Three Pillars of Sustainability:

A framework for provision of water and sanitation in rural Africa

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Environmental Engineering Program, Yale University, USA

Sanitation Challenge, Wageningen University, May 19-21 2008

Our family built a latrine in order to live respectively with each other, our neighbors, and our environment. If one can build a house, one can build a latrine.

-Woman from Njoge Village, Tanzania

For us, having our own latrine means we do not have knock on neighbors' facility. When you need to go to the bathroom, no one has to know "your business".

-Man from Manyata Village, Tanzania

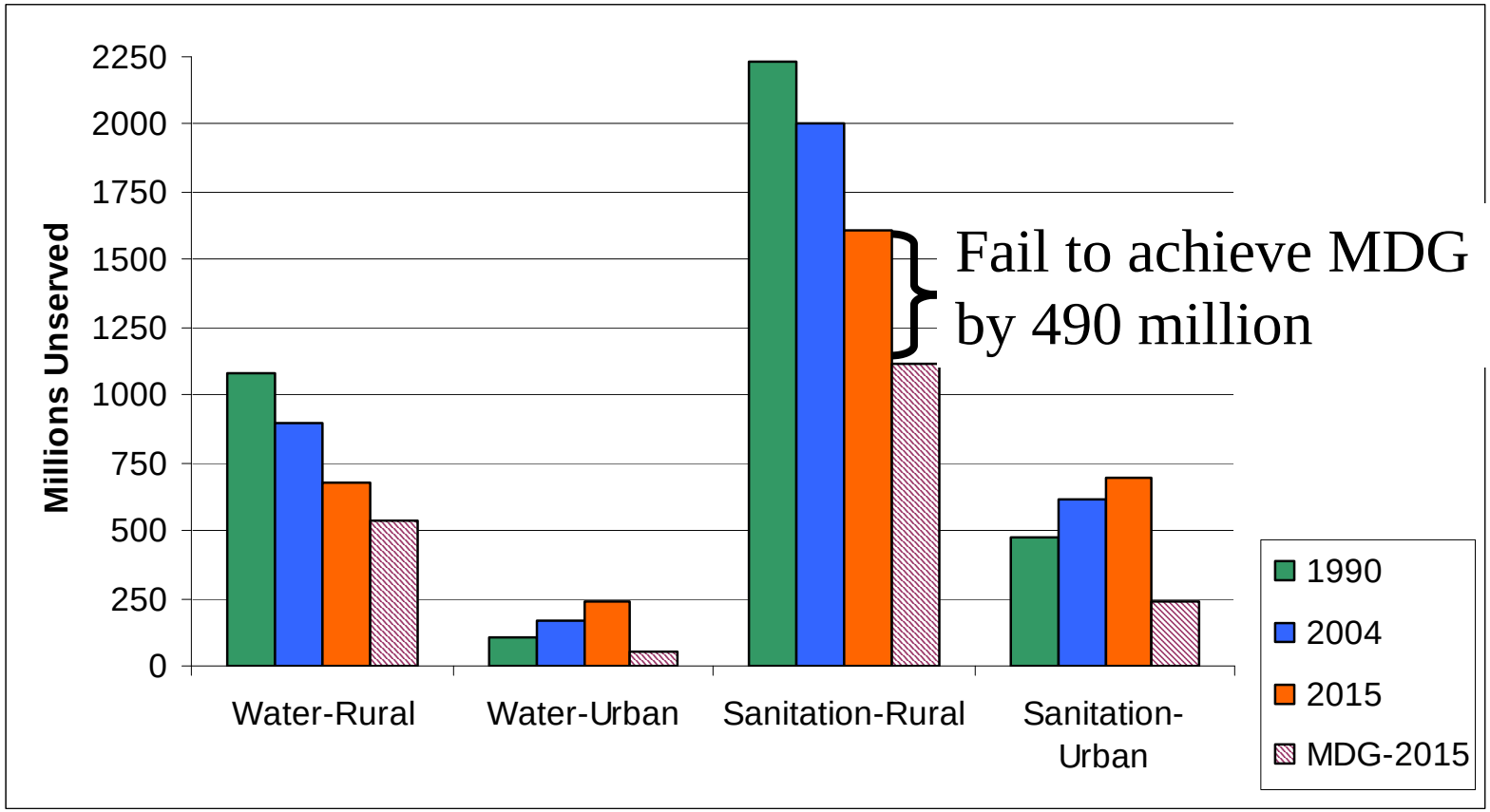
Outline

1. Introduction
2. Three pillars of sustainability
3. Undermining factors
4. Overcoming the obstacles
5. Conclusion

1. Introduction

- Agenda 21, global commitment to sustainability
- Ambiguity in defining, measuring, and improving sustainability in sanitation
- Specific sanitation challenges in rural areas in Africa

