

The Bill & Melinda Gates Foundation

# Landscaping and Review of Approaches and Technologies for Water, Sanitation and Hygiene

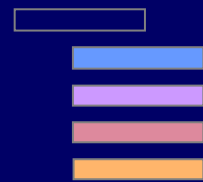
Opportunities for Action  
Main Report

September 2006



*“We shall not finally defeat AIDS, tuberculosis, malaria, or any of the other infectious diseases that plague the developing world until we have also won the battle for safe drinking water, sanitation and basic health care.”*

Kofi Annan, United Nations Secretary-General



**Institute for Water and Environment  
Cranfield University, UK**  
[www.cranfield.ac.uk](http://www.cranfield.ac.uk)

Prof. Richard Carter, International Water Development

Dr. Richard Franceys,  
Director Water and Society Program

Dr. Andrew Trevett, Lecturer in Water and Environmental Sanitation

James Webster, Lecturer in Community Water Supply and Sanitation

Régis Garandau, Research Assistant

Ben Fawcett, Institute of Irrigation and Development Studies  
(Southampton University)

Mike Byers, Consultant



**Aguaconsult Ltd., UK**  
[www.aguaconsult.co.uk](http://www.aguaconsult.co.uk)

Harold Lockwood, Director

Susan Watts, Associate Consultant

**The views expressed in this document are those of Cranfield University, Aguaconsult Ltd., and the International Water and Sanitation Centre (IRC), and may not reflect the views of the Bill & Melinda Gates Foundation.**



**International Water and Sanitation Centre, The Netherlands**  
[www.irc.nl](http://www.irc.nl)

Paul van Koppen, Director

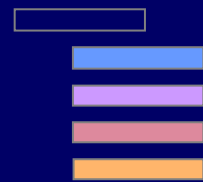
Dr. Patrick Moriarty,  
Head of Knowledge Management Section

Ton Schouten, Program Officer

Dr. Jan Teun Visscher,  
Associate Consultant

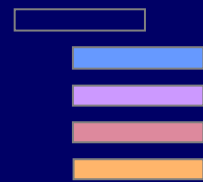
Carmen da Silva Wells,  
Research Assistant

# Acknowledgements



The review team wishes to acknowledge and thank the following people for their time and inputs on this review:

- **Rokeya Ahmed** WaterAid, Bangladesh
- **Augusta Dianderas** Independent Consultant, Lima, Peru
- **Kunlun Ding** China Institute of Water Resources and Hydropower research, China
- **Mariela Garcia Vargas** CINARA, Colombia
- **Minnie Venters-Hildebrand** Independent Consultant, Johannesburg, South Africa
- **Aaron Kabirizi** Assist. Commissioner, Rural Water, Directorate of Water Development, Uganda
- **Peter Lochery** Water Team Leader, CARE, USA
- **Alain Mathys** Lyonnaise des Eaux, France
- **Henk van Norden** Water, Environment and Sanitation Program, UNICEF, New York
- **Vanessa Tobin** Water, Environment and Sanitation Program, UNICEF, New York
- **Juliet Waterkeyn** Africa AHEAD , Cape Town, South Africa
- **Ned Breslin** Water for People, USA
- **Tito Alai** Celtel, The Netherlands
- **David Browning** TechnoServe, USA
- **Yuri Jain** Unilever, India
- **Mike King** Ogilvy & Mather, UK
- **Eddy Perez** World Bank, USA
  
- With special thanks to **Wilfred Griekspoor**, Director Emeritus, McKinsey&Company, The Netherlands for his patient guidance and continued inspiration.



## The main landscaping and review report

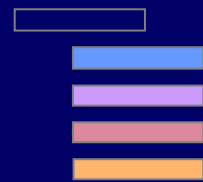
This document is the principal report produced by the consortium as part of the review commissioned by the foundation, and contains the main findings of a landscaping exercise, including a problem mapping of the water, sanitation and hygiene sector and the identification of approaches and technologies to that have the potential to be actionable at scale, providing sustainable services. It should be read in conjunction with the two other documents described below.

## The landscaping of Approaches

This is a supporting document to the main report, which provides an overview and mapping of *approaches* to the delivery of water, sanitation and hygiene services. The document sets out an analytical framework to assess the various approaches that have been tried in the past, describes the main challenges and opportunities and puts forward a number of innovative and potentially viable solutions that may be considered for future work in the sector.

## The landscaping of Technologies

This is a supporting document to the main report, which provides an overview of *technologies* that have been employed in the delivery of water, sanitation and hygiene services. The document provides a framework for assessing and appraising technologies and explores the reasons for the past take up, or failure, taking into account requirements for management, operation and maintenance. It provides a number of recommendations as to the most promising technologies and areas where further research and development may be required.

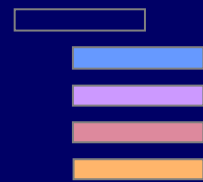


Guided by the belief that every life has equal value, the Bill & Melinda Gates Foundation works to reduce inequities and improve lives around the world.

The foundation is exploring water, sanitation and hygiene as a potential new area of giving. The goal of the foundation's learning initiative is to identify interventions with the potential to be:

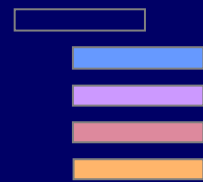
- **Effective** in addressing the health, economic and social inequities of those with inadequate WS&H;
- **Sustainable** in terms of long-term operations and financing; and
- **Scalable** to reach hundreds of millions of people in the developing world.

The results of this study will be used together with the outcomes of other learning activities to determine whether an opportunity exists for a long-term WS&H program of giving that is consistent with the foundation's principles.



In seeking solutions to the WS&H problem, the foundation is guided by certain principles and observations on the sector:

- **Focus on Impact.** The foundation seeks to deliver improved health, economic and social impacts for the poor. Simply installing more hardware or providing expanded services is not sufficient.
- **Target the Underserved.** At present, 80% of those not being served are in rural areas. Looking ahead, the urban poor will face the greatest problems given demographic shifts.
- **Water, Sanitation AND Hygiene.** Water gets most of the attention while sanitation and hygiene are often ignored. The foundation is focusing on all three components to find the best possible solutions.
- **Scalable AND Sustainable.** Many large-scale water and sanitation projects have emphasized the installation of hardware but failed to achieve operational and financial sustainability. The foundation is seeking interventions that are both scalable and sustainable.
- **Supply AND Demand.** Many interventions to date have supplied equipment and assumed that it will be used and maintained appropriately. Sustainable solutions must both catalyze consumer demand for safe WS&H products and services through effective behavior change and ensure delivery of safe, affordable, consumer-oriented WS&H products and services.
- **Partners.** The foundation wants to deliver results, and will engage with those partners – whether in the private, public or NGO sectors – that offer the best way to do that.



## Global conclusions and recommendations

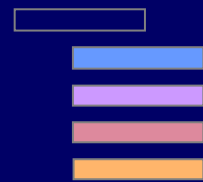
- ***The problems associated with inadequate WS&H services are huge, but there are real opportunities to make a difference.***

The sector is complex, and demands a high degree of understanding, commitment and coordination on the part of numerous actors and stakeholders:

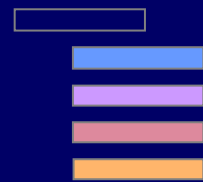
  - **understanding** of a wide range of social, cultural, institutional, scientific, engineering and economic factors which determine what is technically possible, what is socially and culturally acceptable, and what is financially and environmentally sustainable;
  - **commitment** to overcome the obstacles, exercised over the long term, because of the time it takes to bring about changes in user behavior and hygiene practice, and institutional change;
  - **coordination** between different professions and between a wide range of actors including central and local Governments, donors, non-governmental organizations (NGOs) and international agencies, private companies, user groups and households.
- ***Action in the WS&H sector creates new opportunities and freedoms for the poor, including better health, time and energy saving; privacy, dignity and safety; and improved livelihoods and education.***

Just as the problems of the WS&H sector are wide ranging, so too are the benefits when successes do occur. Direct impacts on health, especially of those least well-served prior to successful interventions, are significant. Even if minor improvements to water supply access and basic sanitation and hygiene are achieved, time and energy savings can be significant, with consequent improvements in quality of life, income and livelihoods. Improved sanitation and sheltered bathing facilities have a particular role to play in improving the condition of women, by enhancing privacy and dignity of defecation, menstrual management and personal hygiene.





- ***When all actors cooperate together and there is ownership, real change can take place.***  
There should be no preconceptions about the roles of the many actors involved. **Governments** are key actors, both in terms of investment and on-going support to the sector. They have a key role too in facilitating and regulating the other players. A strong public sector is therefore essential. The **private sector** may act as investor, supplier, contractor or consultant – but there are real dangers if the private sector operates unsupervised or unregulated. **NGOs** can be very flexible and the best of them can have an important role in trying out new ideas and in policy dialogue and advocacy. The **donors** have tended to be very dominant – in terms of ideas and influence, if not always in terms of financial impact. For real and lasting change to take place, it is especially important that ownership of policies, strategies and the change process are in the hands of national public, private and civil society institutions.
- ***There are no silver bullets, but plenty of opportunity for the scaled-up application of best practice which has been proven at pilot scale.***  
It is unlikely that either a single new technology or a single new approach will revolutionize the situation of WS&H for the poorest. The majority of technology development will continue to focus on high-tech commercial equipment, mostly for the amelioration of water quality. While these technologies may penetrate wealthier urban markets, the peri-urban and rural poor are less likely to benefit. For the poorest, technologies or technology principles are generally already known – although there remains a real and generally unfulfilled need for user-centered technology R&D for the poorest. The challenges here centre around affordability, operation, maintenance and management of technology, and user acceptability of necessary behavior changes. This is where approaches fit in – approaches to the stimulation of demand for services, service delivery, financing, and support systems. There are numerous examples of imaginatively integrated approaches and technologies which provide the inspiration for further innovation and investment.



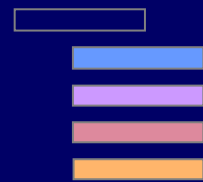
- ***Many barriers to progress in WS&H lie outside the sector. Weak institutions and poor governance affect the ability to “do business” effectively, to bring about beneficial change, and to focus on poverty reduction.***

The major barriers to progress in WS&H lie among the institutions (central and local Government), policies and realities of ‘developing’ countries. The public sector is often weak in terms of skills, structures, decision-making processes, and bureaucratic procedures. Furthermore, it is often unduly influenced by foreign institutions including donors, which do not always fully understand the context into which their advice and requirements are offered. Policies tend increasingly to follow a one-size-fits-all model, but the realities of policy implementation are often quite different from the theory set out on paper. Poor management and accountability at decentralized local Government, and consequent opportunities for corruption, exacerbate the situation.

- ***Developing National capacity to bring about change is crucial. This needs to include not only the transfer of knowledge and skills, but also changes to organizational culture, nationally-owned policies, systems of positive incentives, and assured resources.***

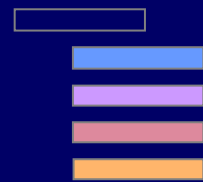
If there is one single message of this document, this is it. Without national ownership of the sector, and a rapidly growing national competence to deliver results, neither national targets nor the Millennium Development Goals (MDGs) will be achieved in the poorest countries. Foreign organizations – donors, private companies, international NGOs and international ‘experts’ – have generally failed to recognize the importance of national ownership, and the inevitable diversity of approach and technology which would result from that ownership.

When national institutions are fully committed to understanding the issues of poverty, and the links between poverty and WS&H; when they are driven by an institutional commitment to overcome this major aspect of poverty; and when foreign institutions and ‘experts’ learn to facilitate those processes of organizational culture and drive, real change will begin to accelerate.



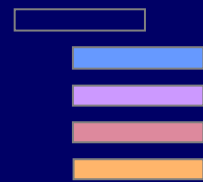
## WS&H coverage

- Over the last 35 years the developing world population has grown by 2.5 billion, while the numbers described as ‘unserved’ with improved **water supplies** have remained steady at about **1 billion**.
- The situation regarding sanitation has however been less encouraging, with the absolute numbers “unserved” growing significantly over the same period to approximately **2.2 billion people**.
- The area of greatest need in terms of increased coverage for water supply is in sub-Saharan Africa, whereas the sanitation gap is greatest in south Asia.
- The most widely quoted figures for coverage come from the Joint Monitoring Program of WHO and UNICEF; whilst this is the best tool we have for describing the situation globally, there are many problems with the data sources and aggregation; it says very little about the quality of service (for example an improved water source cannot be assumed to be a safe source) or about the sustainability of the coverage over time.
- One of the more critical barriers to understanding the sector, and a weakness of current approaches, is the paucity of **reliable data** that goes beyond such broad-brush figures for coverage; efforts to resolve this data gap will be complex and costly, but would be enormously useful to the overall goal of improving sustainable services.



## WS&H services in context

- **Rural areas:** represent a large proportion of populations in the world's poorest countries, but options for private sector driven approaches can be limited by absence of cash economies and rural populations can often lack political leverage.
- **Urban areas:** populations living in cities will be among the fastest growing group in the next 25 years; high population densities and a greater political voice makes this an important grouping; scale can be served by higher levels of organization.
- The traditional balance between rural and urban populations is changing, and a new and significant category of **small town** populations is emerging. Such populations are increasingly important, but face challenges that are different from either rural or urban populations; small scale private sector operators can provide effective and flexible services. Addressing this group of people is critical to achieving scaled-up service provision.

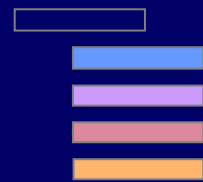


## WS&H services in an increasingly water scarce world

- Despite the fact that drinking water requirements represent a fraction of consumption when compared with agriculture and industrial demands, the trend towards water scarcity in many parts of the world mean that access to water for domestic consumption will become increasingly difficult.
- Many of the world's poorest countries are also amongst the most arid; therefore, technological solutions, especially for excreta disposal, **must** take account of water scarcity.

## Understanding what the goals really are

- There is often a **disconnect** between the goals of sector professionals and end users: professionals often have a primary focus on (MDG) coverage, engineering standards and health impacts, but user's often want more water for multiple (productive) uses, improved access and convenience.
- Sector professionals need to have a better **understanding** of what users want and need. This requires a greater degree of exposure to end users and their problems, and a greater degree of accountability to those users.



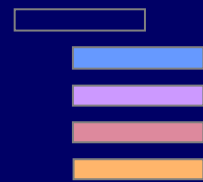
## Approaches to WS&H service delivery

Approaches are the **institutional infrastructure** that provides the social, institutional and financial means to access WS&H services, and to manage and maintain them. Approaches can be divided into three broad categories:

- **Self initiated approaches** in which individual users or groups of users invest in their own services driven by the felt need to improve, without any form of external assistance, but individuals may often engage with external agencies or private providers;
- **Opportunity driven approaches** through small scale entrepreneurs, local private companies and larger private sector organisations driven by either livelihood necessity or profit motives;
- **Externally initiated or supported approaches** with governments, donors or NGOs supporting or facilitating improvements, driven by broader public goals, international development agendas and political imperatives.

### Promising and innovative approaches:

- Service delivery approaches: through self-help, private sector participation and reform of public utilities;
- Innovative financing mechanisms such as rotating funds, targeted subsidies and the promotion of productive water use in the design of systems;
- Demand stimulation, particularly for hygiene improvements and sanitation;
- Scaled up support systems, for capacity building through institutional and legislative reform, exploring franchising options, strengthening supply chains, investing in support for community management at scale, improving access to information, developing strong partnerships and learning alliances.



## Technologies in WS&H service delivery

Technologies are the **physical infrastructure** that provides the means of access to and maintenance of water supply and sanitation services, and the possibility to practise good hygiene. No technology operates outside of a **context** (users, national policies, natural environment) and in the absence of **approaches** and **enabling factors**. Technologies must be culturally and socially acceptable, affordable, and easy to operate, manage, and maintain.

