovascular disease

BOD - Selected water-related diseases

- **Diarrhoea:**

1.8 million people, mostly children, die of diarrhoea every year

- **Malaria:**

1 million people, mostly children, die of malaria every year

Better management of water resources reduces transmission

- **Schistosomiasis:**

200 million are infected, 20 million suffer severe consequences

Basic sanitation reduces the diseases by up to 77%

- **Trachoma**

6 million visually impaired, 146 million threatened by blindness

Improved sanitary conditions and hygiene practices prevents trachoma

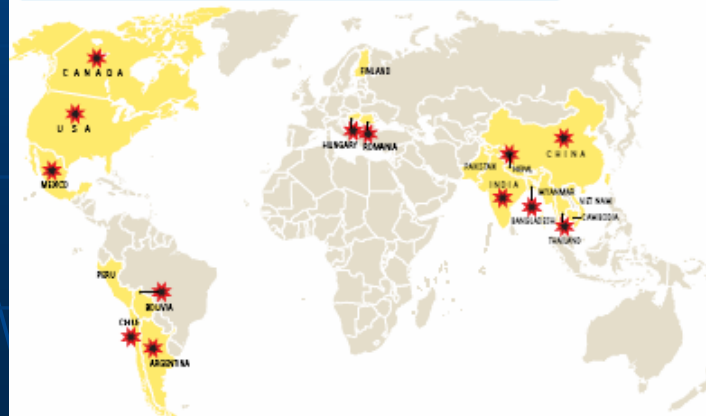
Fluoride and Arsenic in Drinking Water



Arsenicosis

2004 or latest available data

- elevated levels of arsenic (over 50 µg/l) reported in water
- ill-health has been reported due to arsenic-contaminated water

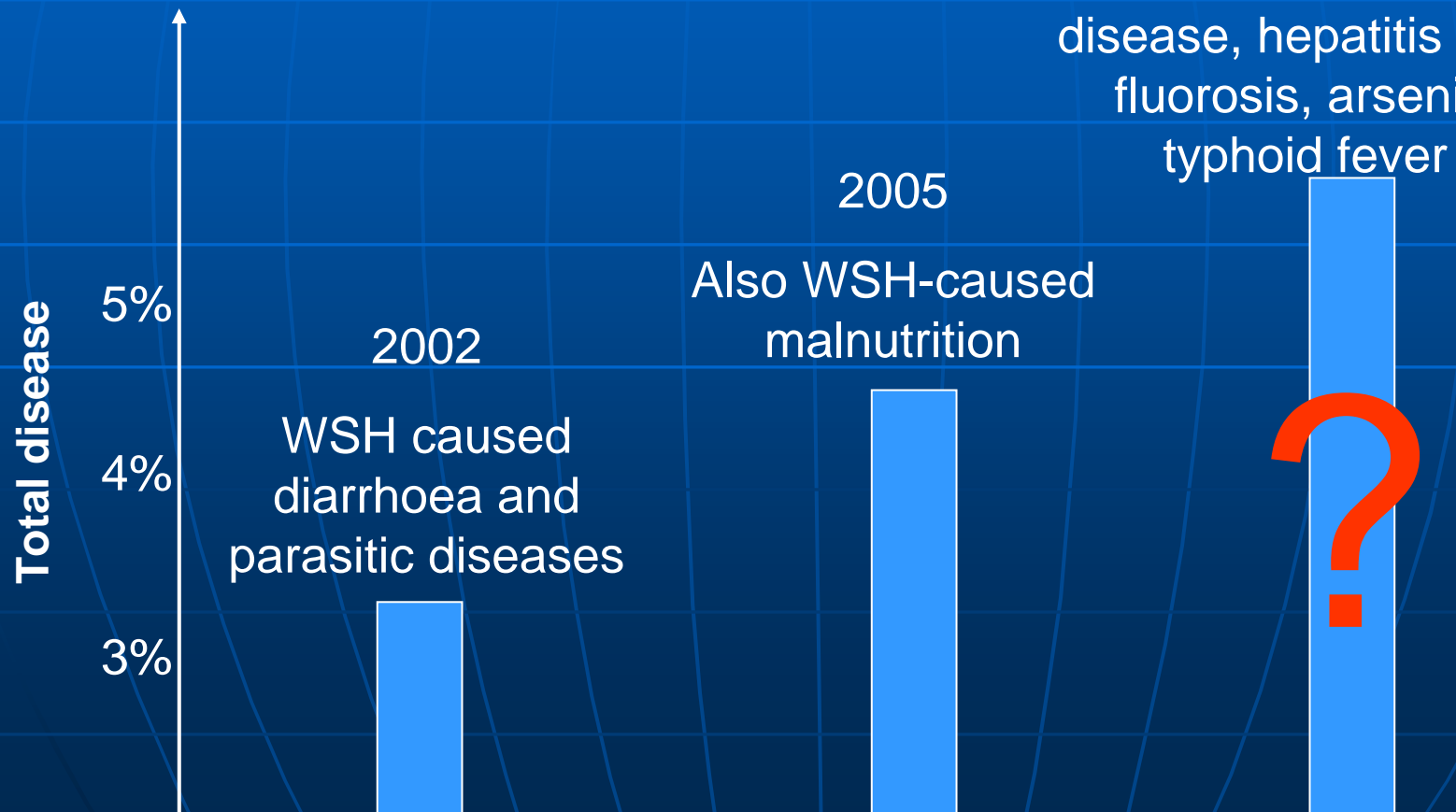


The more we know, the more environment matters

Water, sanitation and hygiene

In addition (2010?)

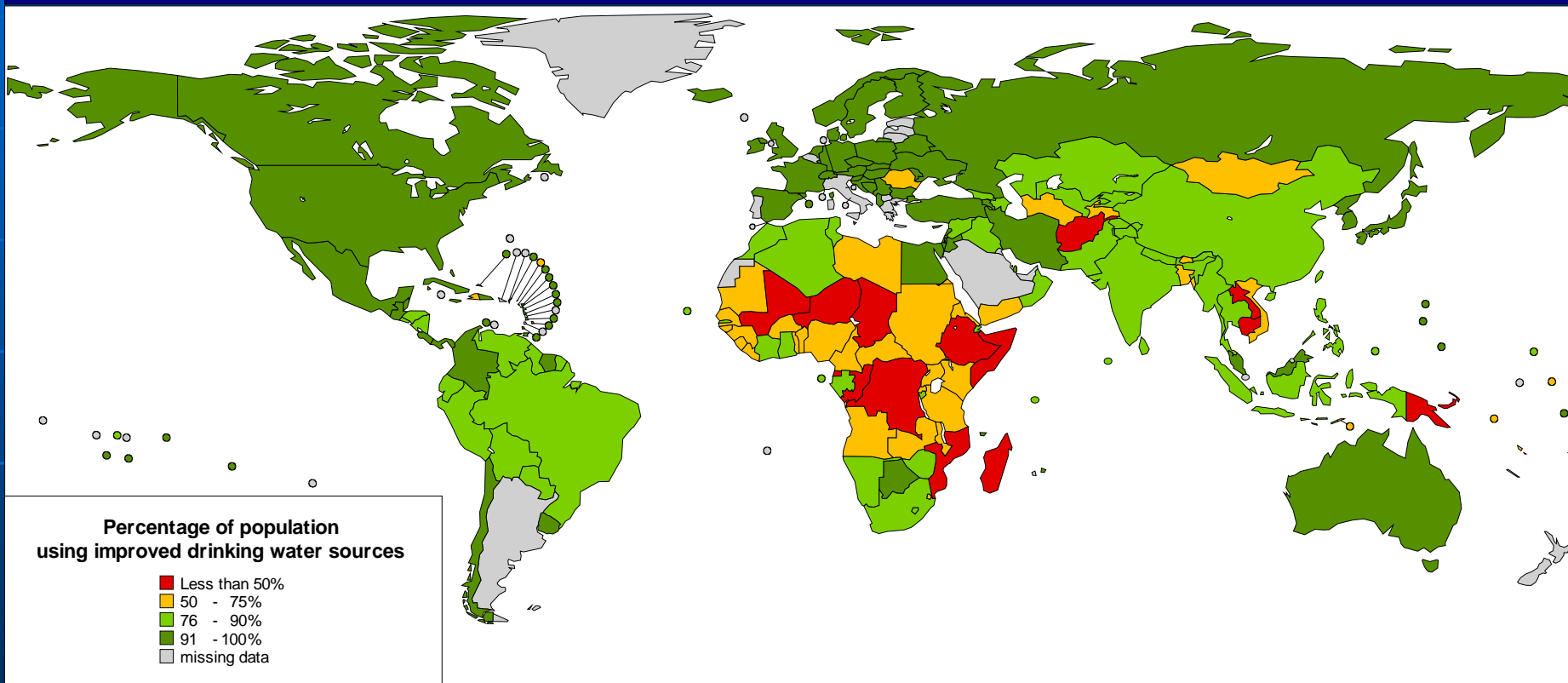
Water hardness and heart disease, hepatitis A and E, fluorosis, arsenicosis, typhoid fever etc.