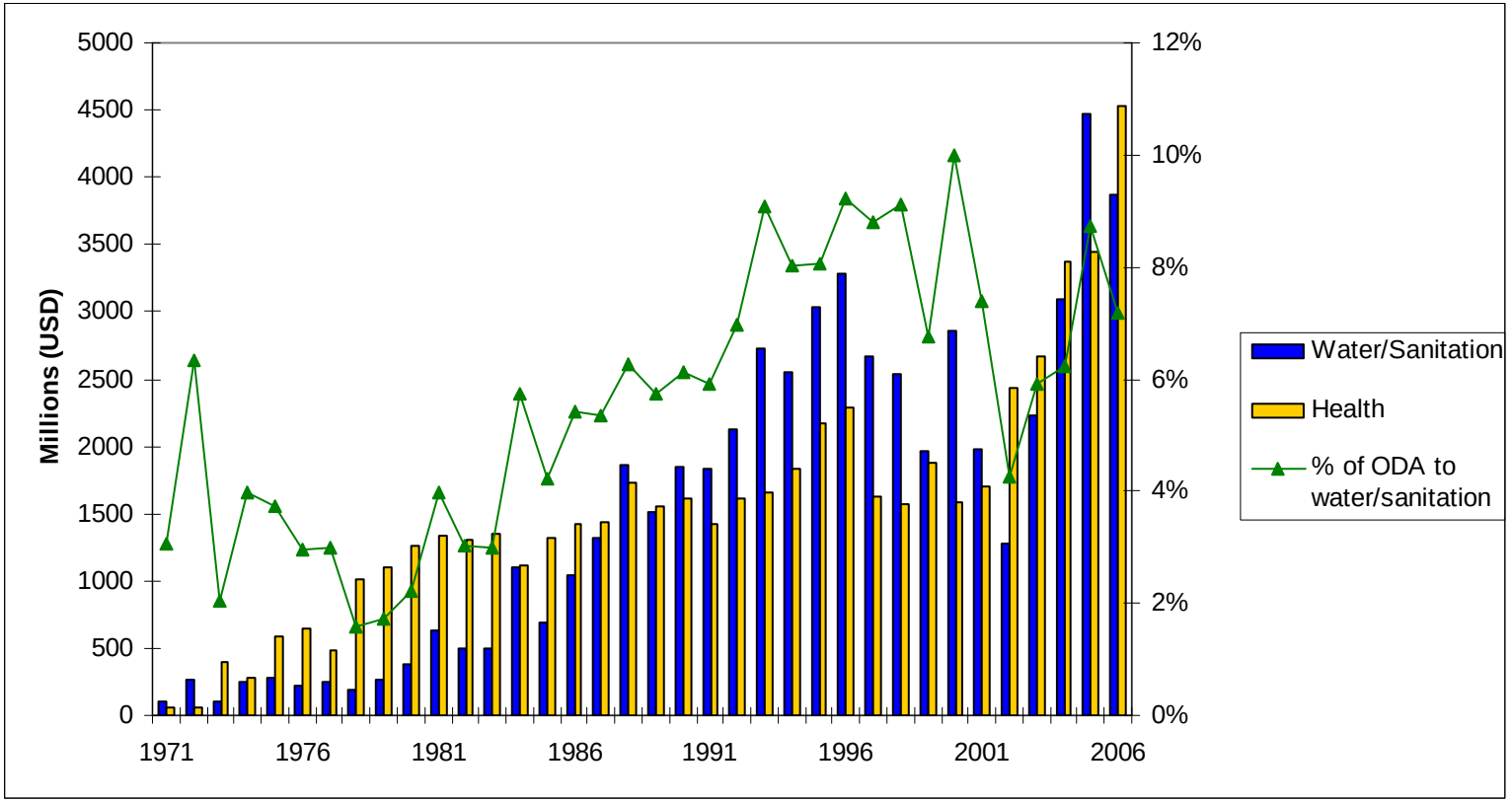
Rural Disparities-Water and Sanitation



Only 38% coverage of sanitation in rural Africa.