### Promising and innovative technologies:

**Water resources:** the potential to “leapfrog” under-funded water resource monitoring which rely heavily on unmotivated human operators, by adopting advanced sensors and communications technologies;

**Water sources:** rainwater harvesting and very low cost water well drilling for both productive and domestic uses;

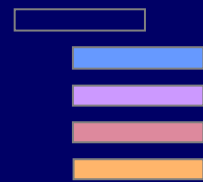
**Water lifting:** the management of water pumping is a particular priority; this has technology implications in relation to handpumps and solar pumps;

**Water storage:** very low cost water containers suitable for safe storage in the home, or in larger capacities suitable for household rainwater storage, could impact on very large numbers of the unserved;

**Water treatment:** there is no lack of “proven” or piloted technologies, and much of the innovation in water supply is currently taking place in this aspect, particularly in lowering costs and improving reliability;

**Excreta disposal:** the main technology emphasis for improved excreta disposal for the poor must lie with on-site and low-cost technologies – pit latrines, pour-flush latrines, eco-san, and small-bore sewerage; It may be that bio-additives could be developed, but this will require significant R&D investments;

**Hygiene and hygiene promotion:** few technologies are needed for hygiene practices, other than those offered by improved water and sanitation services. However, the following technologies need promoting or developing: hand washing water dispensers; soaps and soap alternatives; materials for menstrual management; children’s nappies and potties; low-cost (including wind-up) radios and equipment for visualisation of ‘germs’.



## Opportunities for change

In order to identify specific areas in which positive change could be made a number of **problem arenas** can be identified: these are large populations, sharing a broadly common set of problems, and offering multiple **opportunities** for constructive intervention, based on a combination of promising approaches and technologies:

**Populations served or potentially served by groundwater:** cost-reduction for groundwater development; sustainable management of groundwater extraction; enhancement of groundwater information and understanding; treatment for chemical removal;

**Sanitation for rural populations:** provision/upgrading of on-site household solutions through self-help; non-latrine based excreta disposal; Total Sanitation approaches; school sanitation approaches;

**Sanitation for small town populations:** provision/upgrading of on-site household solutions through self-help; Total Sanitation approaches; entrepreneurial sanitation service provision; school sanitation approaches;

**Sanitation for urban slum populations:** condominial/reduced cost sewerage; provision/upgrading of on-site household solutions through self-help; commercially franchised sanitation and hygiene points; entrepreneurial services for disposal of faecal sludge; bio-additive for on-site sanitation solutions;

**Water supply for small town populations:** improvement of existing water service provision; commercially franchised water vendors; point of use household water treatment;

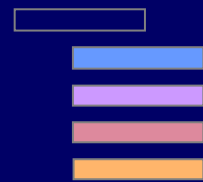
**Water supply for urban slum populations:** utility reform for universal service (including cross-subsidies); Commercial and NGO franchising and intermediation for slum retailing; complementary services for the very poor and destitute; point of use household water treatment;

**Populations dependent on water carrying:** improved household water carrying; household and contracted water carrying and/or vending; rainwater harvesting and storage;

**Populations who would benefit from improved hygiene behaviours:** demand acceleration for commercial provision of hygiene product; social marketing for hygiene behaviour change for the poor; non-soap low-cost alternative hand-washing products.



# Structure of the report document - overview



## 1. Introduction

1.1	Goals and objectives of the review	p. 19
1.2	Process and methodology	p. 20
1.3	End products and outputs	p. 21
1.4	Ten top lessons from the WS&H sector	p. 22
1.5	Key knowledge gaps in the WS&H sector	p. 25

## 2. The problem

2.1	The perspective of the user	p. 27
2.2	The nature of the sector	p. 41
2.3	Critical dimensions to understanding the sector	p. 50
2.4	The challenges of WS&H in different contexts	p. 59
2.5	The challenges of intervention in the sector	p. 64

## 3. The landscape

3.1	Technologies, approaches and enabling factors	p. 78
3.2	Landscaping of approaches	p. 79
3.3	Landscaping of technologies	p. 84

## 4. Potential opportunities

4.1	Opportunities for change	p. 91
4.2	Common aspects of the Opportunity Areas	p. 96
4.3	Identifying the main Opportunity Areas	p. 99

## Acronyms & main references

Acronyms	p. 133
Main references	p. 135

## 1. Introduction

## 2. The problem

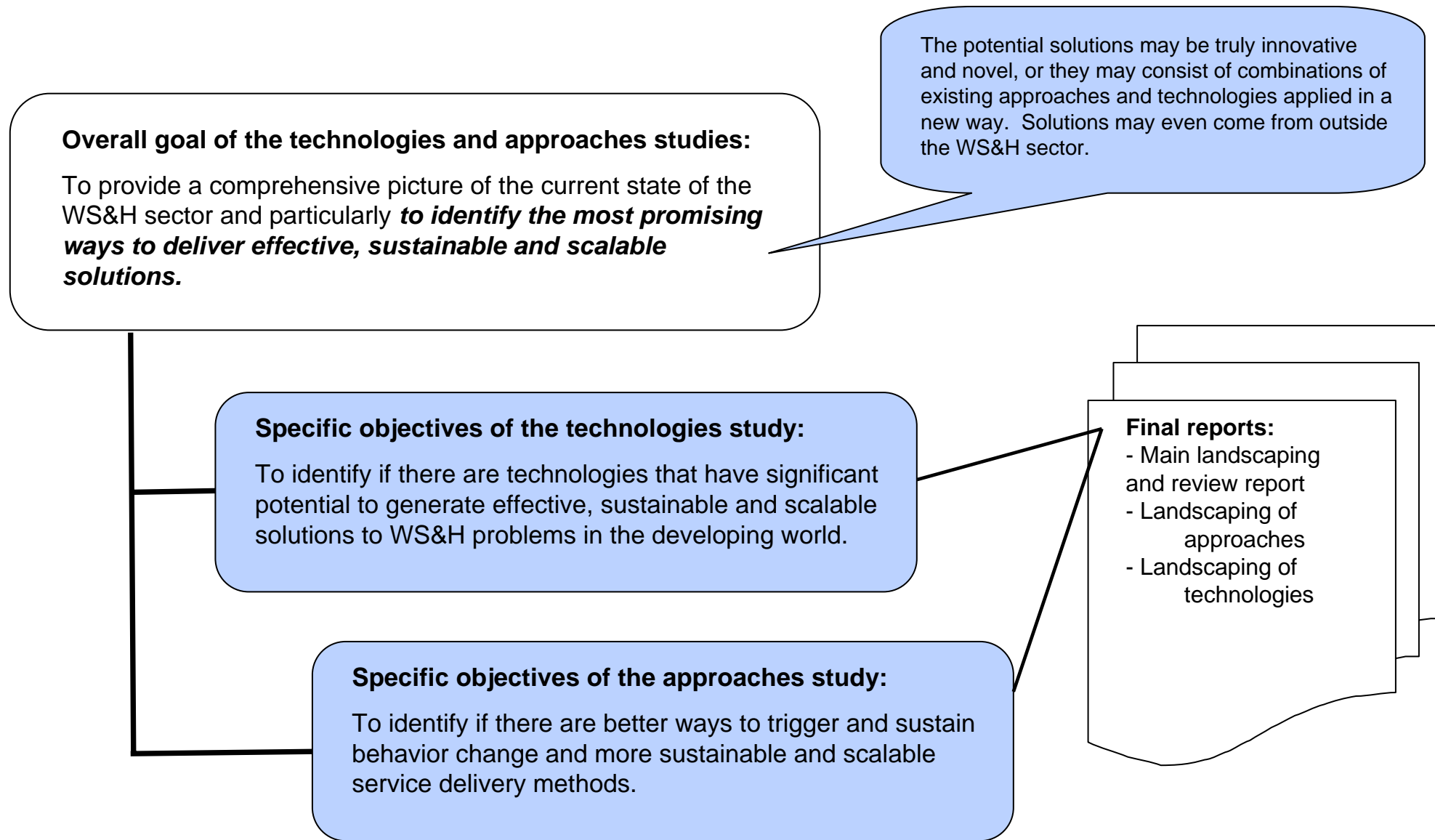
## 3. The Landscape

## 4. Potential opportunities

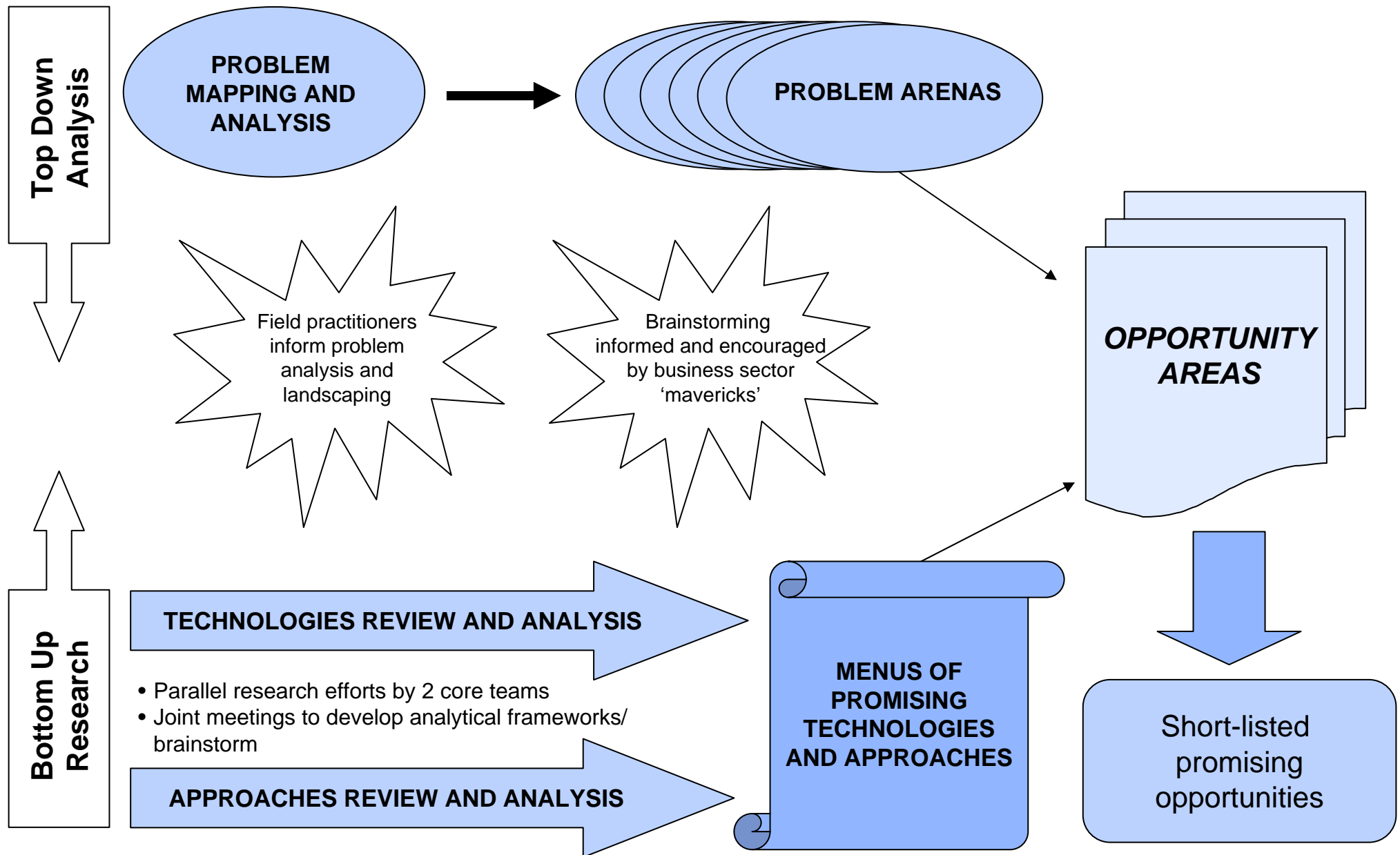
- 1.1 Goals and objectives of the review
- 1.2 Process and methodology
- 1.3 End products and outputs
- 1.4 Ten top lessons from the WS&H sector
- 1.5 Key knowledge gaps in the WS&H sector



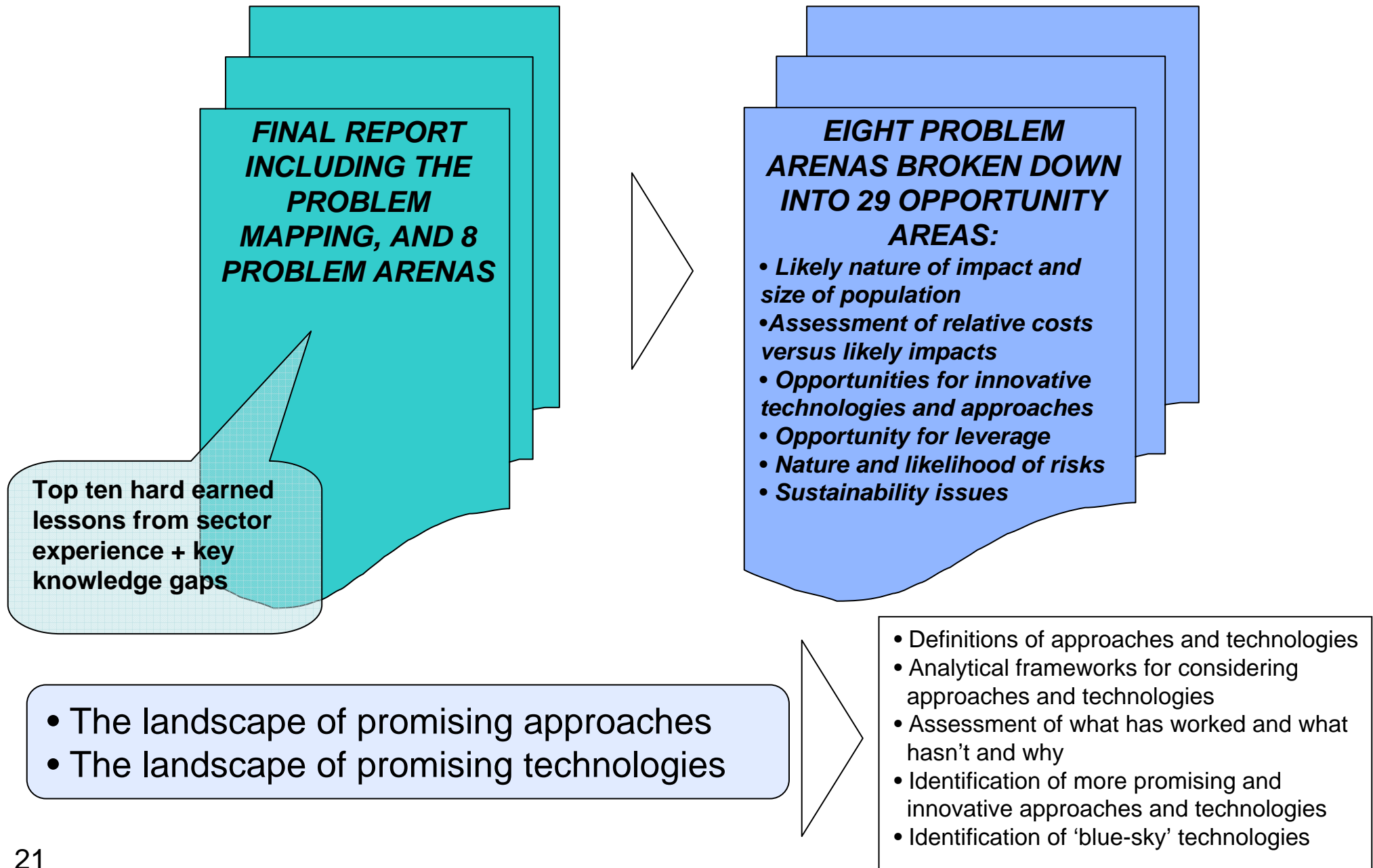
# 1.1 Goals and objectives of the review



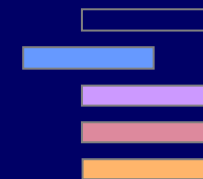
# 1.2 Process and methodology



# 1.3 End products and outputs



# 1.4 Ten top lessons from the WS&H sector



## Overview

The water, sanitation and hygiene sector is complex. *Water* is an economic and social good, a human right, and necessary for consumption, hygiene and food production and for sustaining the natural environment. *Sanitation* includes all aspects of environmental cleanliness from safe excreta disposal through to solid waste management. Excreta disposal is a matter of privacy and dignity, and closely allied to cultural beliefs and attitudes. *Hygiene* practices are also closely related to culture and religion. Change in behavior and practice in relation to water use and management, sanitation, and hygiene is necessary to bring about sustained impacts on the lives of the poor.

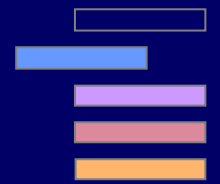
Despite the challenges of the sector (many of which are implicit or explicit in the following lessons), much has been achieved over the last 35 years of activity. Over that period, developing world population has grown by 2.5 billion, while the numbers described as “unserved\*” with improved water have remained steady at about 1 billion. This means that every day over the last 35 years, approximately 200,000 new people have been served with water supply. The situation regarding sanitation has however been less encouraging, with the absolute numbers “unserved” growing significantly over the same period. MDG (millennium development goals) targets require 2.2 billion people (or **384,000 per people per day**) to be served. During the 1990s 205,000 people per day received sanitation.