Who and where are the
disadvantaged?

Improved Drinking Water: Status in 2002

Coverage of improved drinking water sources, 2002



*Meeting the MDG Drinking Water and Sanitation Target: Mid-term
Assessment of Progress*
WHO and UNICEF, 2004

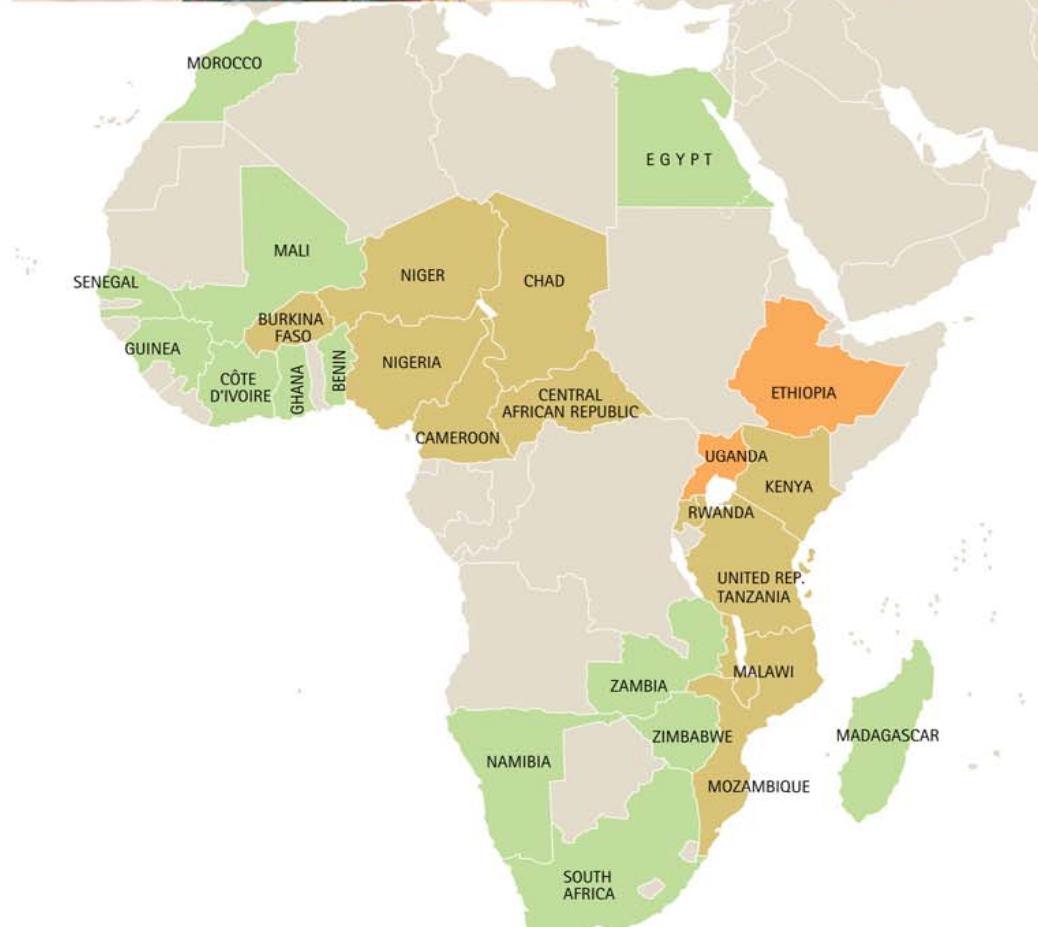
To Fetch a Pail of Water



A heavy burden

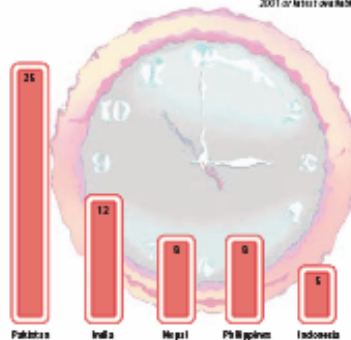
Percentage of people who must travel more than half an hour to fetch water and return home 2001 or latest available data

- over 50%
- 26% – 50%
- 25% and under
- no data



Time ticking away

Average number of hours per household spent each month on essential water collection 2001 or latest available data



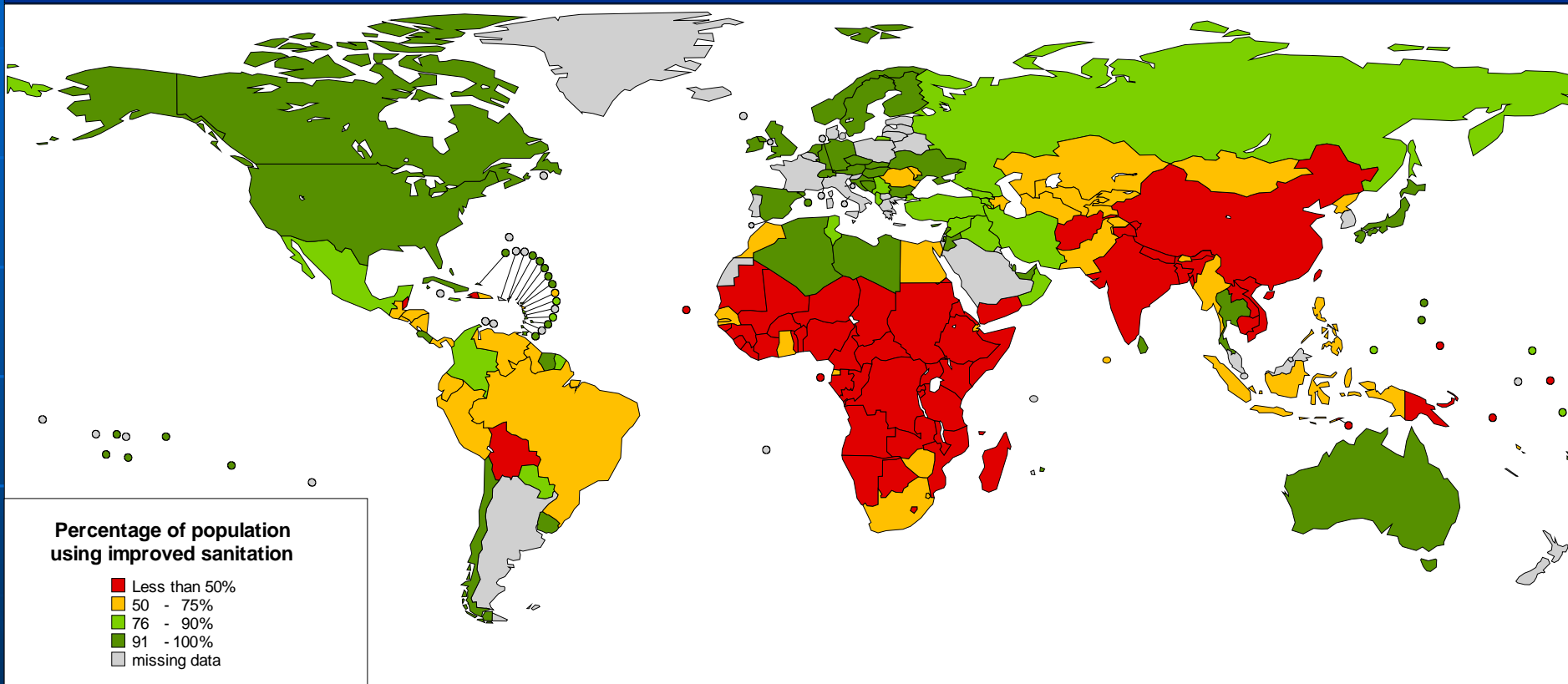
Time spent on water collection represents time lost to household and national economies. Every month, the Indian economy misses out on over 100 million working days in this way. With its large population, Asia loses more time than any other continent.