Greater Investment Needed

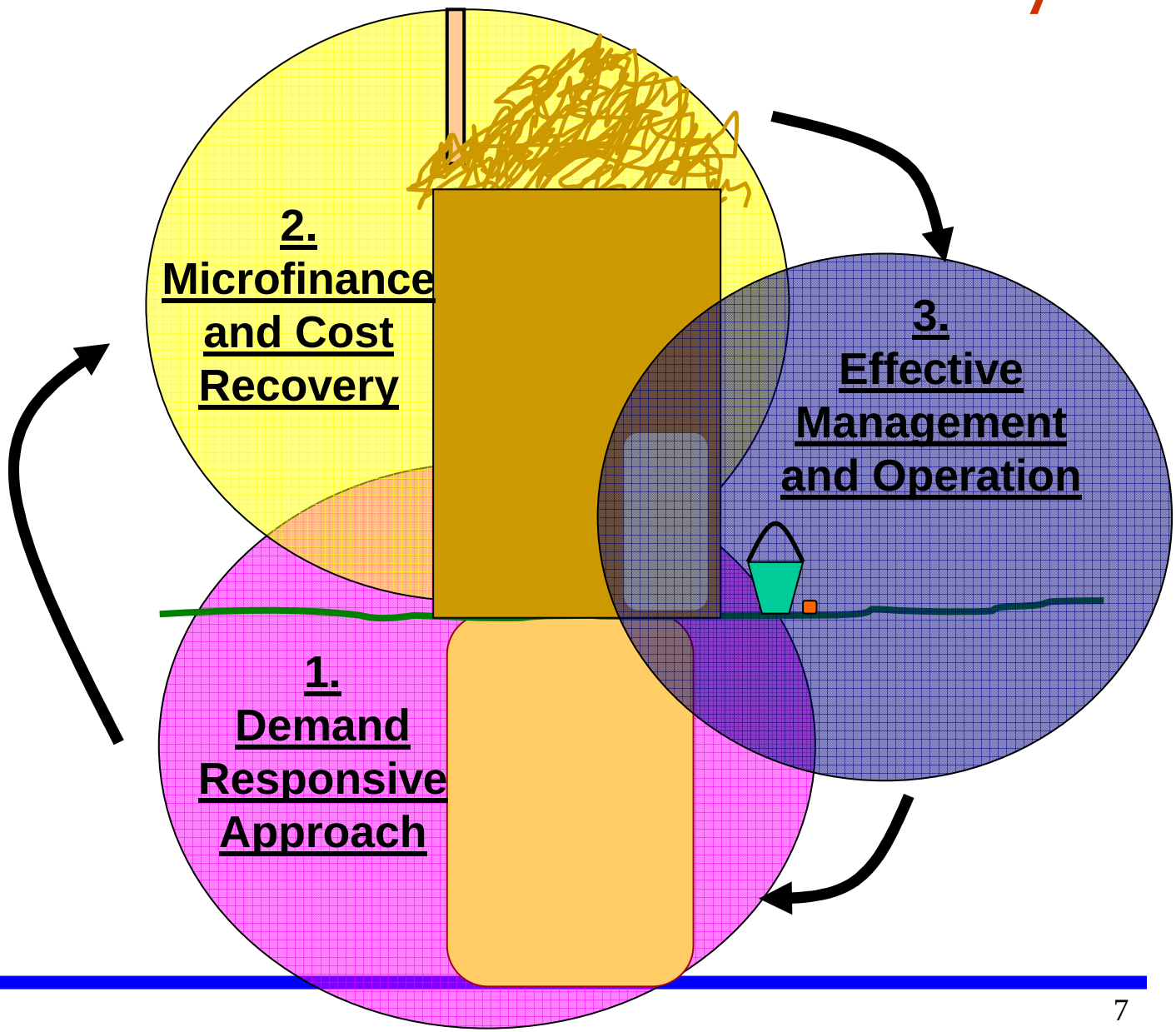
Official Development Assistance (ODA) 1971-2006



Approximately <u>$10.8 billion</u> (out of total $72 billion) needed from donors annually to achieve MDGs

Organization Economic Cooperation and Development (OECD) Stats. http://stats.oecd.org/wbos/Index.aspx?usercontext=sourceoecd Visited May 13, 2008.

Three Pillars of Sustainability



1.Demand Responsive Approach

- **Participatory rural appraisal**
- **Empowered local decision makers**
- **Good governance**

Understanding Contributing Factors

	Latrine Rank				
Household Characteristic	**1=Best (n=99)**	**2=Avg (n=201)**	**3=Poor (n=225)**	**4=None (n=57)**	**p** χ^2 test
Completed primary school (%)	79.6	80.5	67.9	63.2	0.003
Radio (%)	67.7	53.0	46.0	29.8	<0.0001
Bicycle (%)	55.6	53.0	44.3	28.1	0.002
Cell phone (%)	16.2	10.5	8.9	5.4	0.13
Iron sheet roof (%)	41.4	21.4	24.3	7.0	<0.0001

- Education and wealth influence how messages are received and latrines are constructed

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Own garbage pit (%)	36.4	33.3	39.4	26.3	0.26
Clean surroundings (no feces within 10 m of house) (%)	37.4	23.0	9.5	5.5	<0.0001
Share latrine (%)	38.8	46.0	51.9	-	0.09