Poor water supply, sanitation and hygiene reflect only one aspect of people’s poverty. The poorest people often have other priorities, such as food security, income, education and general health. It cannot always be assumed that WS&H are the highest priority of the poor.

To meet the MDGs at least **274,000 people per day** need to be provided with new access to services from now until 2015 – the long-term sustainability of such services will require additional resources beyond this target date.

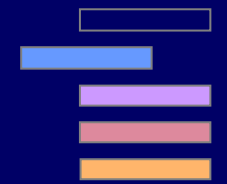
\*The terms ‘served’ and ‘unserved’ are defined by the WHO/UNICEF Joint Monitoring Program as follows: **unimproved** = unprotected well, unprotected spring, vendor water, bottled water, truck water; **improved supply** = household connection, standpipe, borehole, protected dug well, protected spring, rainwater and a source that is *likely* to provide “safe” water, such as a household connection, a borehole, etc.,. Importantly this **does not automatically equate with a safe source** in terms of water quality (i.e. free from biological or chemical contaminants).

# Ten top lessons from the WS&H sector



1. **Sector professionals** in Governments, donor agencies, and some NGOs (non governmental organizations) are **often rather ill-informed about the situation of users**, the nature of their demands, and the performance of their services.
2. **Professionals (engineers and health officials) often have a different agenda from end-users.** Professionals emphasize high engineering standards, physical outputs, and health impacts, while users often value improved access to water for both domestic and productive uses, improved convenience, and privacy and dignity.
3. **Improvements in water and sanitation services, like all development interventions, frequently become enmeshed in political interference and corrupt practices,** to the detriment of sustainable service provision. On the other hand, when politicians and institutions are fully committed to the development process, real progress can be made.
4. **Foreign donors and agencies are frequently part of the problem.** Although their overall financial contribution to the sector is not dominant, their policy influence is very significant, and this often undermines national ownership and initiatives. Their degree of coordination at the country level is often very poor.
5. **Support for the management and maintenance of water supply systems has been a greatly neglected area.** This is crucial for sustainable service provision. Permanent investments (of physical, financial and human resources) in this area are needed to provide support to community-managed or entrepreneurial service provision.

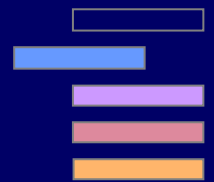
# Ten top lessons from the WS&H sector



6. **Sanitation and hygiene have been the poor relation** to water supply, despite the immense numbers of people lacking adequate sanitation, or failing to practice good hygiene.
7. **There are no quick fixes** to be found in silver bullet technologies or approaches. Sustained impact at scale in this sector involves technological change, institutional change and changes in user behavior. Achieving these takes time and patience.
8. **Interventions need to be carefully matched to context.** A technology or approach which works in one place will not necessarily work elsewhere. It is unwise to place all “developing countries” in a single category, and to try to address apparently common needs and problems with “one-size-fits-all” solutions.
9. **Change in this sector requires collaborative efforts by all stakeholders,** from end-users through to international agencies, with national Governments at the centre. Long-term committed partnerships are crucial for success. Solutions do not lie in unsupported community management, unregulated private provision, or direct intervention by Governments. Each stakeholder group has an important role to play.
10. **For the poor, change in this sector needs to follow a step-by-step process:** a ladder from the current (inadequate) level of service, progressively to better services. At each stage, there must be a clear perception of improvement in service level in order to provide the incentive for financial sustainability. The poor need a stake in the change process and at the same time the differentiated needs and interests of women and men, boys and girls, must be addressed.



# 1.5 Key knowledge gaps in the WS&H sector



During the course of carrying out the review and landscaping exercises, a number of key gaps in sector knowledge became apparent; these are summarized as follows:

- The links between specific aspects of **poverty** (depth and time-related aspects) and the choices people make about their own investment in WS&H are very poorly understood. More research is needed on the nature of poverty, and its relationship to the WS&H sector.
- The importance of **culture and religion** (beliefs, values, attitudes) on WS&H behavior is not fully taken into account, and little-researched. Consequently the role of culture and religion, both as constraints to change, and also in terms of their potential to bring about beneficial change should be better understood.
- Various methods are used to **promote health improvement** through hygiene behavior change. Some approaches focus on education, knowledge and information, leading to individual action; while others emphasize aspects of status, and convenience, through social marketing techniques. There is insufficient knowledge of the key features of this spectrum of approaches – we do not have reliable knowledge about which approaches work, in what contexts, and why.
- In relation to **rural sanitation**, approximately 2.1 billion are estimated to be unserved. If these people were to use non-latrine based sanitation, in appropriate environments, this would place them on the first rung of a sanitation improvement ladder. However, we do not know what the health impacts would be in terms of improvement over current practices (open-defecation), nor the potential impact on the environment in terms of focal points of contamination.
- The detailed nature of the contextual factors which determine whether or not a particular combination of technology and approach will work, are little understood. Interventions in the sector tend to be empirical or based on the experience of professionals. We lack systematic methods for **analyzing context** and determining in advance what technologies and approaches are likely to be sustainable.
- The sector as a whole **lacks data** on a diverse range of topics from the underlying reality of coverage (qualitative aspects, equitability of access) to the real costs of interventions and their benefits. This leads to a gap in information to properly inform debate and decision-making at all levels.

## 1. Introduction

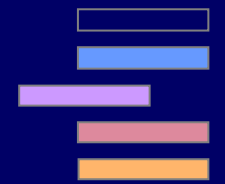
## 2. The problem

## 3. The Landscape

## 4. Potential opportunities

- 2.1 The perspective of the user
- 2.2 The nature of the sector
- 2.3 Critical dimensions to understanding the sector
- 2.4 The challenges of WS&H in different contexts
- 2.5 The challenges of intervention in the sector

## 2.1 The perspective of the user

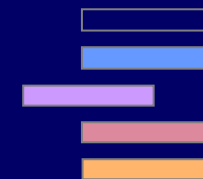


### Overview

The problems associated with WS&H from the perspective of the user are complex but centre on certain issues – typically not the disease burden:

- ***Water has multiple uses*** which have implications for gender and water resources.
- Unimproved ***water sources are distant, and often contaminated and unreliable***. Engineered water supplies may also be unreliable, of variable quality, and expensive.
- ***Excreta disposal is unpleasant*** (smells, flies) and lacking in ***privacy, safety and dignity***. This is often a particular issue for women. The wider issues of sanitation (wastewater and solid waste management in particular) are often grossly neglected.
- ***Poor hygiene practices are a major consequence of inadequate water and sanitation provision***. In such a situation there is little incentive to practice more appropriate hygiene behaviors in spite of the suffering caused by the resulting disease burden.

# The WS&H disease burden facing users



Disease	Risks strongly related to environmental factors	Deaths (WHO, 2004) (World Health Organization)	Morbidity (WHO, 2004)	Estimated environmental DALYs* (WHO, 2002)
<b>Diarrhea</b> 90% of cases affect children under 5	Unsanitary excreta disposal, poor personal/domestic hygiene, unsafe drinking water	1.8 million	4 billion	57 million
<b>Acute respiratory infections</b> (ARIs) Mainly affecting children < 5	Primarily indoor pollution but also transmitted through lack of handwashing (Curtis,2003)	1.4 million	No data but accounts for majority of visits to clinics for < 5s	36 million
<b>Malaria</b>	Primarily associated with poor environmental hygiene including standing water at water sources	1.2 million	396 million	19 million
<b>Intestinal helminths:</b> <i>Ascaris</i> (Roundworm), Hookworm, <i>Trichuris</i> (Whipworm). Mainly affecting children < 5 and school children	Unsanitary excreta disposal, poor personal/domestic hygiene	10,000	133 million	3 million
<b>Trachoma</b>	Poor personal hygiene (face washing) due to lack of water	-	500 million at risk, 146 million threatened by blindness, 6 million visually impaired	2.3 million
<b>Schistosomiasis</b> (bilharzia)	Unsanitary excreta disposal, reliance on contaminated surface waters	-	160 million	1.7 million

\*disability adjusted life years

# The WS&H disease burden facing users



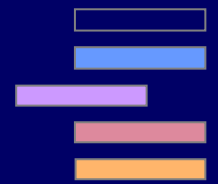
Disease	Risks strongly related to environmental factors	Deaths (WHO, 2004)	Morbidity (WHO, 2004)	Estimated environmental DALYs (WHO, 2002)
<b>Dracunculiasis</b> (Guinea worm)	Unsafe drinking water and standing water at water sources	-	75,000 (WHO,2000)	-
<b>Onchocerciasis</b> (river blindness)	Reliance on contaminated surface waters	-	70,000 visually impaired in West Africa	56,000
<b>Arsenicosis</b>	Drinking water contaminated by arsenic	-	1.5 million cases in Bangladesh	-
<b>Fluorosis</b>	Drinking water contaminated by fluoride	-	Over 26 million in China	-

***Despite the health impacts of poor water, sanitation and hygiene, the disease burden may not motivate change in behaviour by all user segments.***



Photo: H. Lockwood, El Salvador, 2000

# A diversity of users with differing needs and perspectives



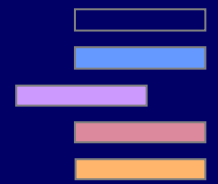
Users are of diverse **age** and **income** and in particular, **women** and **men** have differing requirements depending on roles and responsibilities:

- Women, with the aid of children, usually have primary responsibility for water supply to the home, water management in the home (including hygiene), childcare and feeding the family;
- Women tend to have less disposable income, and less say in the kinds of change which take place in their communities;
- Women have a stronger motivation to improve sanitation and hygiene than men – to create privacy and dignity for defecation and personal washing, and to enable girls to take advantage of educational opportunities;
- Men's interests in water tend to focus on production and income-generating opportunities, but .....
- Men are less likely to place a priority on WS&H spending overall and instead tend to spend on non-essential items such as beer and cigarettes.

## Gender

- Gender designates men and women and the relationship between them.
- Gender roles are socio-economically and culturally determined.
- Women, men, girls and boys have gender-differentiated needs and interests which need to be fully incorporated in any water and sanitation Intervention.
- Gender sensitive interventions should not only focus on women as a group.

# Water supply from the perspective of the user



Aspect	Immediate Problem	Consequences
Provision of drinking water supplies	<ul style="list-style-type: none"> <li>• Distant sources</li> <li>• Low per-capita quantities</li> <li>• Unreliable sources (drought-prone or poorly engineered/managed)</li> </ul>	<ul style="list-style-type: none"> <li>• Expenditure of time and energy (especially women and girls) spent carrying water, walking, queuing or seeking alternative sources</li> <li>• Exposure to water-borne diseases (e.g. bilharzia)</li> <li>• Low levels of consumption (resulting in water-washed diseases)</li> <li>• Lack of opportunities for household based economic activities (livestock; gardens; businesses)</li> </ul>
	<ul style="list-style-type: none"> <li>• Poor quality (faecal or chemically contamination)</li> </ul>	<ul style="list-style-type: none"> <li>• Water-borne diseases (e.g. cholera)</li> <li>• Toxicity (e.g. arsenic),</li> </ul>



# The issue of water quantity and quality



Risk of infection from water-related diseases is strongly linked to lack of adequate sanitation, poor personal and domestic hygiene and unsafe drinking water. The health consequences of inadequate water supply and sanitation centre around two key issues:

**How much water do people really use?** There is limited data available, but given that over 1 billion lack access to improved water, the majority living in rural areas, an **order of magnitude estimate** would be about half of these people survive on very low consumption levels, roughly 60 million in cities and some 600 million in rural areas.

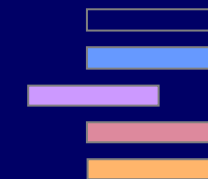
**Quantity:** Poor access to low quantities of water results in consumption that is too low, especially for hygiene purposes, resulting directly in “water-washed” skin and eye infections such as scabies and trachoma and indirectly in increased incidence of “water borne” illnesses such as different forms of diarrhea. In situations such as this, where consumption is very low (3-4 liters per person per day), the priority must be to improve access and increase use of water.

**Quality:** Contamination of water by disease pathogens – most usually from human excreta – is responsible for a range of well known and debilitating infections caused by helminths, viruses and bacteria. Traditionally this has been the focus of water quality related concerns. More recently chemical and industrial pollutants have become of increasing concern, particularly pesticides, industrial chemicals, and heavy metals. The arsenic crisis in Bangladesh has alerted the world to the inherent dangers of water from some sources that have high naturally occurring levels of chemical pollution, with arsenic, fluoride and iron posing serious problems in many parts of the world where groundwater is relied on.

**What does an improved water source really mean?** Contamination of improved sources depends on many factors and there is no aggregated global data to indicate who really is drinking safe water when we speak of an improved source. An educated estimate is that out of the 5 billion people having access to improved sources, less than 25% always get safe water, some 50% have water that is sometimes safe and sometimes unsafe, and 25% always get unsafe water – these are order of magnitude estimates only and should not be taken as accurate.

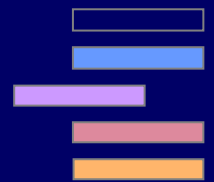


# Sanitation from the perspective of the user



Aspect	Immediate Problem	Consequences
Excreta disposal and menstrual management	Lack of safe facilities for disposal of human excreta	Contamination of soil, surface water and groundwater (leading to excreta-related disease)
	Lack of privacy for defecation, limited water for anal cleansing and hand-washing	Defecation by men in the open, by women under cover of darkness; dignity and security compromised
	Arrangements for menstrual management inadequate	Dignity and security of women compromised; girls stay away from school
	Inadequate treatment and final disposal of septic material	Serious health hazard
Wastewater and solid waste disposal	Engineered facilities and organized arrangements are limited, poorly maintained and managed	Indiscriminate disposal leads to environmental contamination, insect habitat creation, and/or unsafe re-use downstream
	Lack of an integrated and holistic approach to urban management	Mixed systems (wastewater and drainage water) leads to overflows and strain on treatment systems

# Demand for sanitation



- The demand for private and safe excreta disposal is often latent among men, women and children. Demand for adequate facilities for menstrual management is particularly important to women and girls.
- The consequences of lack of adequate services have additional impacts on women (for reasons of dignity and security), girls (who tend to stay out of school) and young children (for reasons of incompletely developed or compromised immunity). This latent demand is not often translated into expressed or market demand, for social and financial reasons.

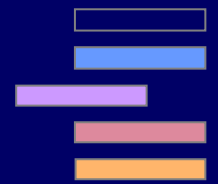
Meeting any increased demand for sanitation must be considered in a holistic manner at the local level – for example, care is required when siting new pit-latrines, especially in areas of high water tables, to ensure that cross-contamination does not take place with water being abstracted for domestic uses.

- Often the surface drainage system, such as it is, is the only mechanism for conveying storm water, grey water, sewage and solid waste out of densely populated urban areas. Much of the ill-health in urban slums is a consequence of inadequate attention to these aspects of sanitation.



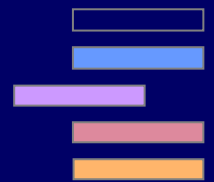
Photo: H. Lockwood, Pakistan, 2002

# Hygiene practice from the perspective of the user



Aspect	Immediate Problem	Consequences
Hygiene practices and demand for water and sanitation services	Those with little water and poor sanitation cannot practice effective hygiene	Water-washed disease, faecal-oral disease transmission, acute respiratory infections
	The link between water, sanitation and health is often poorly understood	Demand for <b>clean</b> water and sanitation remains latent; there is low willingness to pay for services
	The link between hygiene and health, or the status and dignity conferred by improved hygiene behaviors has not been effectively communicated	Motivation to practice good hygiene can be low

# Hygiene behaviors: why people don't change (after Waterkeyn, J, 2006)



- **conservatism:** clinging to familiar practices
- **cultural values:** respect for tradition
- **conformity:** not wanting to stand out
- **“pull him/her down”:** envy of others
- **poverty:** the inability to take risks



Photo: L. Braakman, Pakistan 1995

These reasons – some rooted in the individual, some in society – help to explain resistance to the adoption of behaviors which, to outsiders, are clearly “better”. All these reasons are rational for poor individuals, households and communities, and for external agents of change to disregard them is either ignorant or irrational.