Improved Sanitation: Status in 2002



WHO/OMS

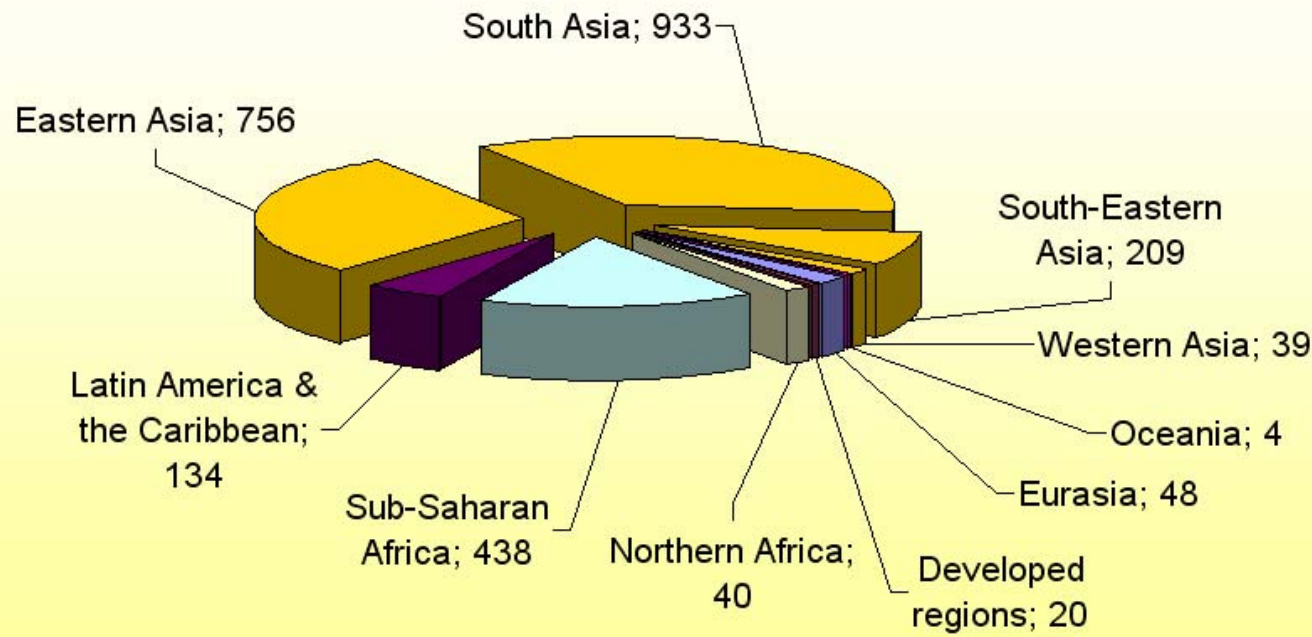
Sanitation coverage, 2002



*Meeting the MDG Drinking Water and Sanitation Target: Mid-term
Assessment of Progress*
WHO and UNICEF, 2004

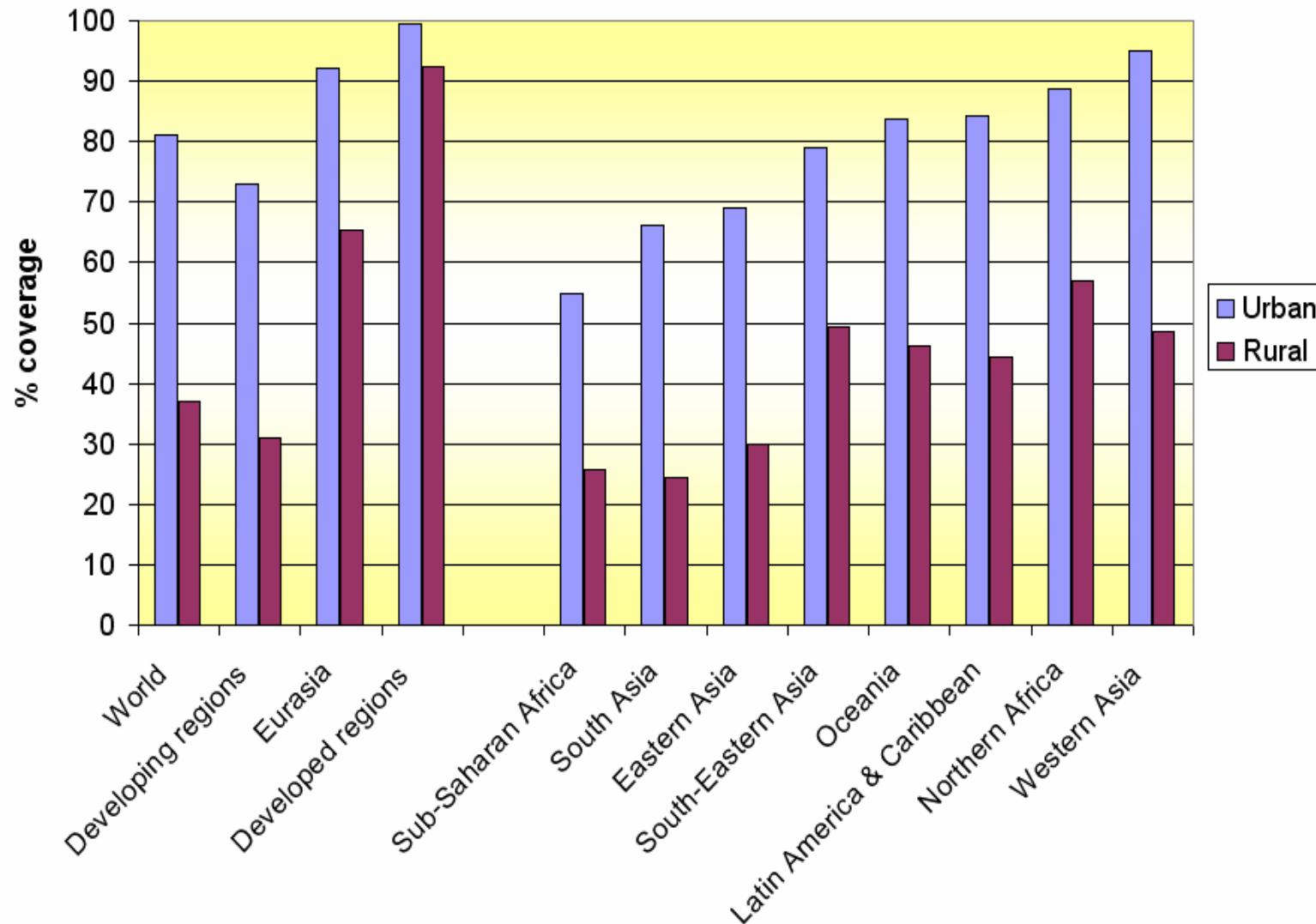
Improved Sanitation:

Unserved population by region, 2002 (millions)

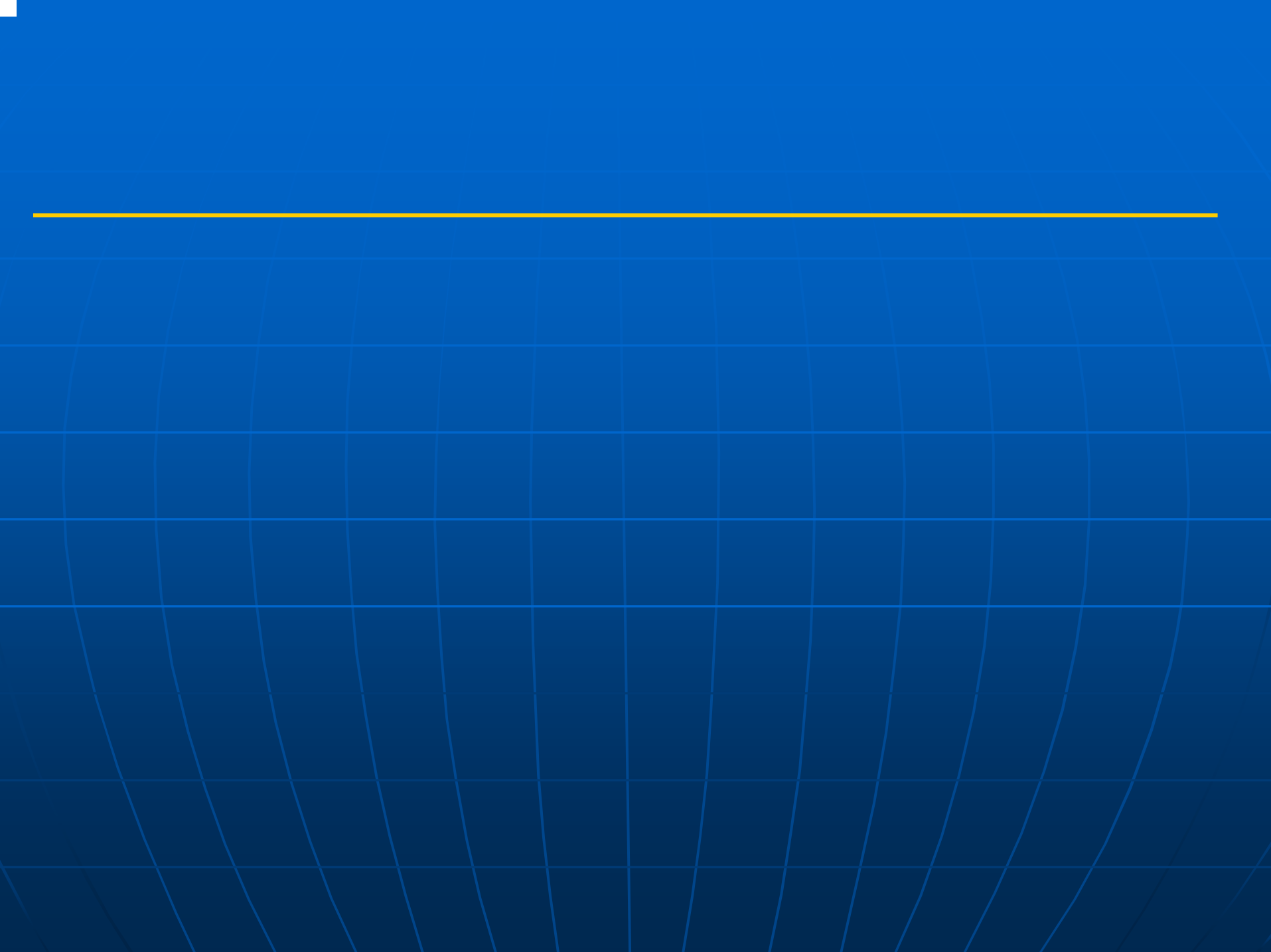


*Meeting the
MDG
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Disparities Masked by National Averages: Rural versus urban sanitation (2002)