- Well maintained latrines $\neq$ solid waste sanitation
- Latrine sharing not necessarily detrimental

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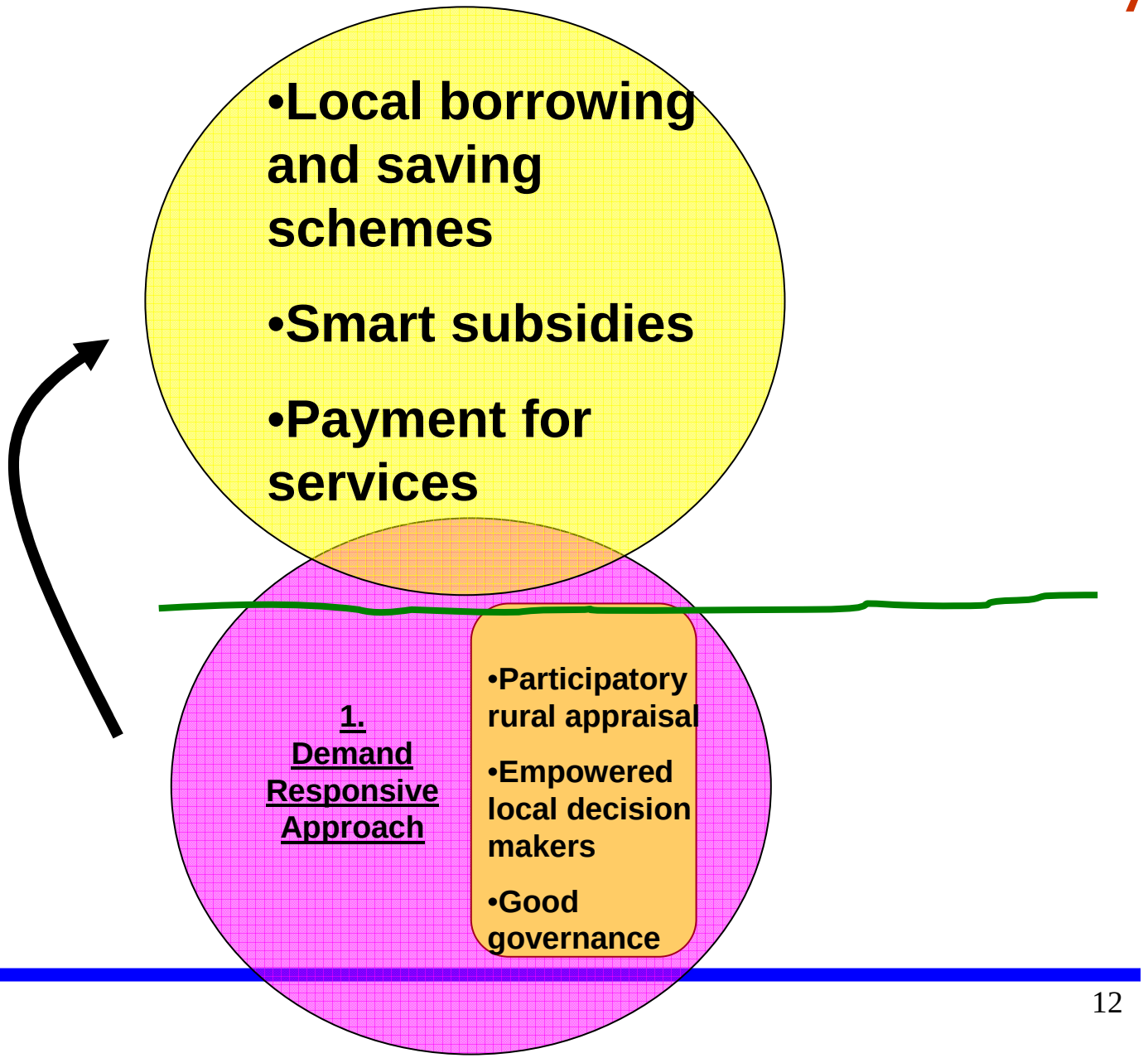
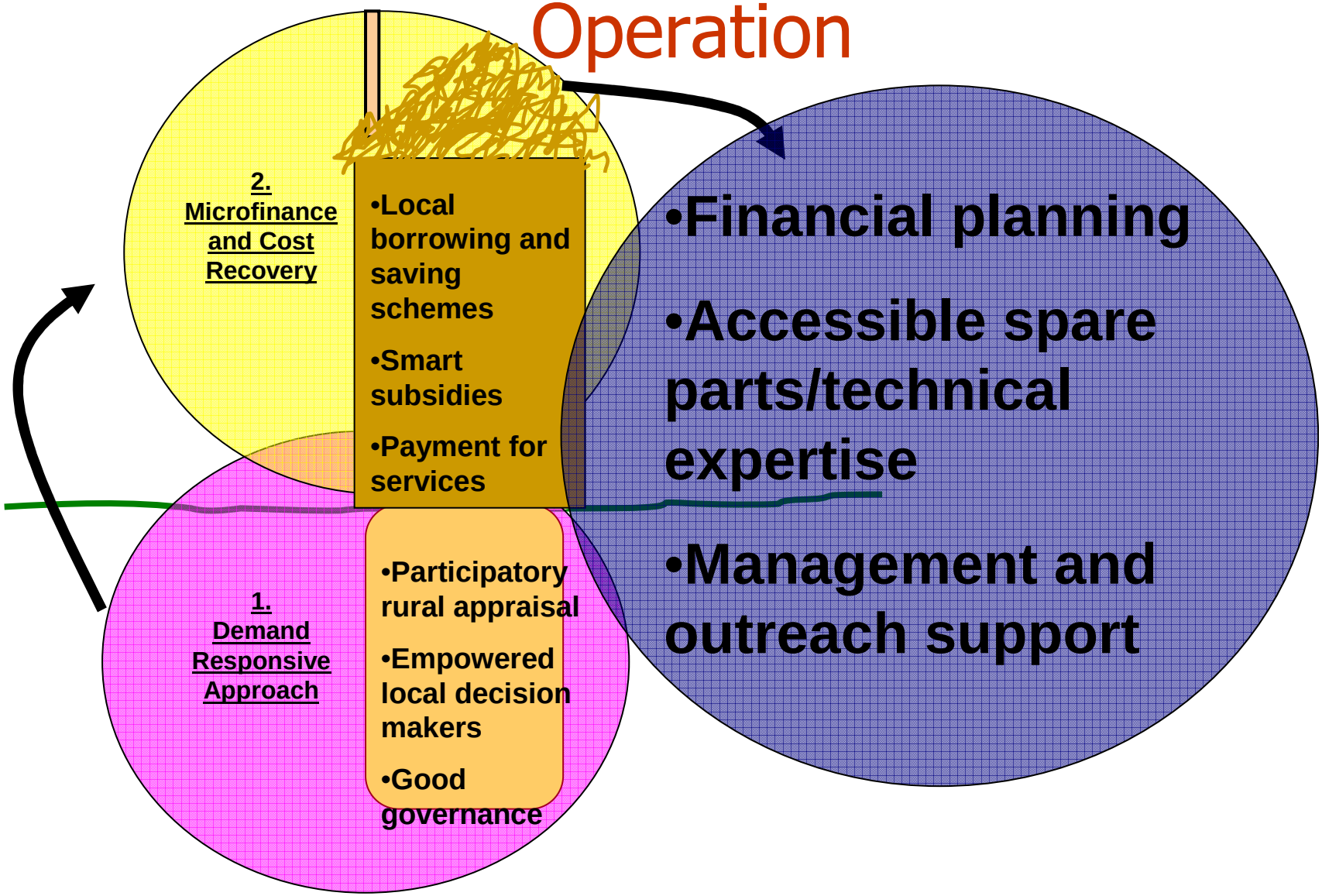
Share latrine (%)	38.8	46.0	51.9	-	0.09
Reported diarrhea (%)	18.2	21.9	23.9	22.8	0.72
Participate in community (%)	65.7	60.2	63.3	37.5	0.003
30 min or less to water source (dry season) (%)	6.06	23.9	19.5	8.77	0.0004