# Approaches to hygiene behavior change

- Approaches to hygiene behavior change based on turning education and knowledge into practice have often failed in the past because they have under-rated the importance of conformity to societal norms and traditions.
- Participative approaches (e.g. Participatory Hygiene and Sanitation Transformation or PHAST) have addressed this shortcoming through group-based learning and participative techniques.
- The Community Health Club (CHC) concept is a proven model for bringing about behavior change in a wide range of different contexts, drawing on PHAST methods.
- Behavior change can be encouraged by techniques of commercial or “social” marketing, appealing to aspects of social conformity, status, cleanliness or attractiveness.

Knowledge alone is not enough.

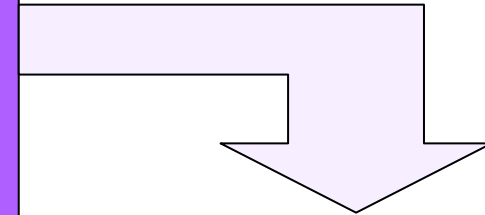
CHCs have been highly successful in rural and emergency contexts, and are to be piloted in urban areas shortly.

Although these approaches are potentially promising, they remain largely unproven at scale. The motives for behavior change in society are very complex, relating to the individual motivation and decisions of hundreds of millions of (often very different) individuals. As for other aspects, there is no one-size-fits-all solution – and what works in one setting may fail in another.



**Globally, approximately one-third of those without adequate WS&H may attribute sickness to the spirit world and seek traditional remedies first:**

- 'Intense' cultural beliefs and practices are defined as where an individual believes sickness is attributed to the spirit world and traditional remedies are sought before or instead of 'Western' remedies (based on materialistic, deterministic, and reductionist thinking patterns). It does not include those who 'double up' i.e. seek Western remedies first then traditional if they don't work, or as a safety insurance. The issue is where their primary belief pattern is rooted.
- There are approximately 180 million adherents of traditional ethnic religions in the world, the vast majority in Africa.
- Varying degrees of syncretism exists in developing countries between traditional religions and the major world religions of Christianity, Islam, Buddhism, Hinduism and Chinese religion, with an estimated average of 40% of the unserved initially practicing traditional remedies'



## **Points to bear in mind with culture**

1. There is always a reason for apparently irrational behaviors
2. Culture determines behavior to a great extent
3. Cultures are not homogenous
4. Cultural change can be rapid, if the conditions are right

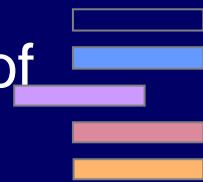
### **Religious beliefs and health amongst the Bane of Southern Ethiopia**

Most Bane attribute the majority of sicknesses (and all major sicknesses) to dead spirits (*maeshi*), and will therefore go to the traditional healer before a clinic, in part due to tradition. Diviners find out who of the *maeshi* is making a person ill and how a recovery can be assured by the sacrifice of goats, sheep and even cattle where the illness is critical.

Gabo, a 45 year old mother exhibits such thinking: 'There are times in which we don't get better even if we take medicine. The reason is the devil wants to drink the blood of the goat. If we do not do that we will not be healed'. ***Hygiene promotion needs to address the religious and world views to have any impact.***



# Problem mapping: rural populations have the greatest problem of access to “improved” water supply

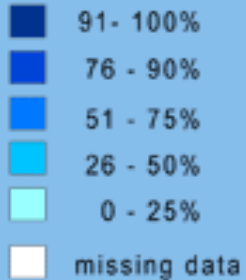


## Joint Monitoring Program data for developing countries, 2002 – water

Globally approximately 1 billion people lack access to an improved water supply

Despite an increase in coverage of 9% from 1990 to 2002, only 68% of sub-Saharan Africans have access to improved water. About the same number of Africans live in small towns as in large urban centers – about 15% of the population or some 140 million people.

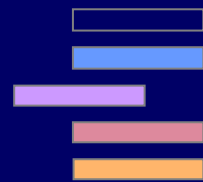
### water supply coverage (total access in 2002)



Sub-Saharan Africa has the greatest disparity between urban and rural coverage. Five times as many rural people (256m) compared with urban populations (47m).

In south Asia the priority needs to be on piped water for rapidly growing slum populations.

# Problem mapping: access to improved sanitation is lowest in south Asia



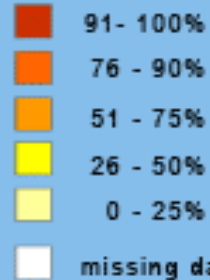
## Joint Monitoring Program data for developing countries, 2002 - sanitation

Globally 2.6 billion remain without improved sanitation services of any kind; out of this total south Asia has the largest number of unserved of any region in the world.

In Africa, rural sanitation coverage is low (less than 50%). It will become a more pressing issue in future in areas of high rural population density, but especially so in emerging small towns and cities.

The major focus for sanitation needs to fall in the Asian slums (about 560 million people) and "small" towns, most of which in the Asian context are significantly larger than African small towns.

sanitation coverage  
(total access in 2002)





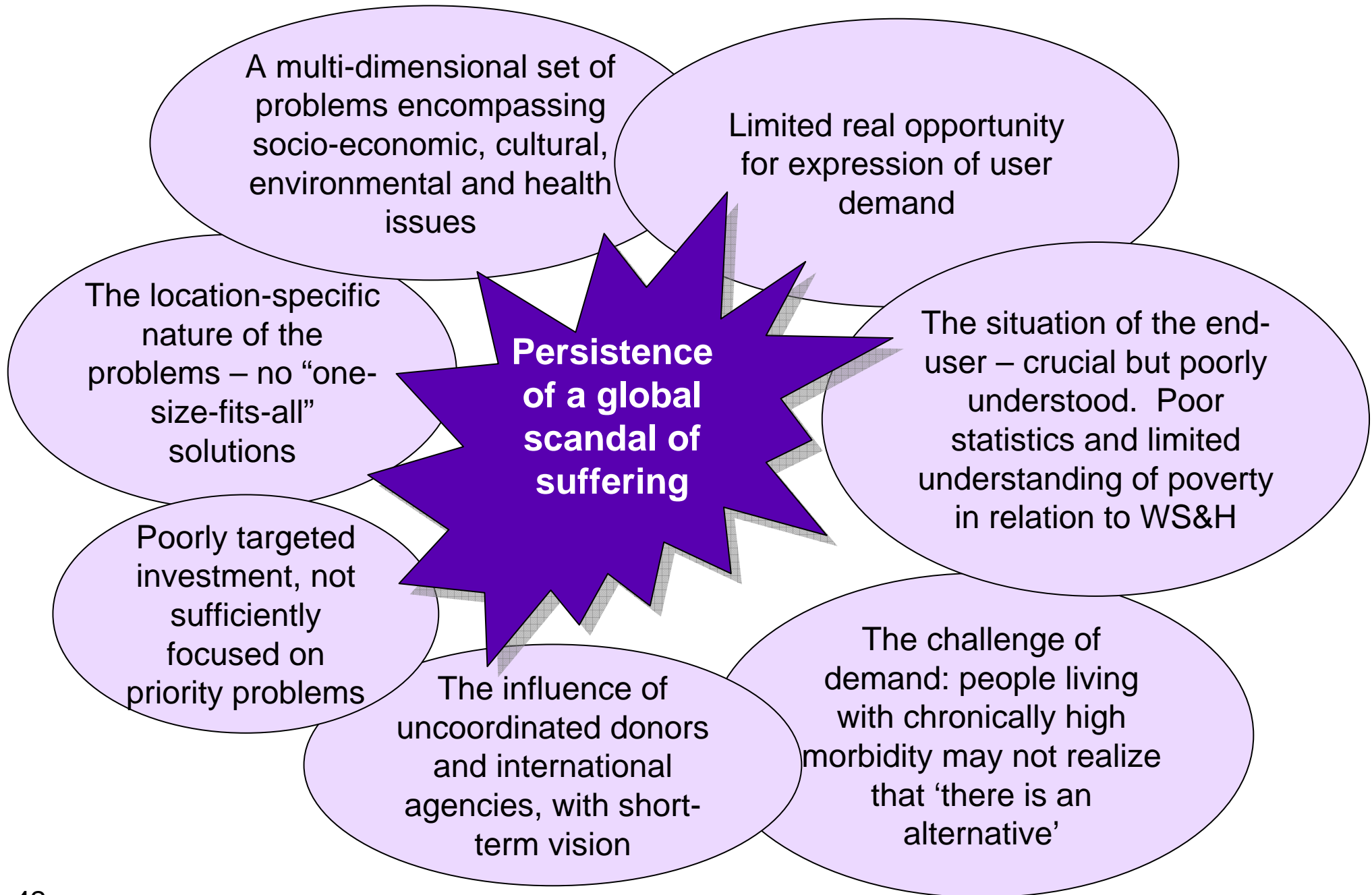
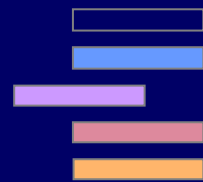
## 2.2 The nature of the sector

- The WS&H sector has a number of special features which present major challenges. These concern the **multiple** problems which sector professionals are trying to address, the **nature of the services** provided (essential for life and health, a human right, social and economic goods), and the **large number of stakeholder groups** which need to be involved in addressing the problems. Moreover, some of the ways in which sector professionals and institutions have intervened have on occasions contributed more to the problem than to its solutions.

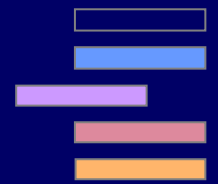


Photo: H. Lockwood, Bolivia, 2005

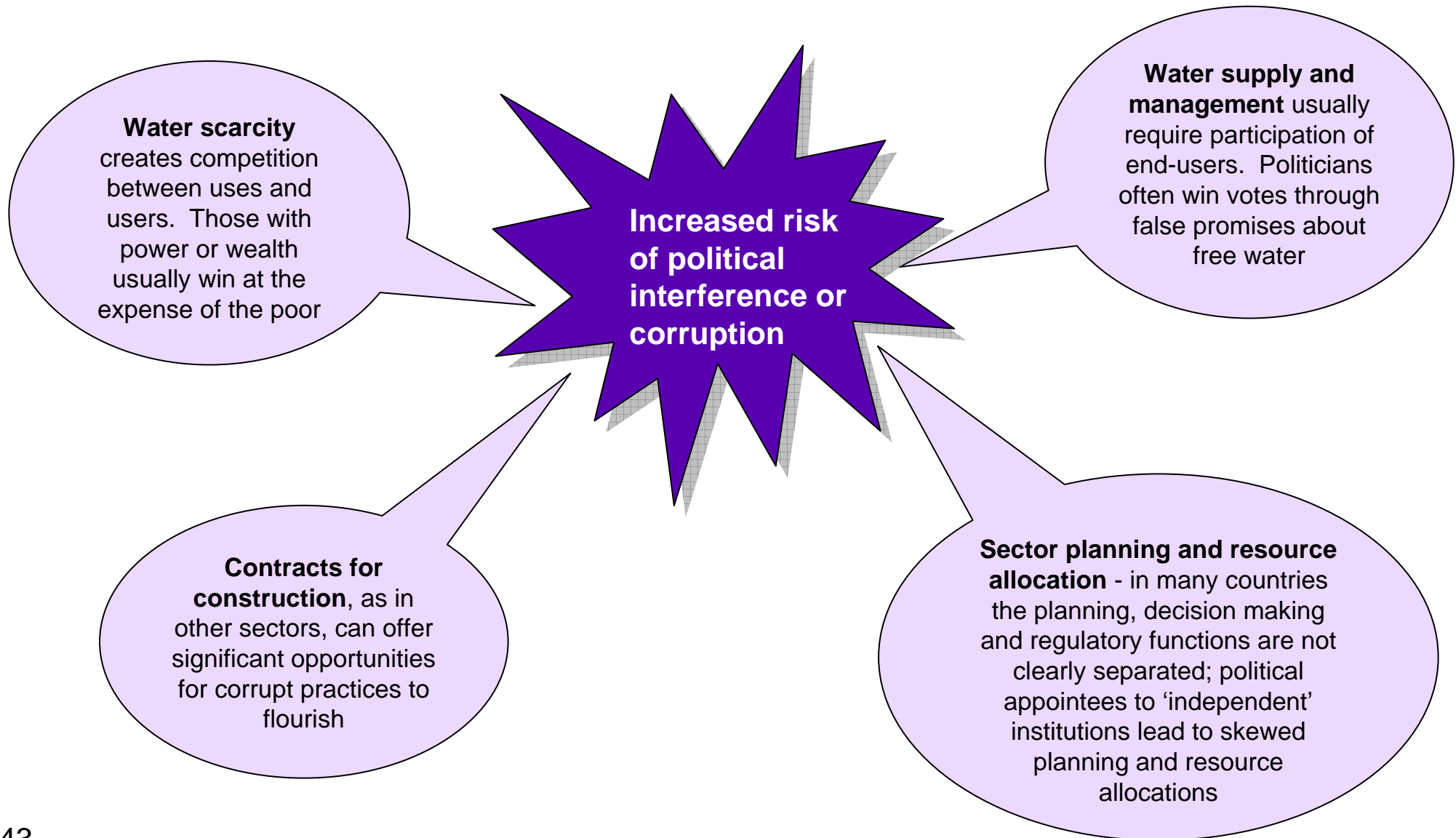
# Components of the problem



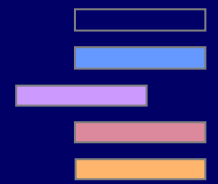
# Water is a political issue



Water becomes a political matter when it is scarce, or when it creates opportunities for individuals to win political power or commercial business



# WS&H is trying to achieve multiple objectives



**Water: providing people with an adequate supply of water for their household needs**

**Targets of:**

- Quantity (>20 liters per day, or more for productive uses)
- Quality (defined by international norms)
- Reliability (a supply that functions all the time)
- Convenience (in or close to (<500m to the household))

**Sanitation: providing people with a safe and secure means of excreta and wastewater disposal**

**Targets of:**

- Coverage (every household with access to at least a basic pit latrine)
- Acceptability
- Privacy
- Security

**Hygiene: bringing about personal and household hygiene behaviors which promote good health**

**Targets of:**

- Good handwashing and personal hygiene practice
- Use and maintenance of safe excreta disposal facilities
- “Fit” of practice to culture and religion

WS&H addresses a **complex** set of issues – some technical, engineering or hardware orientated, but many also to do with ‘software’ issues such as behavior change, capacity building and policy development – addressing a range of sectors that cut across health, education, agriculture and rural development.

Addressing WS&H requires an **integrated approach** – in order to maximize health impacts it is necessary to reinforce positive hygiene behaviors as well as increase access to water and sanitation infrastructure – synergy of impact may be reached when all three areas are addressed simultaneously. However how to do this effectively is not easy or clear.