*Meeting the
MDG
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of Progress
WHO and
UNICEF,
2004*



Perspectives / trends

Reaching the MD Goals from 2002: What does it mean for Goal 7 Target 10?

To halve, between 1990 and 2015, the proportion of the population without improved drinking water and sanitation now means means:

Enabling an additional
260 000 people a day up
to 2015 to use improved
drinking water sources

Enabling an
additional 370 000
people a day up to
2015 to use improved
sanitation

Ensuring continuation of services to an unprecedented
population and maintenance and renewal of infrastructure

Reaching the MD Goals from 2002: Focusing G7 T10 on the wider goals

Reaching the target would:

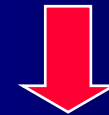
- Reduce disease and death
- Improve nutrition and food security
- Reduce poverty (avert health care costs, time savings)

Unserved, children and women likely to benefit most (health and education)

Studies show WS&S to be cost effective

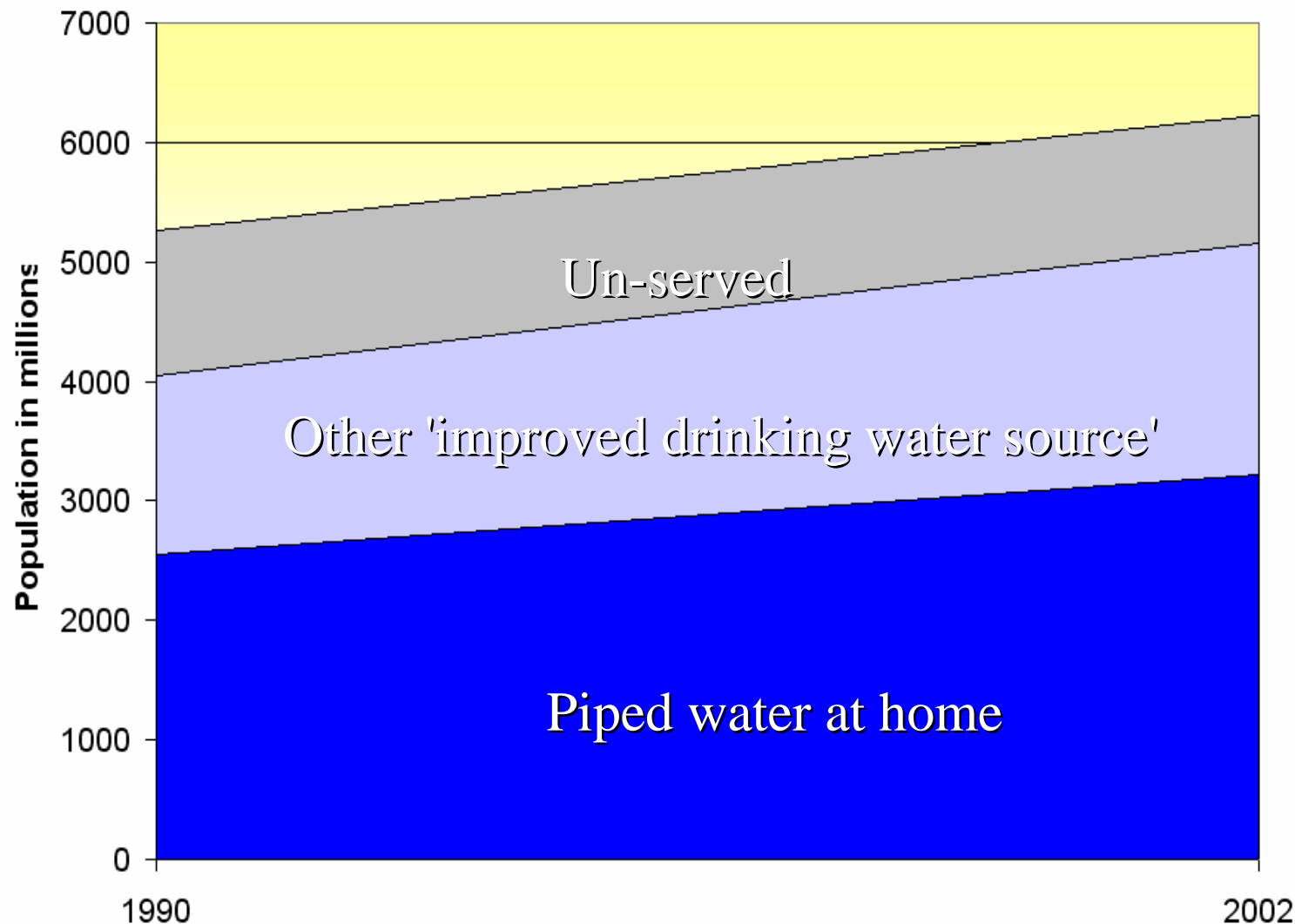


1 billion urban dwellers to keep up with urban population growth – targetting slums



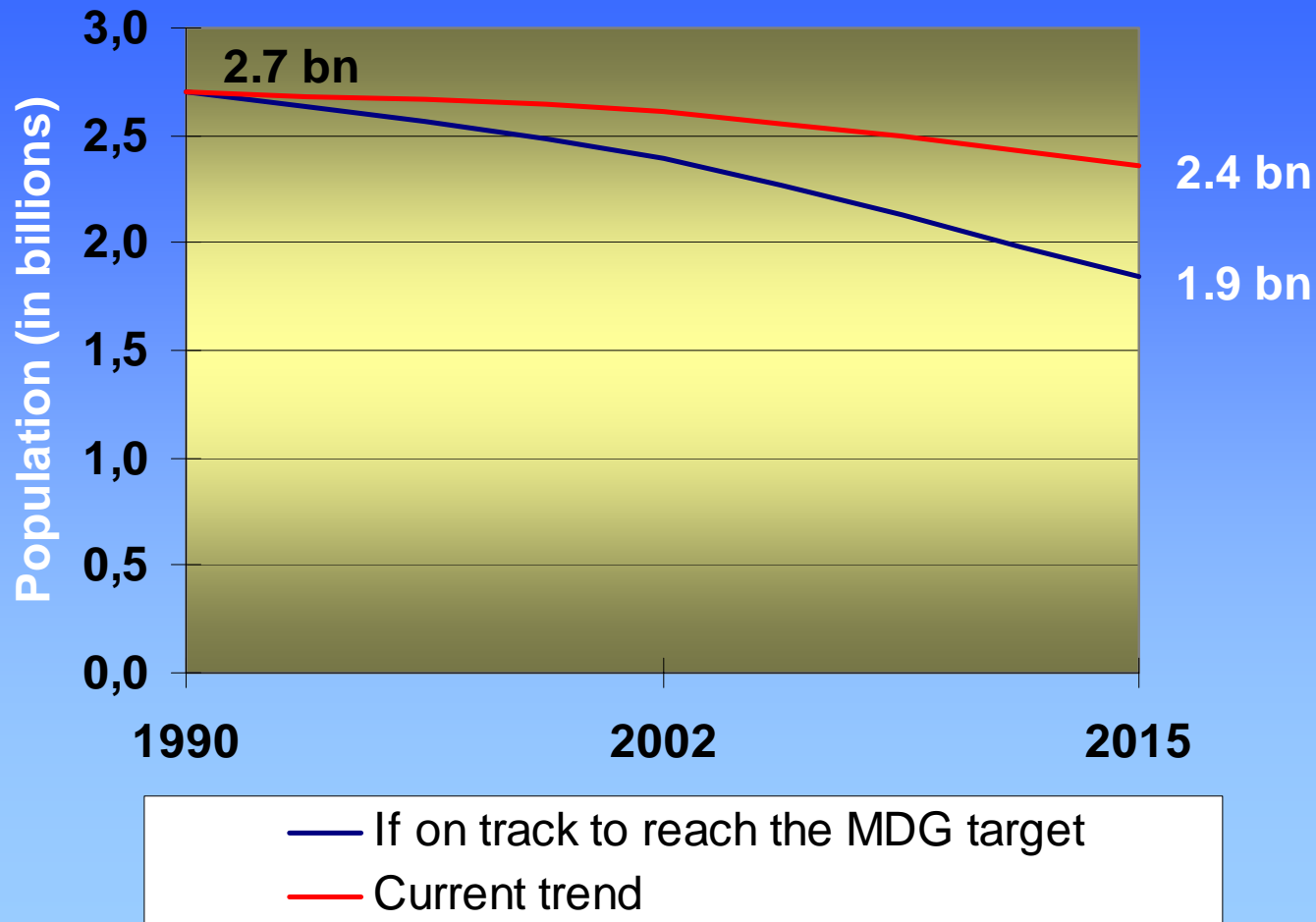
900 million rural dwellers to start to deal with the rural backlog