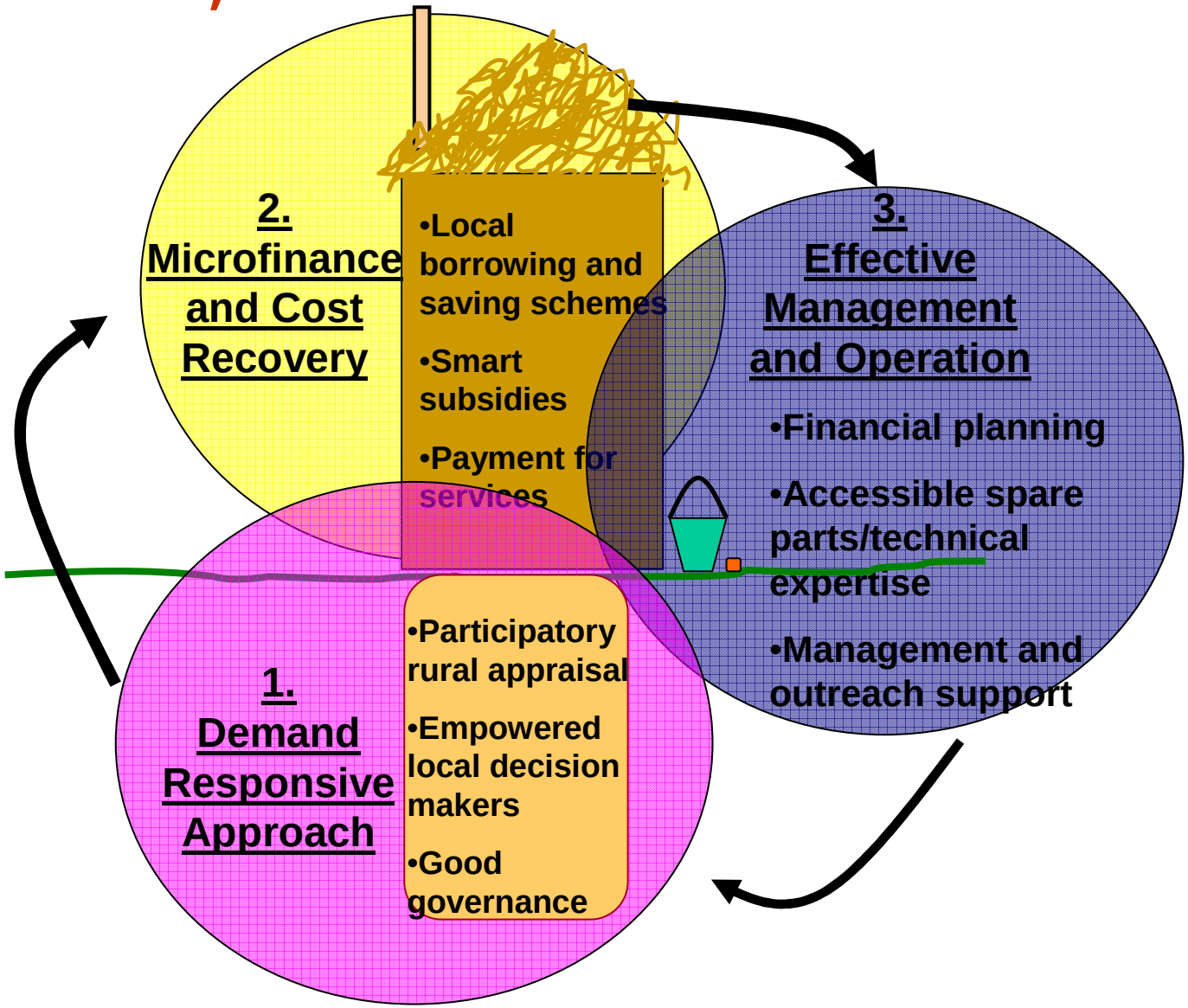
2. Microfinance and Cost-Recovery



3. Effective Management and Operation



Pillars; foundation of sustainability



Undermining Factors- Lack of communication

- Dispersed rural populations, insufficient/unreliable infrastructure
- Lack of human and financial resources at district level
- Few incentives for post-project communication

Cell phones and bicycles facilitate communication in rural areas

Undermining Factors- Limited microfinance

- Sanitation capital intensive
- Only 6% of Sub-Saharan Africa has access to microfinance
- Bureaucracy
- Diversion of water funds for other uses

Undermining Factors- O&M not a Priority

- Focus on initial mobilization, not long-term operation
- Sanitation and hygiene behavior improvements require ongoing efforts
- M&E allows for dynamic sanitation solutions

Latrine in need of care in Mkutani Village, Tanzania

Overcoming the obstacles- Communication

- Develop district “water-sanitation depot”
- Deliver messages through existing supply chains; cell phone card distributors
- Provide incentives for sustaining services

Village health attendant with proud latrine owners

Overcoming the obstacles- Access to capital

- Use of local materials, appropriate technology
- Revolving funds and smart subsidies
- Create independent water and sanitation budgets
  - Lesotho increased sanitation coverage from 20%-53% in 10 years

Latrine Team leader in Ngelenge Village, Tanzania

Overcoming the obstacles- Establishing O&M

- Establish supply chain before construction
- Create long-term financial plan
- Engage private operators
- Empower traditionally marginalized stakeholders (women, youth)

Research Needs

- Systematic review of successes and failures of community managed projects
- Agents of change; “positive deviators”
- Mechanisms to promote local PPPs

Conclusion

- Rural areas require particular consideration
- Increased aid important, but engaging private sector (informal and formal) is even more critical
  - Gain of $5-35 for every dollar invested in water/sanitation
- Understanding contributing/motivating factors important
- Three pillars essential:
  - Demand Responsive Approach
  - Microfinance and Cost-Recovery
  - Effective Operation and Management

Thank You

- Villagers, field assistants in Tanzania
- Adviser, Menachem Elimelech
- Research funders: National Science Foundation, P.E.O. Women's Organization, Yale Lindsay Fellowship for Research in Africa

"Kila jambo ni wakati wake."