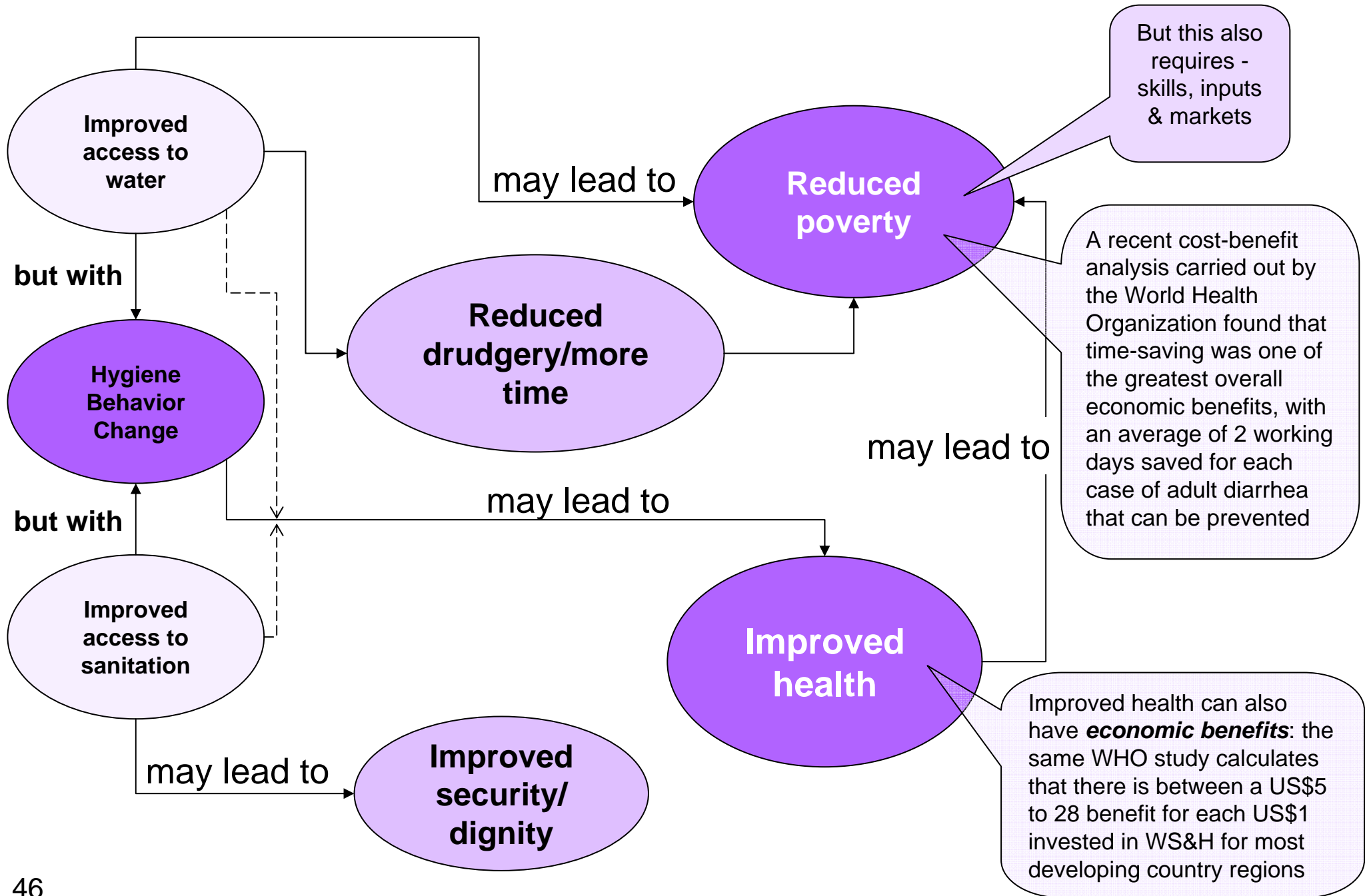
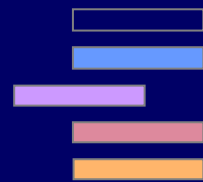
# WS&H is targeting not only health, but also wider aspects of poverty



- **Health:** the usual justification for improving water and sanitation services is health impact. Poor quality water and an unsanitary environment are linked to many serious illnesses. Yet in all except the most extreme situations (densely packed urban slums, or highly polluted water), the link is complex and often not obvious. **Without changes to how people behave (hygiene behavior), the provision of improved quality water and sanitation does not lead to significant improvements in health and well-being.**
- **Poverty, quality of life and income:** in addition to health benefits, access to an improved water source can be an important factor in raising the quality of life at household level, boosting economic activity, and reducing poverty. The most direct benefit is reduced time, normally that of women and children, spent collecting water, that can become available for other work or leisure activities.
- In addition, small quantities of water (50-200 liters per day) can be used for a range of household activities – such as growing vegetables and watering livestock. These can contribute to poverty reduction and livelihood improvements, and it is often these, rather than health benefits, that attract people to an improved water supply. However, for **productive use benefits** to be realized, a range of skills need to be mastered and economic factors such as access to markets and availability of finance and other inputs must be assured.

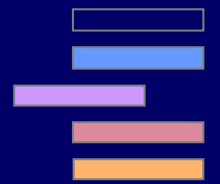
A recent **WaterAid** study from **Bangladesh** shows that lost time from common water-borne or excreta related illnesses was reduced by almost 45% in rural villages that had received WS&H services, as compared to a set of control villages without improved services. In the same study urban neighborhoods with project interventions lost 37% less working days than those without such services.

# The intended impacts of improved water, sanitation and hygiene are hard-won





# Water supply is part of a broader water resource management picture



Key issues linking water supply for domestic purposes with water resources and water scarcity:

- **Rural water supply has an insignificant impact** on water resources, except in the most extreme water-scarce environments;
- **Urban water supply and agriculture use large amounts of water**, with similar consumption levels on a per-area basis, but with agriculture demanding 10 times as much water on a per capita basis than domestic only;
- **Large abstractors (urban water supply and especially agriculture) can have major impacts on smaller abstractors**, especially if poorly regulated;
- **Water requirements by the poor often include needs for small-scale productive uses** (such as crop or livestock watering), as well as domestic water.

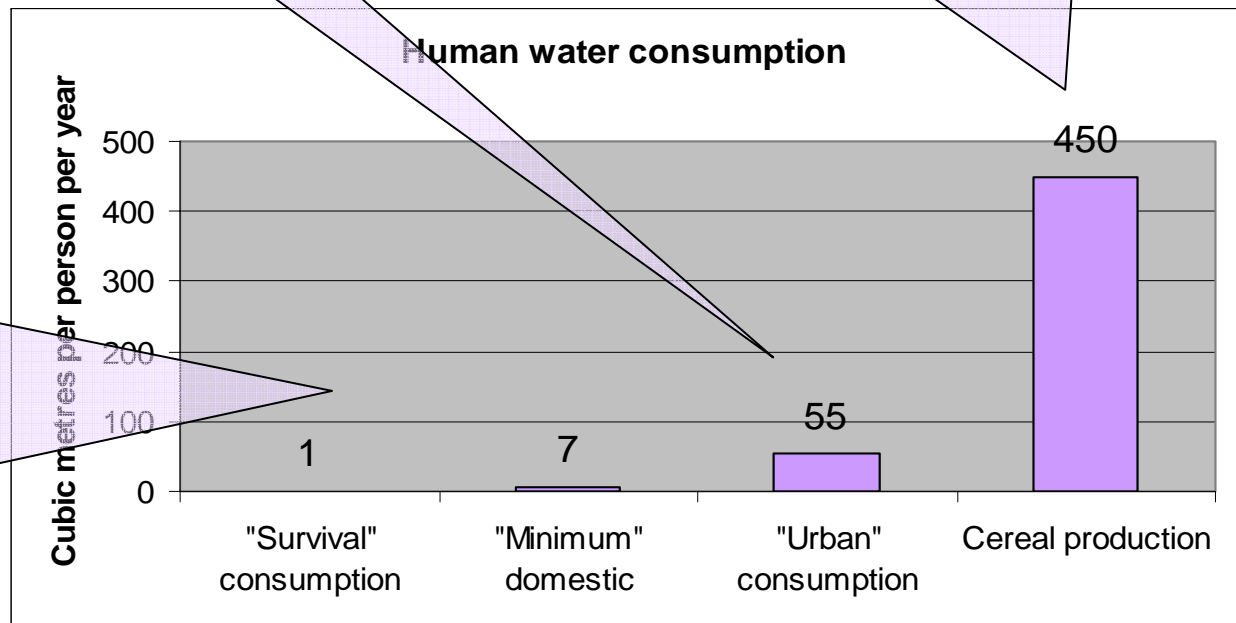
There is often an institutional disconnect between agencies and ministries that are responsible for different aspects of water resource utilization – typically sectors as diverse as irrigation, livestock, natural resources and environment, industry, energy, health, as well as drinking water and sanitation will all be involved, but poor coordination and governance can often lead to inefficient management and over-abstraction

# How water consumption impacts on water resources

**At urban consumption levels** of 100-200 liters per person per day, and urban population densities in the order of 9000 persons/km<sup>2</sup>, the impact on water resources can be significant – typically about 500mm per year averaged across the urban area.

**The greediest water consumer however is agriculture.** Typically as much as 70% of all freshwater consumption is estimated to be used for growing crops. Each person requires at least 10 times as much water to grow their food as they use for domestic purposes. It can take 4000m<sup>3</sup> of water or more to grow one kilo of cereal, a figure which corresponds to 500-1500mm per year averaged across the farm land.

**At a survival level of consumption** of 3-4 liters per person per day, and even at the typical **minimum design standard** of 20 liters, the impact on water resources is usually small. In rural Africa, where densities are typically 100 to 300 persons/km<sup>2</sup>, the minimum design standard would result in consumption of only 1mm per year averaged across a rural area.



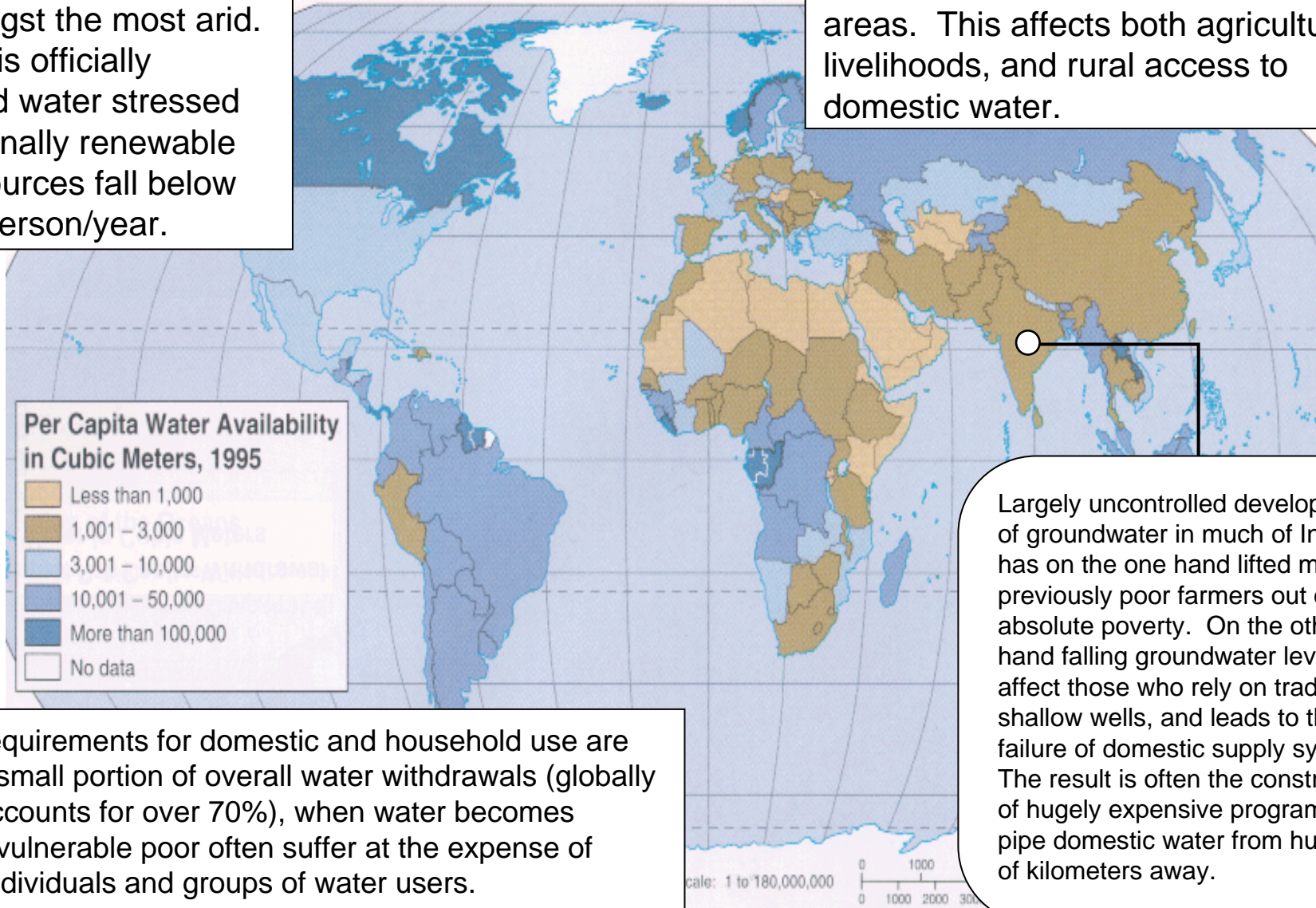
1 liter = .001 cubic meter



# Absolute water stress leads to conflict and reduced access for poor domestic users

Many of the poorest countries in the world are also amongst the most arid. A country is officially designated water stressed when internally renewable water resources fall below 1,000m<sup>3</sup>/person/year.

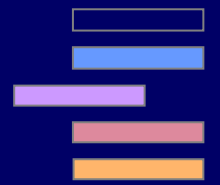
Large cities can pose a huge strain on the water resources of surrounding areas. This affects both agricultural livelihoods, and rural access to domestic water.



Although requirements for domestic and household use are normally a small portion of overall water withdrawals (globally irrigation accounts for over 70%), when water becomes scarce the vulnerable poor often suffer at the expense of wealthier individuals and groups of water users.

Largely uncontrolled development of groundwater in much of India has on the one hand lifted many previously poor farmers out of absolute poverty. On the other hand falling groundwater levels affect those who rely on traditional shallow wells, and leads to the failure of domestic supply systems. The result is often the construction of hugely expensive programs to pipe domestic water from hundreds of kilometers away.

## 2.3 Critical dimensions to understanding the sector



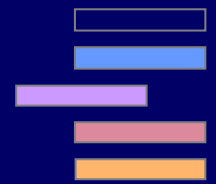
### Overview

***There are significant gaps in understanding in the sector.*** The main issues relate to our limited understanding of the various ***dimensions of poverty***. We have limited knowledge of its severity and chronicity, and its varying attributes in rural, small town and urban slum contexts – and how these relate to the priority which the poor put on water and sanitation services and altered hygiene practices.

Consequently our understanding of users' willingness and ability to pay (in cash, kind or labor) for improved services is limited.

This limited understanding means that too often assumptions are made by outsiders (sector professionals in Governments, NGOs and donor agencies) about what sort of services people want. ***Those assumptions may often be flawed. This may be an important reason for the lack of sustained impact of many projects and programs in the sector.***

# There is a lack of reliable data which is a barrier to identifying and targeting the unserved



To be able to reach the un-served, it is essential to know who, and where, they are. Yet the WS&H sector is beset by poor data availability and quality. Few countries know accurately who is un-served. Moreover the location, or status of much water supply infrastructure is not monitored or recorded.

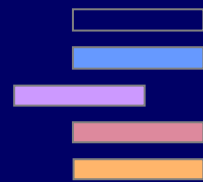
The most widely quoted source of statistics on the served and unserved is the Joint Monitoring Program (JMP) of WHO and UNICEF. This presents country data disaggregated by water/sanitation and rural/urban. JMP data is based on information collected by UNICEF/WHO country offices, largely using non-national sources such as USAID's Demographic Household Survey results. The JMP is essentially an advocacy tool – data collected is not linked to any specific action but to overall global monitoring of MDGs. There are numerous problems with the statistics, but they are the best we have for characterizing the problem globally.

## Some of the main limitations with available data are:

- There is no accepted standard definition of what constitutes “served” or “unserved”. Several country definitions have slipped relative to the “minimum standards” of the International Drinking Water Supply & Sanitation Decade of the 1980s;
- Many countries’ statistics present coverage in terms of a notional populations served per water source – the actual numbers using each source are unknown;
- The geographic locations of water sources and populations are rarely mapped or known with any precision;
- The statistics tell us very little about water quality at source, or quality of water consumed, which means that ‘improved’ water may not actually be *safe* water in terms of human consumption;
- The statistics often fail to account accurately for non-functionality and down-time of water sources;
- Little is known about actual usage of excreta disposal facilities;
- Even less is known about hygiene practices.

**Order of magnitude estimates** are that about one quarter of the world’s population (1.25 billion) has improved supplies that are always safe; about 50% of those currently served (or some 2.5 billion) having an improved supply which may or may not provide safe water with the 1.25 billion remainder assumed to have an improved supply that is actually unsafe.

# Understanding the 'unserved'



**Our target population is conceptualized in various ways, including:**

- The 'unserved' (2.6bn for sanitation and 1.1bn for water supply);
- The 'poor' (the 1.2bn on less than \$1 a day);
- The 'chronically poor' (the 400 million on less than \$1 a day for more than five years).

All of these ways of looking at the target population for WS&H interventions are simplistic and over-generalized. What is needed is a clear stratification of the unserved population, with answers to some specific questions:

- What other livelihood issues do the unserved face, apart from lack of access to safe water and adequate sanitation (e.g. cash income, lack of education and healthcare facilities, food insecurity, natural and man-made hazards)?
- Which comes first? – a focus on improving WS&H as a vehicle for improving livelihoods, or improving livelihoods (income generation) and therefore improving access to WS&H?
- How can the unserved be most usefully stratified in terms of cash and in-kind income? Is it really true to assume that in-kind income is readily convertible to cash? What implications do seasonality/intermittency of income have for the WS&H sector?
- What spending priorities do the poor have? Where do water and sanitation fit?
- What social and cultural factors determine the possibilities for behavioral change?