Improved Drinking Water: Trends in service levels



*Meeting the
MDG
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WHO and
UNICEF,
2004*

Improved Sanitation: Perspectives



*Meeting the
MDG
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2004*

**Why invest in water and
sanitation?**

Annual cost of not dealing with water and sanitation

Lives lost

- 1.6 million annually due to diarrhoea alone

Health care costs:

- USD7 billion per year to health agencies
- USD340 million to individuals

Value of time lost

- USD 63 billion per year

Cost-benefit analysis (CBA)

The aim of the study was to estimate:

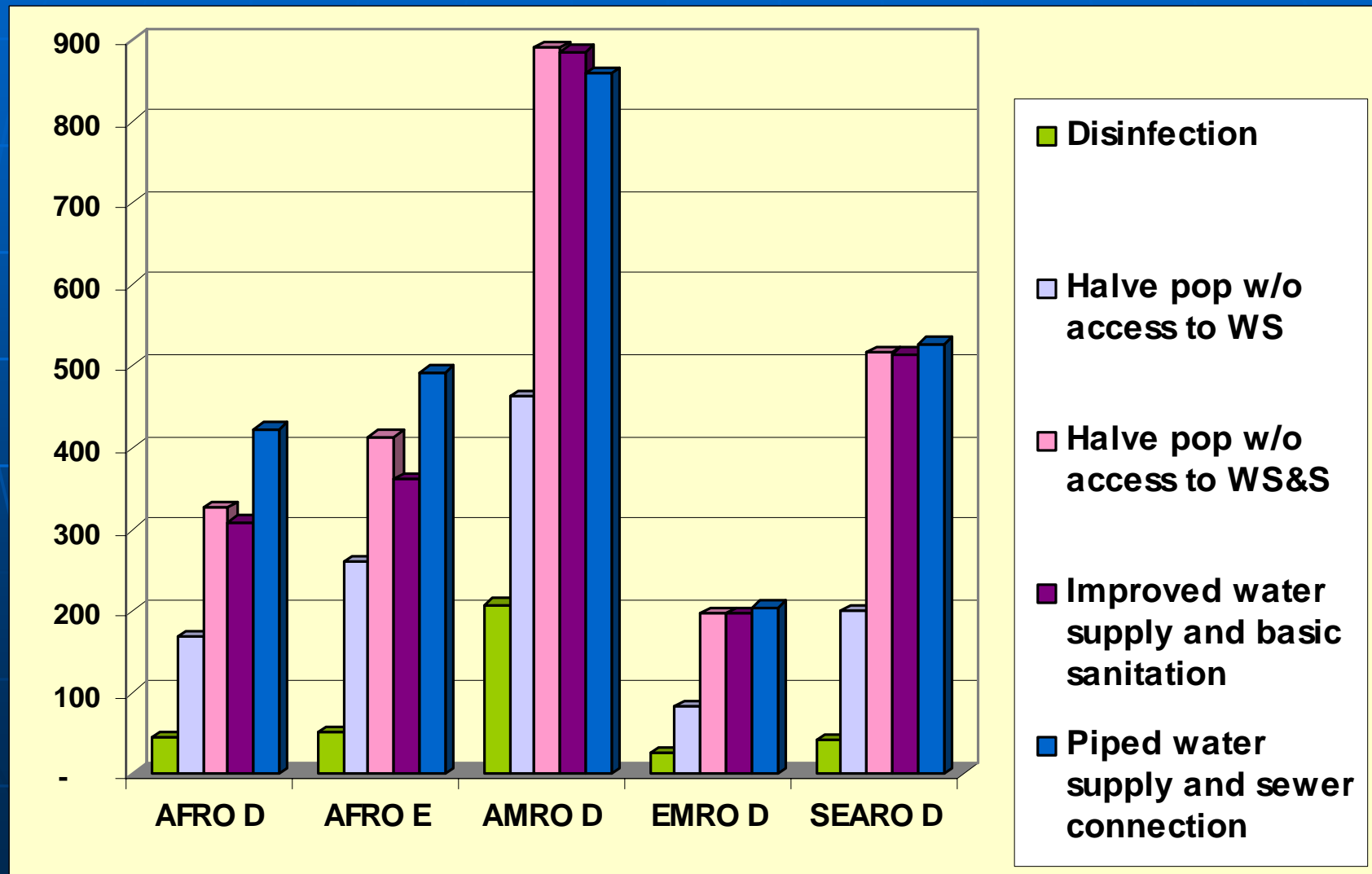
- the costs (capital and recurrent)
- the health benefits (diarrhoea cases and deaths)
- the additional benefits (costs averted, time saved)
- Results presented as US\$ per year, per capita , per intervention.

Interventions

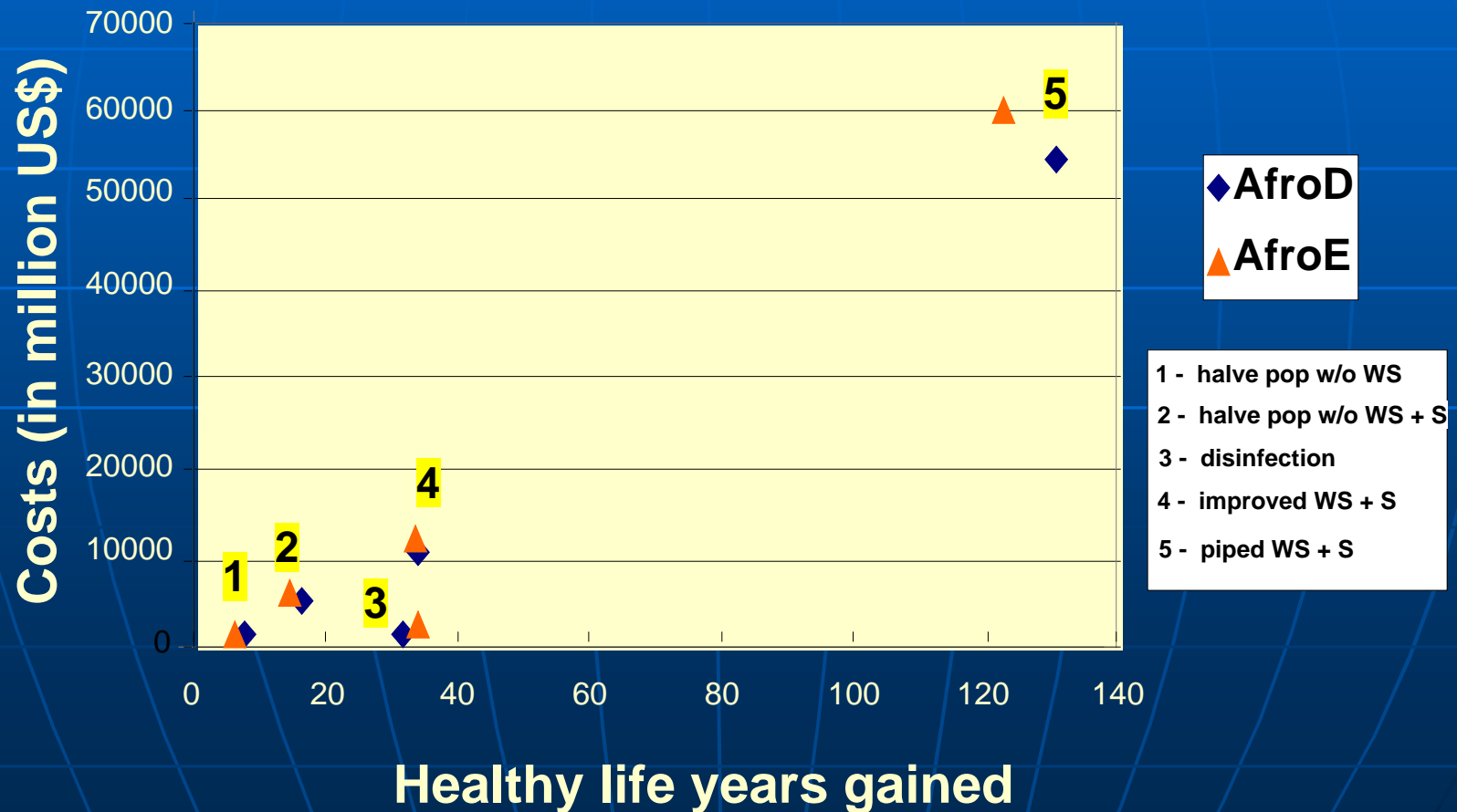
5 interventions were modelled:

- Halving population w/o improved WS by 2015 (through low-tech services).
- Halving population w/o improved WS&S by 2015 (through low-tech services) (MDG 7).
- Increasing access to improved WS&S services (low-tech) for all by 2015.
- Increasing access to improved WS&S services (low-tech) plus disinfection at point of use, for all by 2015.
- Increasing access to in-house piped water and sewer connection for all by 2015.