There is an opportune time for everything.

(Swahili Proverb)

Questions?

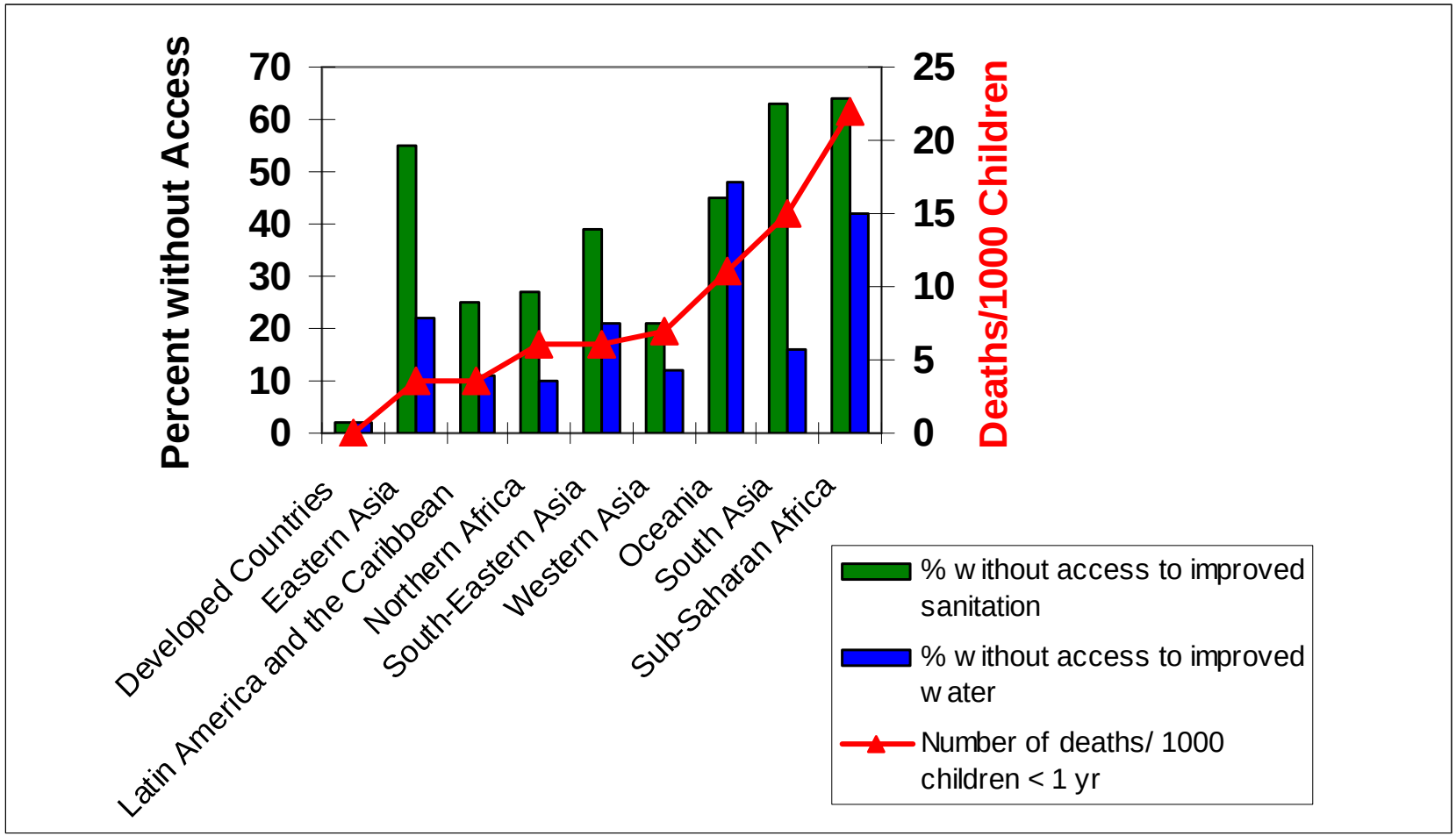
Extra Slides

Lack of reliable data-Tanzania

Indicator	Measure	TZ Target for Rural Areas	WaterAid Figures	Kongwa District
Improved Water	Water from borehole or protected well	65% by 2010	42%	63% (dry season) 50% (rainy season)
Water Availability	Within 30 minutes	65% by 2010	No data	12% (dry season) 25% (rainy season)
Sanitation	Latrine	95%	88%	88%
	Improved Sanitation	None	1% (Ventilated Pit Latrines Only)	16% Improved <1 % (VIP)