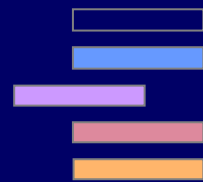
There are numerous unknowns here, pointing to the need for a much more in-depth and nuanced understanding of the attributes of the 'unserved', and the implications for impact and sustainability

**Getting answers to these questions:**

- National and sub-national case studies of poverty in relation to WS&H
- Extraction of generic lessons related to specific contexts

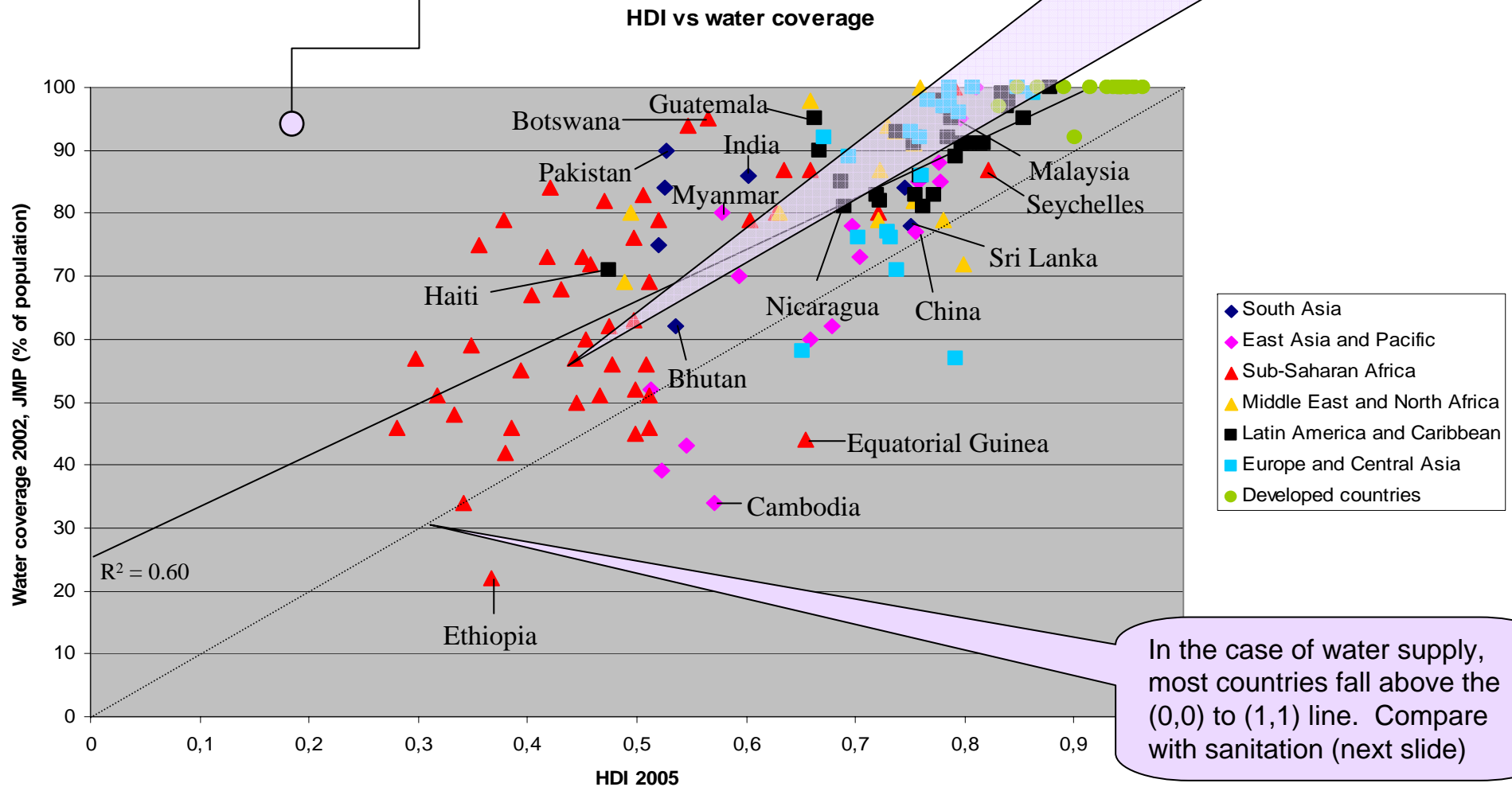


# Access to water supply compared with the human development index (HDI)



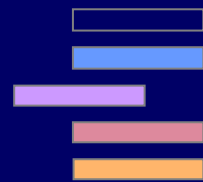
Access to water services correlates well ( $r^2=0.60$ ) with the UN's human development index, indicating a possible (not necessarily direct causal) link between water supply coverage and a wider range of developmental issues.

Africa shows the greatest diversity of coverage/HDI out of all regions, both for water supply and sanitation. The explanations for the outliers are expected to be equally diverse.



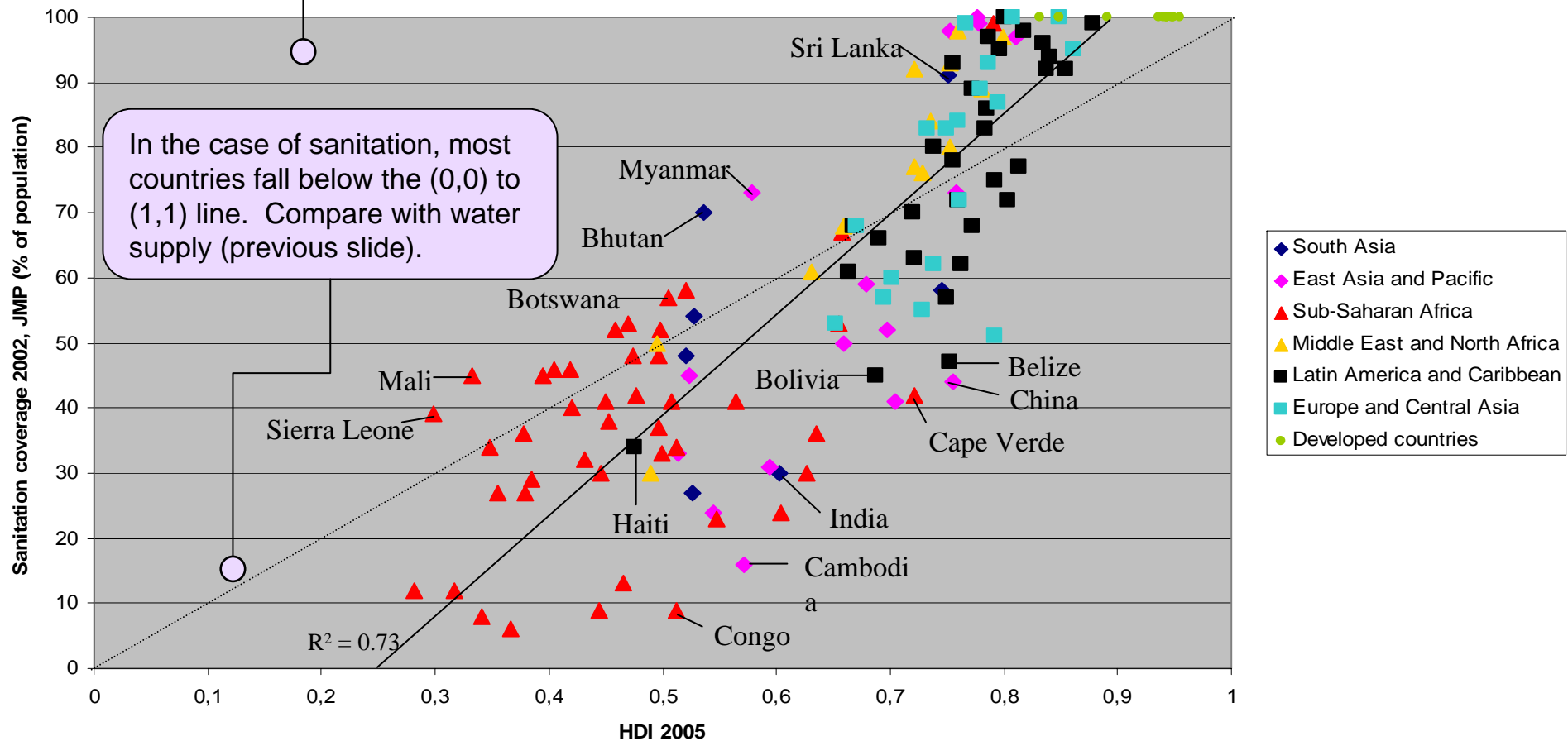
In the case of water supply, most countries fall above the (0,0) to (1,1) line. Compare with sanitation (next slide)

# Access to sanitation services compared with the human development index (HDI)

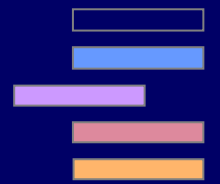


Access to sanitation services correlates well ( $r^2=0.73$ ) with the UN's human development index, indicating a possible (not necessarily direct causal) link between sanitation coverage and a wider range of developmental issues.

HDI vs sanitation coverage



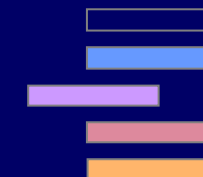
# The poverty dimension of water, sanitation & hygiene



- The links between access to WS&H services and poverty are complex and two-directional. **Poor people have limited access and access to services can help to reduce poverty.**
- Inadequate access to water impacts on many different aspects of poverty – and when access to water is accepted as a fundamental human right, lack of access can, in itself, be seen as a dimension of poverty.
- Poor access is **both a cause and consequence of poverty.**
- Absolutely poor people **cannot afford** acceptable levels of service. When choices have to be made between food, education, medicine and sanitation, then sanitation will lose. A choice between going hungry and providing a latrine is not a real choice.
- The 400 million **chronically poor** (largely found in sub-Saharan Africa), therefore need solutions which are either highly **subsidized** (using currently accepted “minimum standards” of service) or affordable and which recognize the need for much-relaxed standards.
- The **transitory poor** (or fluctuating poor) can afford some contribution to the capital and recurrent costs of services. They lie at the bottom end of market-oriented solutions, but are also likely to need targeted subsidies at least some of the time.

# Describing poverty in rural and urban settings

(descriptors from CPRC, Chronic Poverty Research Centre, UK, 2005)



Poverty descriptor	Urban poor	Rural poor
<b>Non-poor</b>	Perhaps employed at low wage levels by government or the formal private sector, living in conventional housing. Susceptible to unexpected financial shocks, particularly ill-health or family expenses. Conventional water and sanitation tariffs are normally affordable but may need to be structured in a way that allows for delay in payments in exceptional circumstances so as not to disrupt household finances and push the family into poverty.	Households typically producing some cash crops or livestock for sale, in addition to subsistence crops. The household may have one or more family member working in salaried employment in a nearby town or city. <i>Able to make significant cash contribution to costs of water supply and sanitation, and able to afford full contribution to running costs.</i>
<b>Occasionally poor</b>	Can be characterized as a household in a slum or informal housing area that has sufficient income to be able to invest in permanent (semi-permanent) materials for their own housing, with a fairly regular income from at least one semi-skilled member of the family.	Households with children and sufficient land and means of production to produce regular surpluses for sale in accessible markets. Opportunities to enhance income and standard of living are being taken up. <i>Able to contribute small amounts of cash and labor to construction of WS&amp;H services, and pay full contribution to running costs.</i>
<b>Fluctuating poor</b>	Describes households with perhaps a single daily employed unskilled earner living in what we could call a temporary shelter (but that might be used for many, many years), perhaps rented from a slum landlord.	Households with children old enough to help with farming and household chores. Irregular but fairly reliable income from sale of surpluses or from laboring. <i>Able to contribute to running costs of water supply and sanitation.</i>
<b>Usually poor</b>	Might be characterized as a single parent family, sharing a one or two room temporary shelter with other families with very irregular or seasonal employment.	Typically parents with many young children or elderly widow(er) with grown up children. Poor quality housing and very little cash income gained from selling surplus production or from casual labor. <i>Very low priority put on WS&amp;H improvements.</i>
<b>Always poor</b>	Refers to the street sleepers, the street children with no fixed living space.	Those living in extremely basic shelter, marginalized, perhaps mentally or physically disabled or suffering chronic illness (e.g. HIV/AIDS). <i>Unable to prioritize WS&amp;H.</i>



# Behind the statistics: a real story of the cycle of severe, chronic poverty



## Agatha, Kamwezi, SW Uganda

Agatha is one of the members of the village of Kamwezi who was too poor to benefit from the subsidized provision of rainwater storage jars and tanks. A household rainwater jar would have cost her about US\$10. Another public water supply system in the community is unreliable, and she also lacks the cash to pay the small amount required for routine maintenance (about US5cents/month). Consequently she fetches her water from a spring a few kilometers from her home, two or three times daily.

In principle Agatha can get cash income from farm laboring, earning the equivalent of about US30cents per day. However this work is seasonal, not always available, and it distracts from her duties at home – feeding and caring for her husband and four young children, fetching firewood and water, and cultivating her own crops.

Agatha's spending priorities, were she to have surplus cash, would be on food items, clothing, school fees and health care.

Agatha's poverty is severe (her productive capacity is probably equivalent to about \$0.10 per day) and chronic (unchanging).

Hers is the classic poverty trap. She cannot buy or work her way out of poverty. She is at the very bottom of the pyramid, and can only be assisted through a heavily subsidized approach, or an approach which can lead her step-by-step up a ladder of poverty alleviation.

### ***How to escape the poverty trap?***

- micro-credit
- promotion of income-generating activities ahead of or alongside WS&H promotion
- subsidy/welfare
- much cheaper technologies