Cost-effectiveness ratios (US\$ per DALY averted)

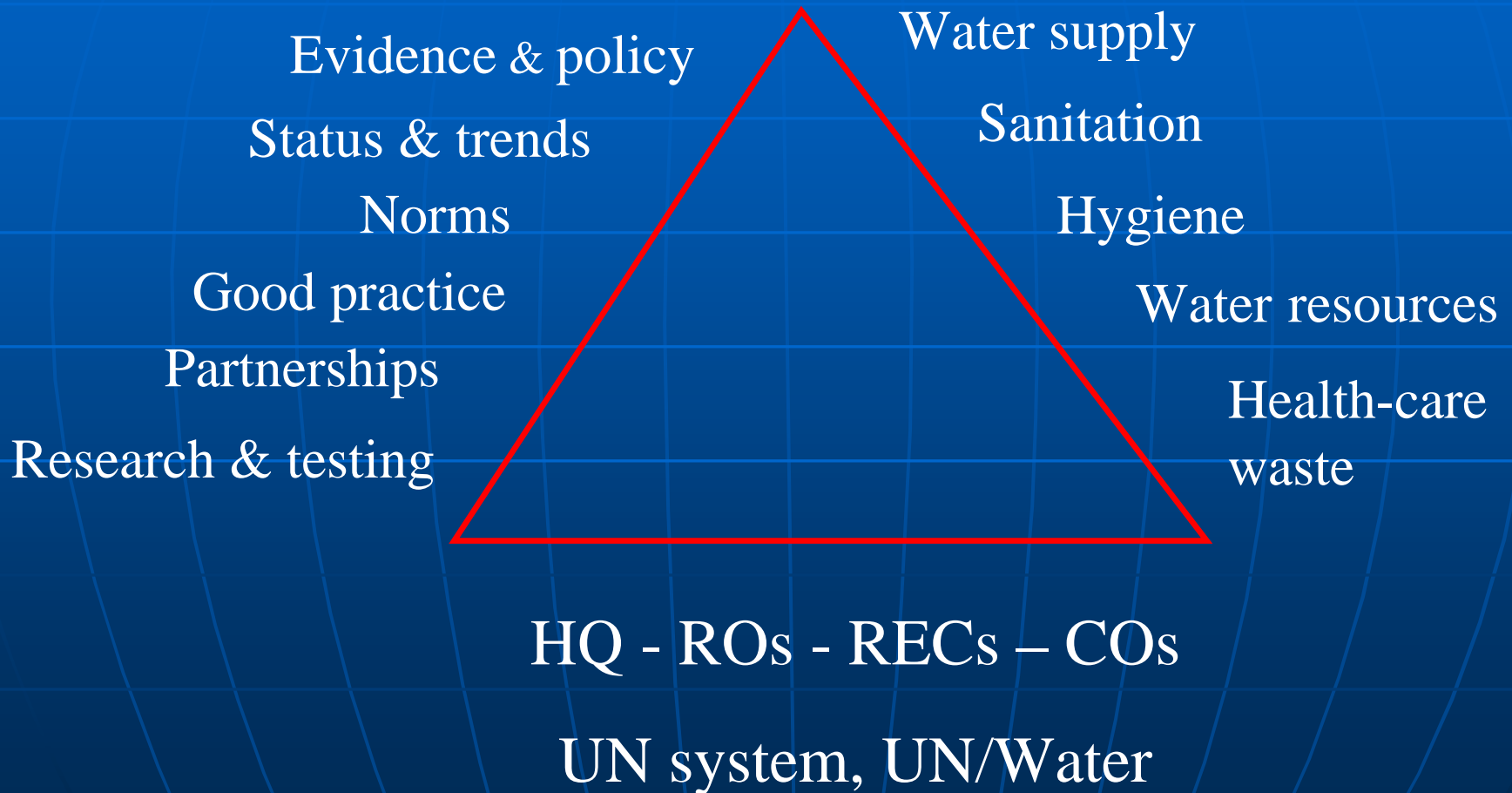


Costs of interventions vs. healthy life years gained

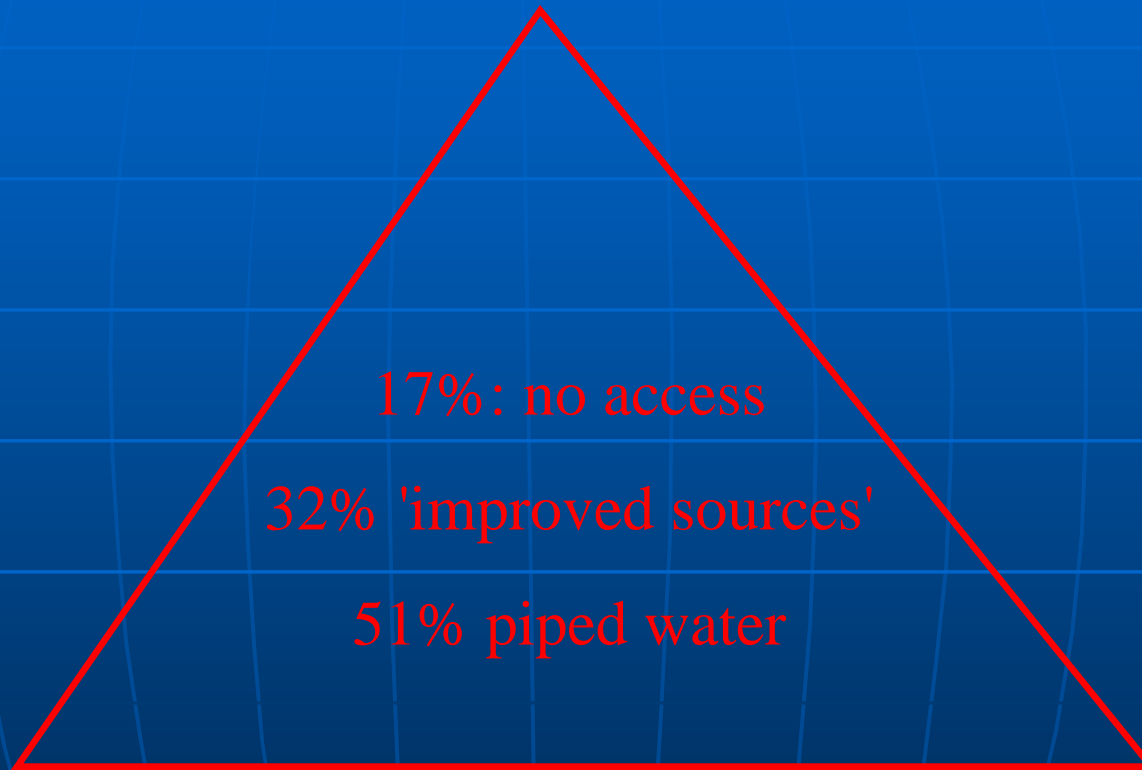


How to respond?