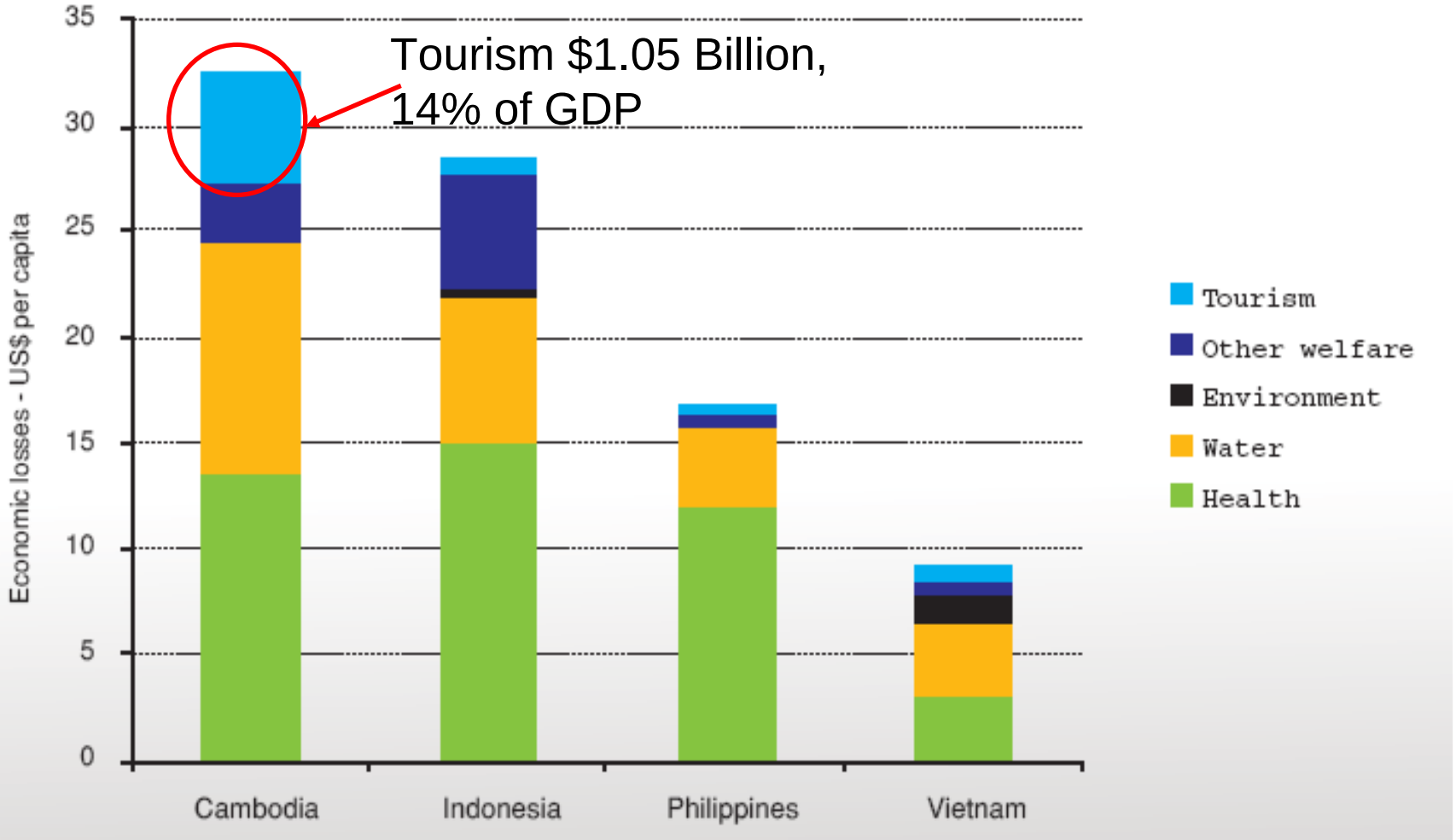
Water availability low

Impacts-Diarrheal Disease



Montgomery M, Elimelech M. 2007. Water and sanitation in developing countries: including health in the equation. *Environmental Science and Technology* 41: 17-24.

Impacts-Economic Losses



Source: World Bank, Water and Sanitation Program, 2007

Links: Water, Sanitation and Health

Intervention	% reduction in diarrheal disease
Water Quality (at Source)	11
Water Supply	19
Multiple	30
Hygiene	33
Water Quality (POU)	35
Sanitation	36