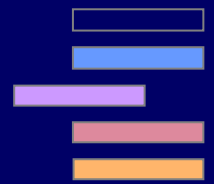
Photo: R. Carter, Uganda, 2006

# The market potential of the poor (after CPRC, 2005)



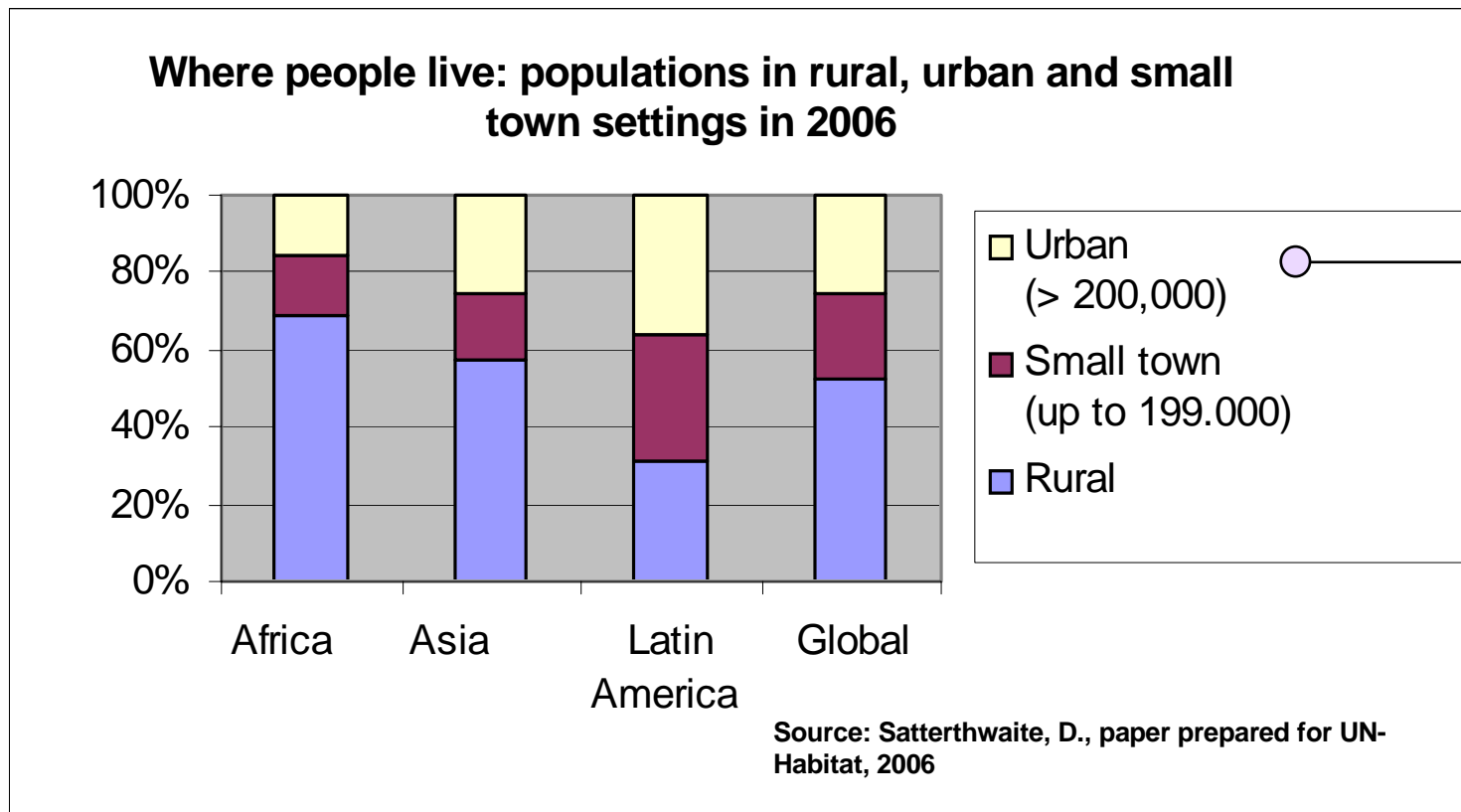
Category		Economic Descriptor	Pop (m)	Market Opportunity
Occasionally poor	Urban	\$1-\$2 per day: dependent upon low pay temporary employment	400	<b>Financial</b> (up to \$100 capital; 75 cents/ day) and <b>in-kind (labor)</b> contributions. Medium access to media and services.
	Rural	\$1 - \$2 per day: dependent upon agricultural seasons and markets	1,100	<b>Financial</b> (up to \$100 capital; 75 cents/ day) and <b>in-kind (labor)</b> contributions. Low access to media and services. Some <b>in-kind (material)</b> contributions and food/accommodation for skilled labor (e.g. external (I)NGO or Govt).
Fluctuating poor	Urban	<\$1 per day (<5yrs): dependent upon low pay occasional employment	200	<b>Financial</b> (little, but up to \$10 capital; 50 cents/day) and <b>in-kind (labor)</b> , less than urban occasionally poor (above), due to lower health levels and greater time-poverty. Limited access to media and services.
	Rural	<\$1 per day (<5yrs): agriculturalists with limited material assets and capabilities	600	<b>Financial</b> (< \$10 capital; 50 cents/day) <b>in-kind (labor &amp; materials)</b> - as for rural occasionally poor (above), but less due to lower health levels, greater time-poverty and lack of produce/land. Very limited access to media and services.
Chronic poor	Urban	<\$1 per day (>5yrs): slum dwellers with capability deprivation, low levels of material assets & social or political marginalization	100	No <b>financial</b> contribution. Limited <b>in-kind (labor)</b> contributions due to combinations of physical disability and ill-health, or time poverty (often due to caring for disabled/sick family members). Very limited access to media and services.
	Rural	<\$1 per day (>5yrs): agriculturalists as above	320	No <b>financial</b> contribution: conversion of produce to cash at unfavorable times prevents cash contributions. Limited <b>in-kind (labor)</b> contributions (as above). Limited <b>in-kind (material)</b> contributions due to lack of produce and land. Negligible access to media and services.

## 2.4 The challenges of WS&H in different contexts



### Overview

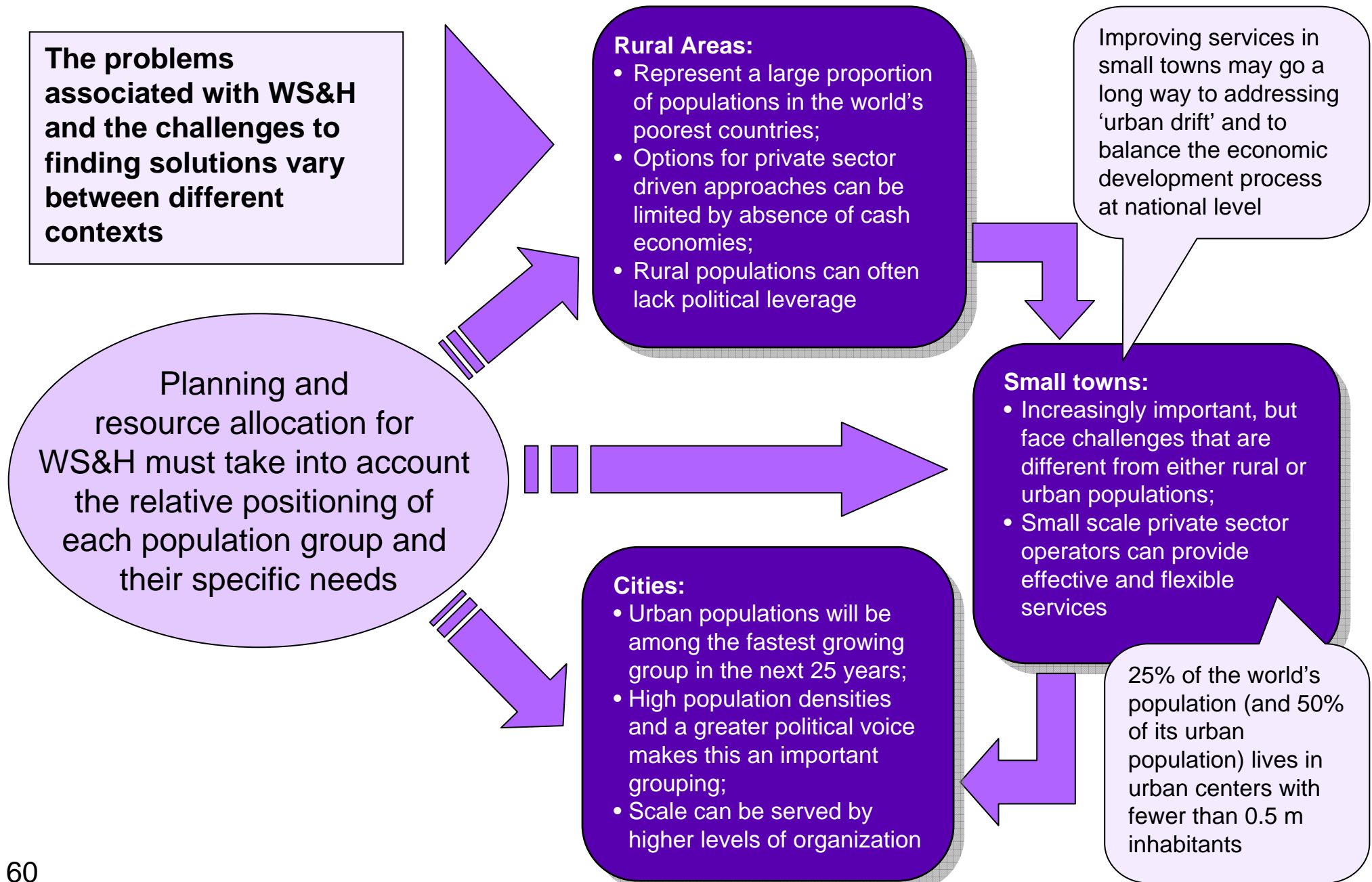
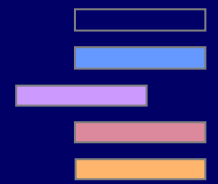
**The nature of the world is changing.** The world became officially 'urban' in 2006 with, for the first time in human history, more people living in urban than in rural areas. And urbanization continues at a rapid pace. But this global figure masks major regional differences, with Africa likely to remain predominantly rural until the middle of the century, while in many countries it is the **small towns** which are becoming more important.

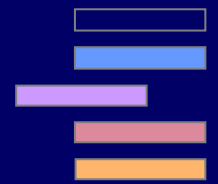


Data for small town populations is difficult to collate and compare because of differing criteria for rural and urban population centers used around the world.

The statistics used to compile this chart are not complete, but show an indication of trends with regard to the importance of small town populations.

# Meeting WS&H challenges in different contexts





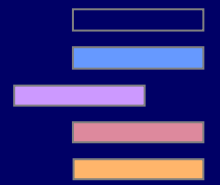
## Dispersed rural populations

While the trend is to increasingly urban living – with growth in cities, but also small towns and villages - much of the population of the poorest countries continues to live in low density rural areas. This is particularly true of Sub-Saharan Africa which has the lowest urbanization levels of all the major regions.

- On the one hand, those living in dispersed rural areas benefit from a generally healthier and more hygienic environment – they are not so prone to the diseases associated with high density living such as cholera and typhoid.
- On the other hand, it becomes costly and difficult to provide scattered individual dwellings and hamlets with services, particularly in difficult terrain where there are few if any roads. In such settings self-supply is generally a preferable option wherever appropriate.
- Household supplies for the poorest communities may require a high level of subsidy – often from the national or regional level.

Self supply options that are suitable for dispersed rural households include rooftop rainwater harvesting (where rainfall patterns allow) and privately owned wells and boreholes. Dispersed rural settings are also appropriate for community management approaches, where the community as a whole takes on the ownership and management of systems – with appropriate support from intermediate level organizations a critical adjunct for sustainability.





## Small towns – neither rural nor urban

Small towns present a complex set of challenges that are different from both those of urban slums and of dispersed rural settlements. Small towns tend to lack the scale that may attract large scale investment – they do not attract the big utilities. Typically, water and sanitation is the responsibility of municipal authorities who may lack the skills to meet people's needs.

Population densities in small towns are such that sanitation is an urgent issue requiring priority attention, but are often of low enough density that on-site solutions are an attractive option. Population densities are also such that household taps based on piped networks are often a cost effective option. At the same time, small town populations often retain 'one foot in the countryside' with high demand for water for productive activities such as livestock, food production, and various small businesses.

The opportunities for cross-subsidy between richer and poorer citizens – available in large towns and cities – are often lacking as the population tends to be more homogenous.

Small towns are particularly amenable to solutions based on local private sector and/or municipal capacity building. For example, municipalities – or associations of municipalities – in much of Latin America sub-contract the management of water supply systems to independent contractors.

## Urban Slums

People living in urban slums face a host of competing financial demands, all of similar urgency. They must pay for food and fuel. When they are sick they must pay for medicines. If they want their children to be educated they must pay school fees. They are faced with fuel or power bills (to cook, and to light their dwellings). Often they must pay to commute to a place of work. Then there are the 'luxuries' that can help to make life bearable: mobile phones; televisions; alcohol and other drugs.

Water (usually highly priced and vendor provided) is something for which there is little choice but to pay – along with food. However, sanitation may suffer when put alongside all these competing needs, especially if there is any free alternative option – such as a local pond or rubbish dump.

In general therefore there are a number of competing priorities for household expenditure, which are driven by multiple factors. In addition, household spending is also influenced by different priorities for men and women – with men in general less likely to place a priority on WS&H than women.

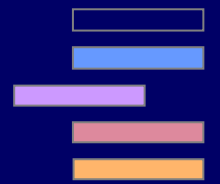
What is known and has been abundantly documented is that poor people in slums pay far more per unit of water than do those in middle-class suburbs connected to mains water supplies. This is partly because the latter tend to be highly subsidized; partly because the former are provided by people who make a living by providing small quantities of water in a labor intensive and inefficient manner; and partly because as with many services in 'illegal settlements' water supply is open to take over by criminal gangs.

Providing sanitation in urban slums, and effecting behavior change is a huge challenge, and one not amenable to simple solutions. Social marketing of hygiene products, public wash-houses and toilets, and innovative solutions for home excreta disposal are all promising. But, given the reality of people's priority needs, subsidy is likely to be required.

There is a high demand and real willingness among slum dwellers to pay for water services. This is already the basis of a thriving informal system of water carriers. There is large potential to provide sustainable water services to slums.

The main barrier is often official resistance to recognizing 'illegal' settlements.

## 2.5 The challenges of intervention in the sector

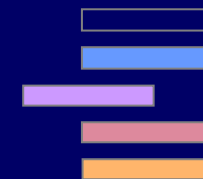


### Overview

- While the proportion of people un-served has diminished sharply, absolute numbers not served have either changed little (water) or increased (sanitation) in the last 30-40 years, despite much activity by donors and “the international community”.
- New models (such as more market-oriented solution packages and support to individual and community self-help initiatives) are needed to complement and fill in the gaps in established approaches by Governments and donors.
- More effective identification and targeting of the poor are needed, through mapping and the use of targeted subsidies.

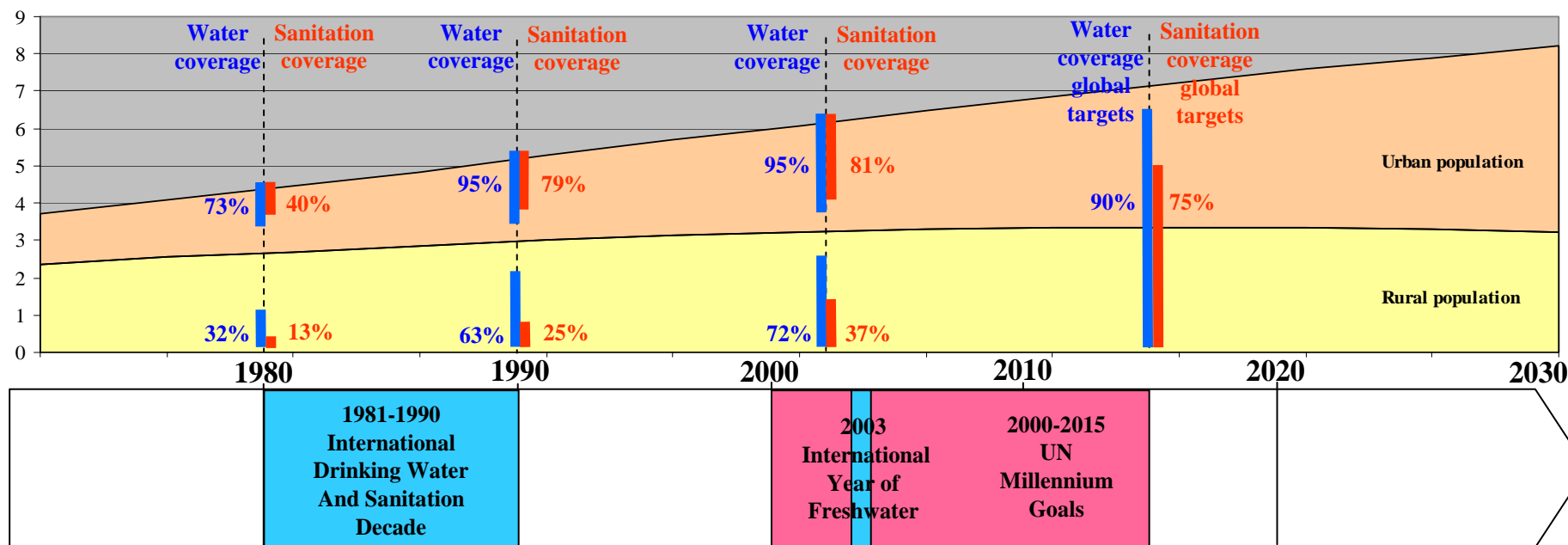


# Progress in meeting needs – and what remains to be done



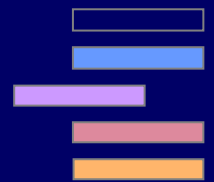
Official statistics show high aggregate coverage, however these figures are often inaccurate and mask large regional, rural/urban, and wealth related variations. They seldom relate to user satisfaction or safe services, being based instead on hardware counts and (frequently untested) assumptions about average rates of use. The poor and marginalized are likely to be left out – often because they do not ‘officially’ exist (e.g. ‘illegal’ slum dwellers).