WHO Response on WSH issues



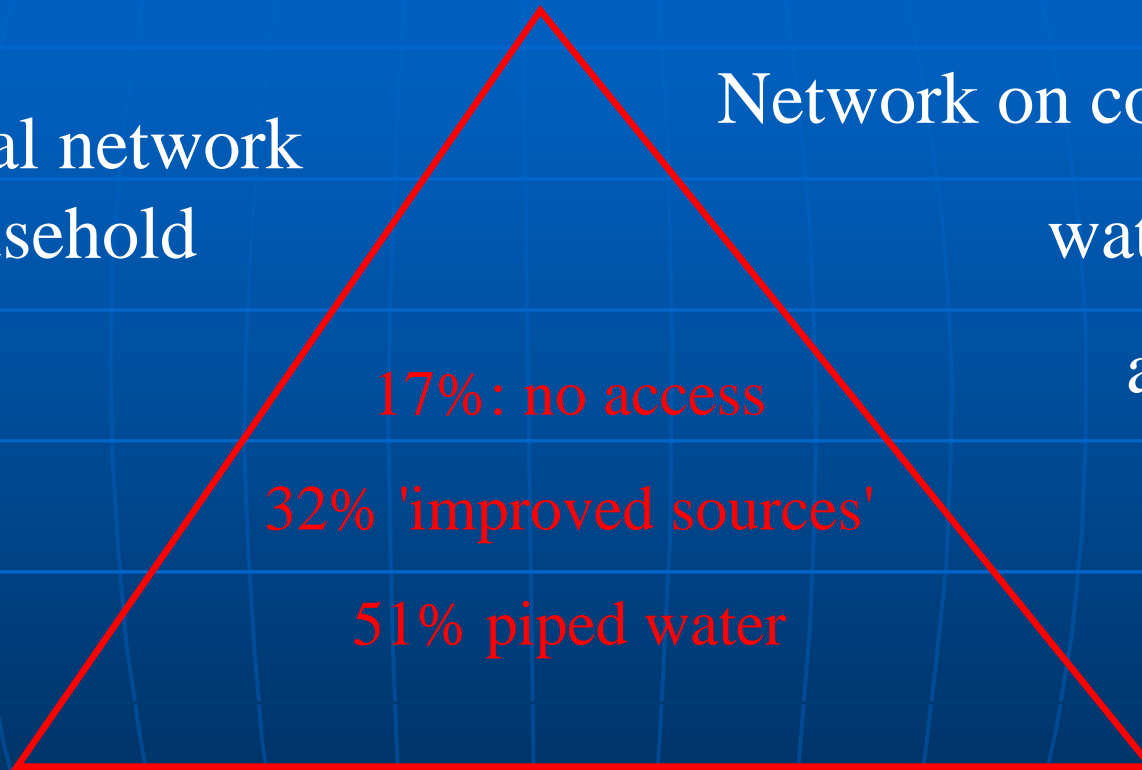
WHO Responses on Drinking-water quality



3 Prong Response to Drinking-water Quality

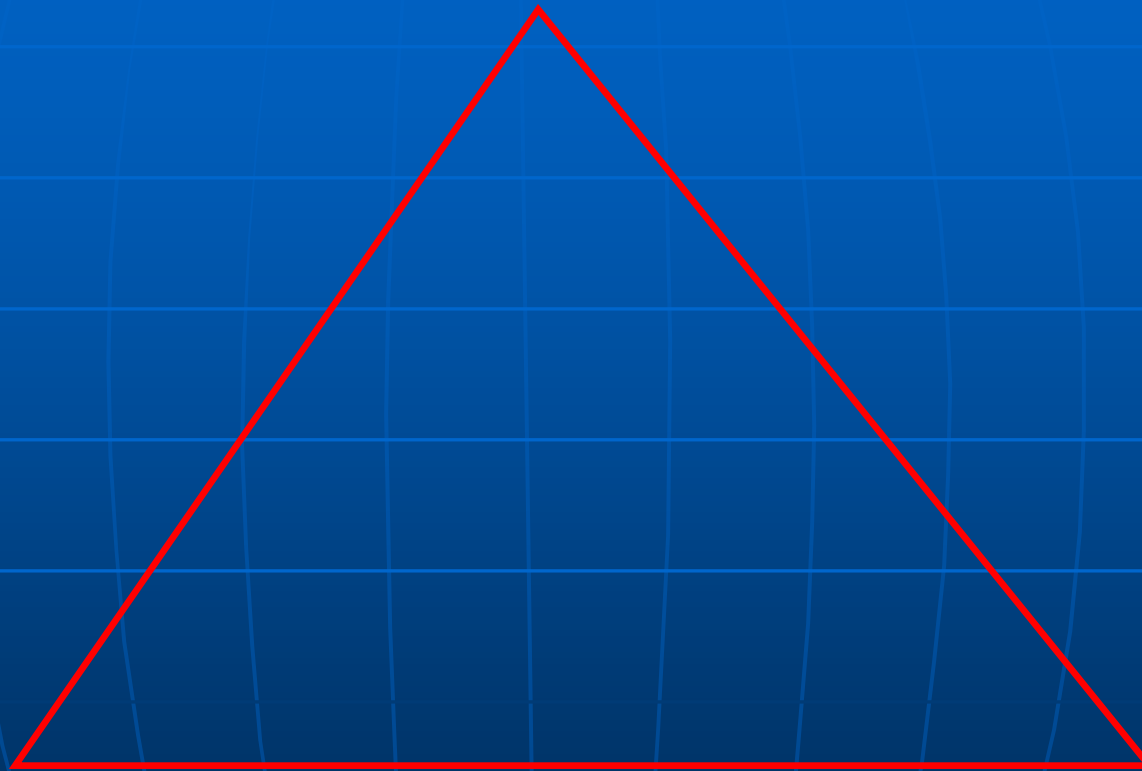
International network
on safe household
water

Network on community
water supply
and safety



Guidelines for Drinking-
water Quality

3 Prong Response to Drinking-water Quality



'Organised supplies' –
Guidelines for Drinking-
water Quality

WHO Guidelines on Drinking-water Quality

- Protection of human health (safe and acceptable)
- Advisory to national standard setting – flexible to account local social, cultural, economic & environmental context
- Risk-benefit - adaptation to local priorities for health gain
- Best available evidence - science and practice
- Scientific consensus
- Use global information and experience

Framework for Drinking-water Safety

Health Based Targets

Water Safety Plans

- 1 System Assessment
- 2 Monitoring of control measures
- 3 Management Plans

Independent Surveillance

WSPortal



World Health Organization

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[Health Impact Studies](#)

Water Safety Plan - The WSPortal

[WHO](#) > [WHO sites](#) > [WSPortal](#)

WSPortal

Drinking Water Safety Plans

```
graph LR; A[System Assessment] --> B[Monitoring]; B --> C[Management & Communications]; C --> A;
```

Drinking Water Flow

```
graph LR; A[Water Resources & Sources] --> B[Treatment]; B --> C[Distribution System]; C --> D[Consumer System];
```

RECENT PUBLICATIONS

Water safety plans: Managing drinking-water quality from catchment to consumer
[Full text](#)

Water, sanitation and health links to health
[Facts and figures](#)
updated November 2004

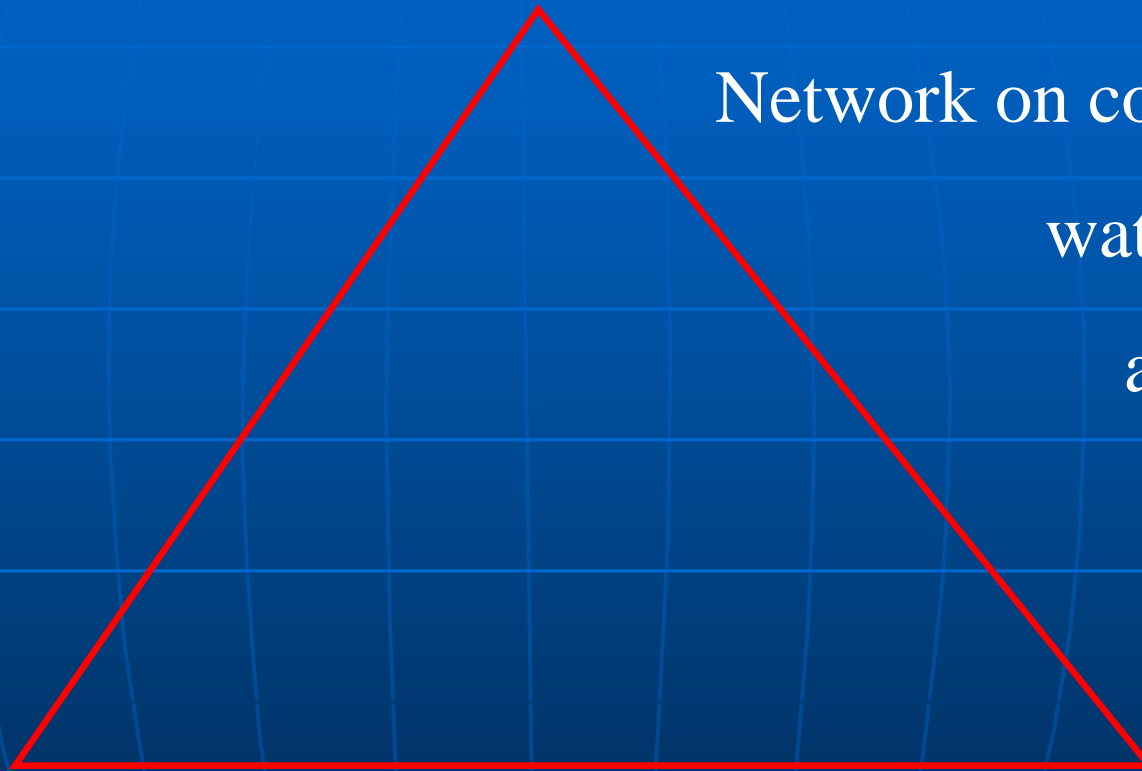
EVENTS

International Decade for Action: Water for life 2005-2015
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wsportal@who.int

3 Prong Response to Drinking-water Quality



Network on community
water supply
and safety

Why focus small communities'?

- 6 of 7 people without access to an improved water source live in rural areas
- Small system management is problematic in both developing and developed countries
- Most detected outbreaks of water-borne disease are associated with small community and single household supplies

WHO Small Community Pilot Projects 1980s - Peru, Indonesia, Zambia

Key lessons learned

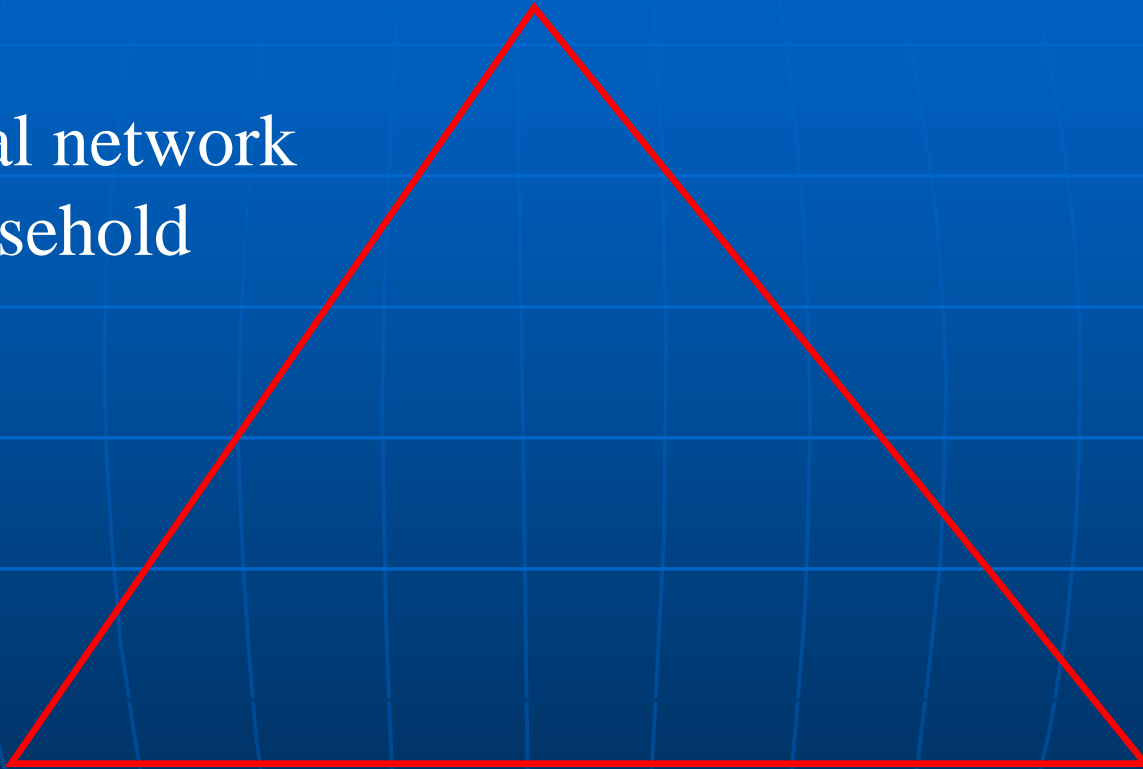
- Catchments to consumer
- Risk assessment + water quality analysis
- Community participation in process
- Regulatory 'enforcement' of little value
- Local outreach
- Prioritising where to act
- Correcting recurrent errors
- Need a responsible public health authority
- System specific

Accelerating action – improving systems

- Proposed *Network on Small Community Water Supply*
- Conceived at a meeting in Iceland, January 2005:
 - Models of best practice, info sharing
 - Case studies, country databases
 - Network development
- Second meet Australia July 2005
 - Sharing 'tools' (NHMRC leadership)
 - Approaches review (Bangladesh and others)

3 Prong Response to Drinking-water Quality

International network
on safe household
water



Ensuring safety - household interventions

Can make an *immediate* difference:

- *Effective*: Can reduce risk of diarrhoea by 39%
- *Cheap*: US\$ 60 in benefits for US\$ 1 invested
- Variety of technologies - no "silver bullet"



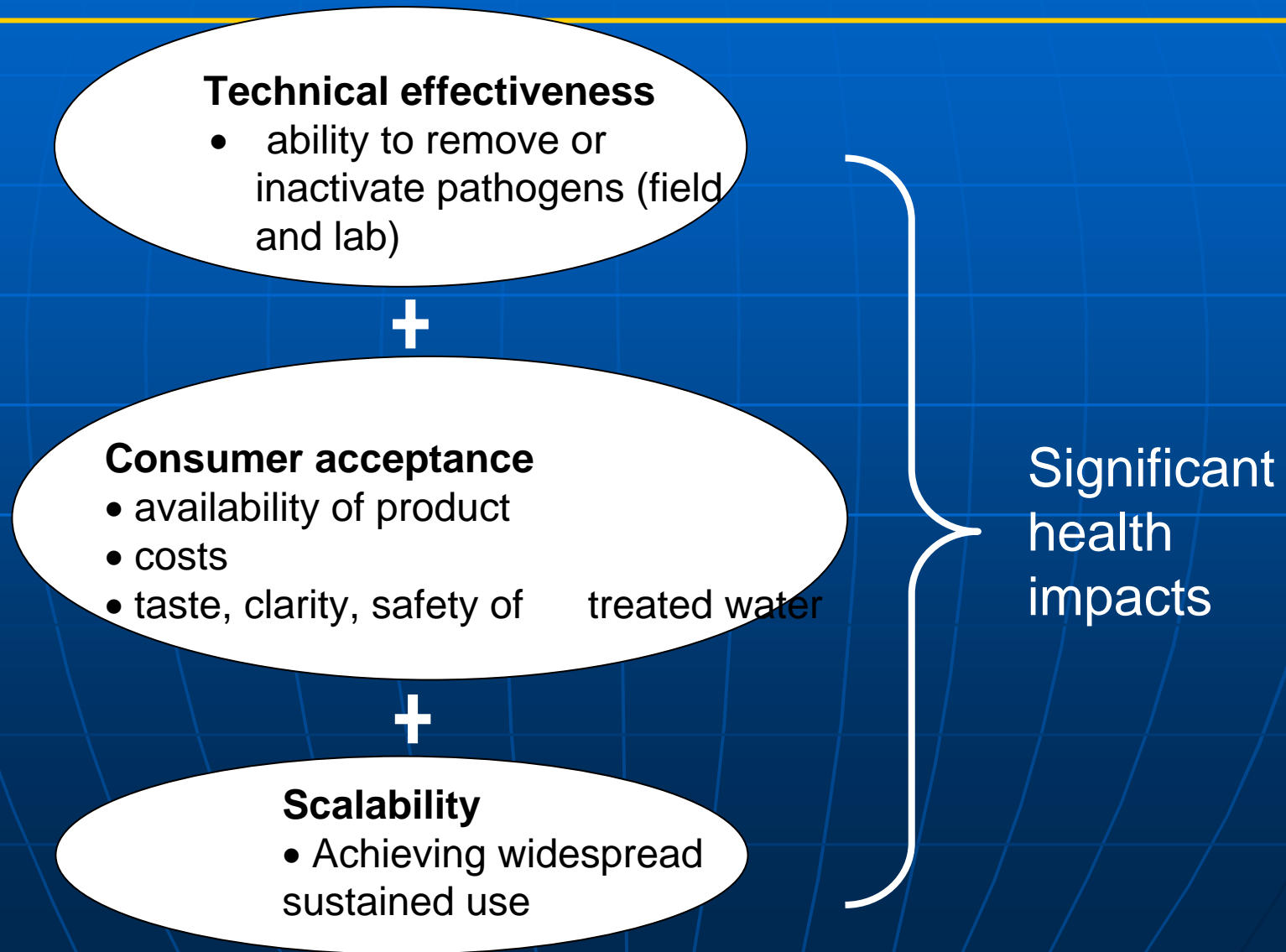
International Network to Promote Household Water Treatment and Safe Storage



Accelerating action –

- *WHO Network on Safe Household Water*
- More than 90 members
- 4 working groups: research, communication, advocacy and implementation
- Member projects in more than 60 countries

Household interventions - Achieving health gains



Water and Health in Developing Countries and Disadvantaged Populations

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