World population evolution 1970 -2030 (UN Population medium variant, 2004), billion  
 Water and sanitation coverage 1980 (WHO, 1987), 1990, 2002 and Millenium targets 2015 (JMP, 2004), %



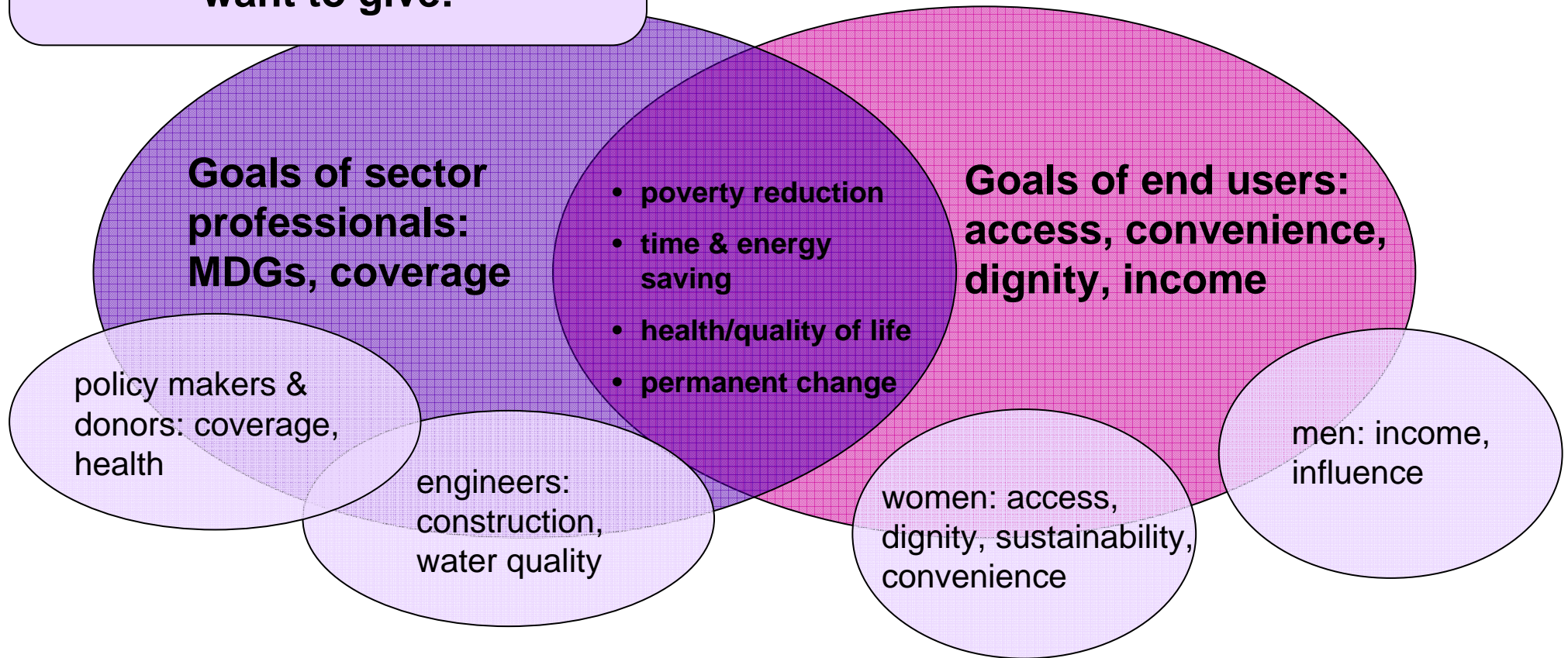
- 1977, UN Conference on **Water**, Mar del Plata, Argentina
- 1990, Global Consultation on **Safe Water and Sanitation** for the 1990's, New Delhi
- 1992, International Conference on **Water and the Environment**, Dublin
- 1994, Ministerial Conference on **Drinking Water Supply and Environmental Sanitation**, Noordwijk
- 1997, 1<sup>st</sup> World **Water** Forum, Marrakech
- 2000, **UN Millenium Declaration**
- 2000, 2<sup>nd</sup> World **Water** Forum, the Hague
- 2000, Ministry Conference on **Water security** in 21<sup>st</sup> century
- 2001, International Conference on **Freshwater**, Bonn
- 2003, 3<sup>rd</sup> World **Water** Forum, Japan
- 2003, International Year of **Freshwater**
- 2006, 4<sup>th</sup> World **Water** Forum, Mexico

# There is a disconnect between the goals of sector professionals and end users



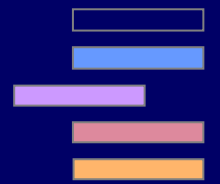
**What users want to have and what sector professionals want to give:**

If the objectives of all the stakeholders are not focused on a common goal – a goal especially shared and articulated by the users of water and sanitation services – then efforts will be diluted.



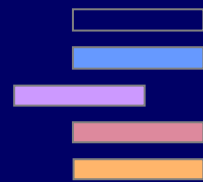
Sector professionals ***need to have a better understanding of what users want*** and need. This requires a greater degree of exposure to end users and their problems, and a greater degree of accountability to those users.

# The disconnect between service providers and service users



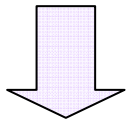
- Nominally both service users and providers want the same things: good services, improved health, reduced poverty. However, ***the assumptions that service providers make are often ill-founded; and the models that they use often unsuited to the realities of users' livelihoods.*** Examples of this mismatch include the widespread use of water borne sewerage in arid countries – where more treated water may be required to remove excreta than for any other use; and the provision to rural people of very low per-capita supplies of 'drinking water' when what they really want is more water for themselves, their livestock and their vegetables.
- This discrepancy occurs for many reasons: engineers educated in Northern Universities using Northern norms; donor 'experts' who are not familiar with the reality of users' environments, and an over-emphasis on health as the exclusive driver behind interventions in the sector.
- Underlying all of these problems is a ***failure to properly link the satisfaction of users to the incentives and rewards of service providers.*** This is partly because of the public-sector ethos of WS&H; partly because of the dominance of donors and partly because of the highly political nature of WS&H. Market mechanisms are one way of improving this crucial linkage – but so are others that can be applied as part of public sector reform. The crucial issue is to give water users a leading and informed voice in deciding key issues related to type and level of services (including tariffs).

# The problem of non-accountability: top down setting of goals and assessment of 'success'

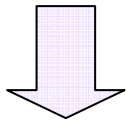


How it is now – top down and no accountability to users

Governments and donors set targets & norms for W&S services



Professionals receive instructions and implement services



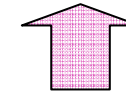
Water users receive services for which they were not consulted – but for which they are expected to pay

Professionals are assessed on their ability to effectively provide services as set out in plans & strategies. They are accountable to governments and donors.

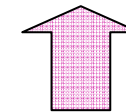
Professionals are assessed on their ability to satisfy users to whom they are accountable. This can (but does not have to be) through market mechanisms.

How it could be – professionals accountable to end-users

Governments and donors set policy, provide (some) finance, monitor/regulate



Professionals support users in achieving the services they want

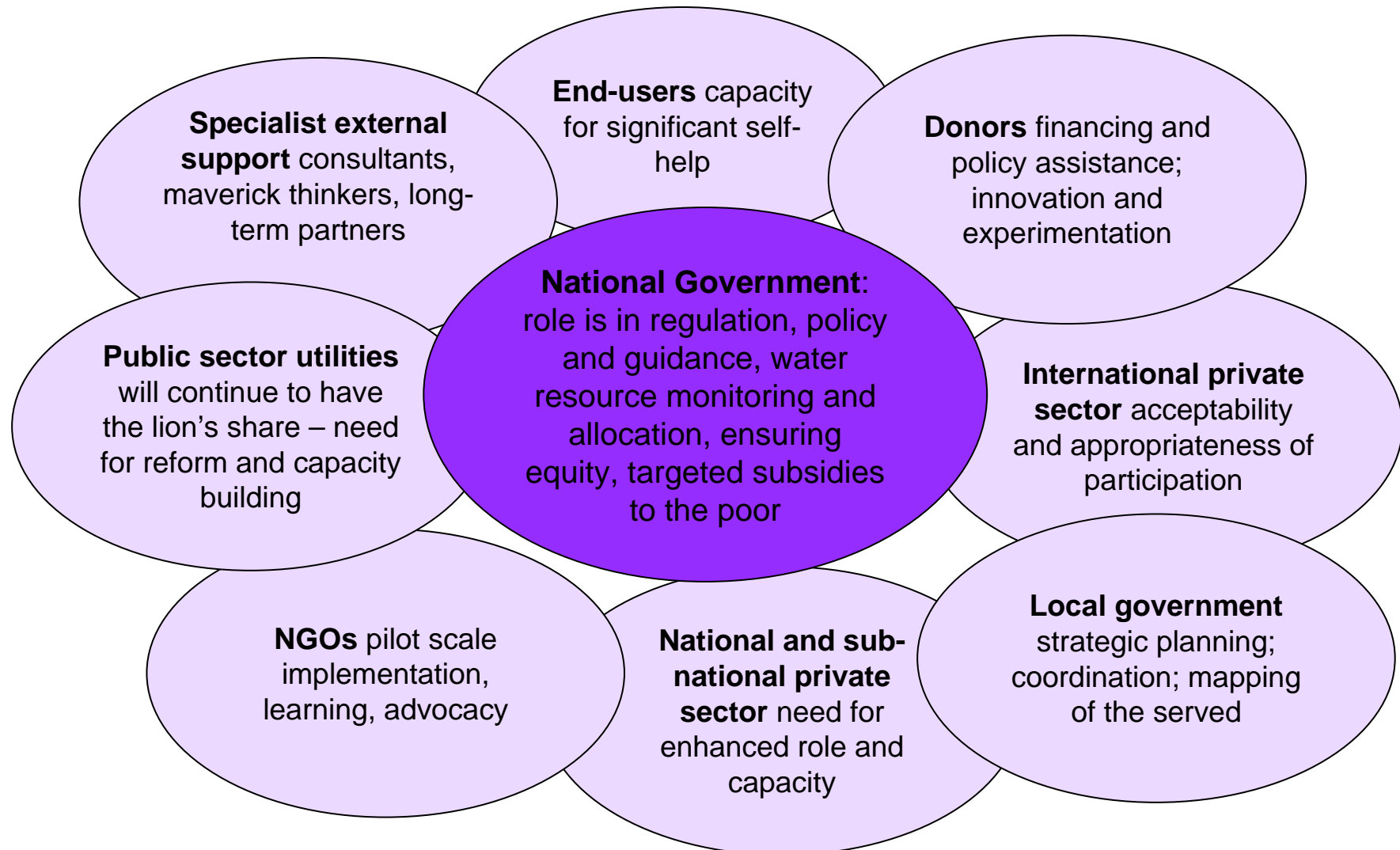


Water users are involved in identifying services that suit their needs and for which they are willing to take ownership

# The institutional map is complex, but solutions must be government-led

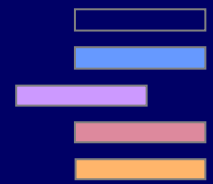


Not one player, but different stakeholders must play different roles according to the nature and scale of the need:





# The role(s) of donors: often not great in terms of absolute financing, but often having enormous influence on policy



## Bi-lateral and multi-lateral donors are important players in the WS&H sector:

- **Tend to be 'fashion-dominated', have a short-term focus**, and change funding priorities and focus, on the basis of broader political and economic considerations (e.g. the impact of the war in Iraq on development aid policy in the USA and UK).
- Although donors are making efforts to improve financing through Poverty Reduction Strategies and sector-wide approaches, they still tend to be **poorly coordinated or fragmented**; for example, several differing cost-recovery policies being applied by multiple donors in the same country context.
- May **convey ambiguous messages** with regard to the public sector. For example, working with direct budgetary support to line ministries in some countries and in others avoiding the public sector. Alternatively, working entirely with large NGOs through significant operational programs, can create parallel delivery mechanisms to those of government.

## ODA does not always go to the areas where it can have greatest impact:

- **Not to** countries where less than 60% of population is unserved
- **Not to** smaller-scale/'low tech' projects (50% of funding goes to large-scale projects)
- **Not to** sanitation in general (accounted for only 20% of total in 2002)
- **Not to** rural areas where coverage gaps are considerable

## But donors have a limited role in financing the sector:

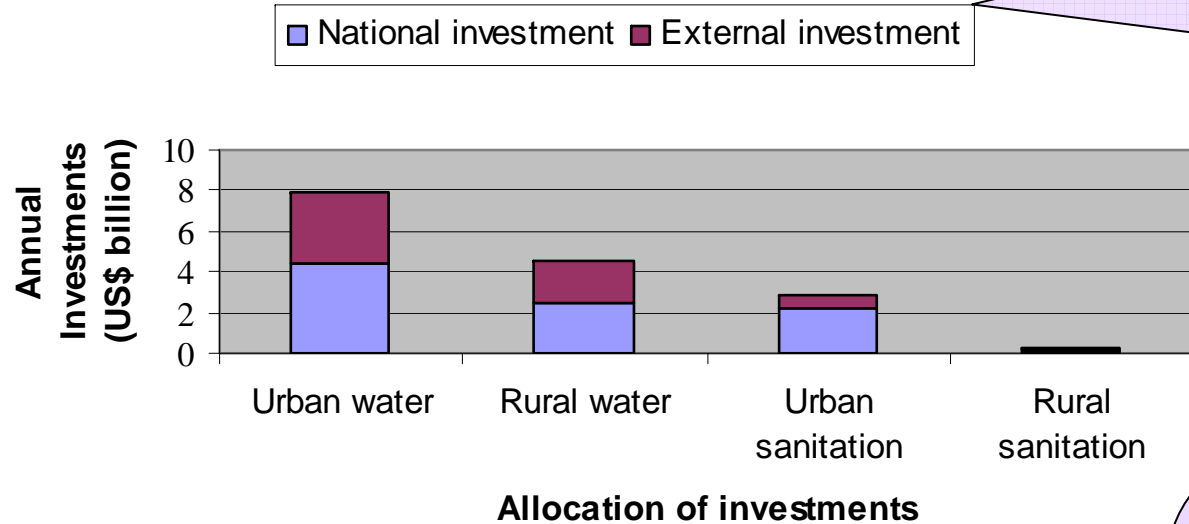
- Total Overseas Development Assistance (ODA) of USD78.6 billion in 2004
- WS&H is **about 5%** of total ODA
- Average water-ODA is about **US\$3.4 billion/year**
- **Top ten** donors provide **more than 85 % of ODA** for WS&H: Japan, IDA, Germany, USA, France, EU, AsDF, Netherlands, Denmark, UK
- **Top 10 countries** receive 41% of assistance: India, China, Egypt, Viet Nam, Indonesia, Turkey, Morocco, Palestine, Philippines, Jordan

The **role and influence of donors differs** between countries (e.g. India, Nigeria) where their inputs are dwarfed by government spending, and those (e.g. Niger, Mozambique) where they can represent close to 100% of sector investments. At the same time, donors such as the World Bank can have an influence far beyond their financial contribution to the sector – such as 20 years of ideologically driven utility privatization.

# National investment is of critical importance; but investment needs to be better targeted



## Water and sanitation investments in developing countries, 1990-2000 (JMP, 2000)



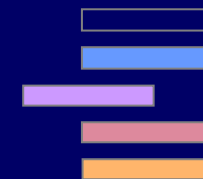
**Official Development Assistance (ODA)** is reported as a small percentage of total investment except for the poorest countries. However, it should also be noted that in some cases there is a possibility that the national investment figures might actually *include* loans from the (international financing institutions (IFIs), thereby distorting the picture.

There is no reliable aggregate data to show trends in direct investments by private householders, but we know that this is a huge area of spending, particularly when taking into account non-monetary investments of time etc.

- Government investment in many poor African countries lies between 1% and 2% of GDP (gross domestic product) (data for Kenya, Ethiopia, Zambia, Uganda and South Africa)
- Recent research into government spending priorities in 4 African countries show low priority for WS&H in poverty reduction strategies due to:
  - lack of political support for the sector;
  - lack of advances in substantive sector reforms;
  - institutional fragmentation of sector;
  - WS&H being viewed as the 'poor cousin' of health and education which receive much higher funding



# Public sector reform remains a crucial necessity



During the 2006 World Water Forum in Mexico, Jamal Saghir – Head of Water and Energy at the World Bank – said that at least 10-15 years have been wasted in ideologically driven privatization policies that were not backed by any empirical evidence of improved efficiency in the private sector. He urged a pragmatic approach to improving public sector provision.

In Tamil Nadu, a change management program within the public Tamil Nadu Water and Drainage board has led to demonstrable improvements in user satisfaction. This is now being replicated in other Indian states.

Public sector utilities will continue to be the major supplier of water to urban and peri-urban populations.

- The vast majority of people living in urban or peri-urban areas in the developing world are served (or not served) by publicly owned and managed utilities.
- Public utilities suffer from the same problems of low motivation, poor management, inadequate cost recovery and political interference that have hindered the international private sector from operating successfully in developing countries.
- Yet they have a legitimacy and high degree of acceptance that the private sector does not.
- Reform of the public sector is and will continue to be one of the most important avenues for sustainably increasing coverage – particularly in urban and peri-urban areas.
- Encouraging public sector utilities to extend services to slums (in partnership with citizens groups or informal private sector operators) is a priority.

According to PSIRU (Public Services International Research Unit UK), the public sector accounts for 85% of finance and 90% of coverage in water and sanitation globally

# The informal private sector represents immense potential

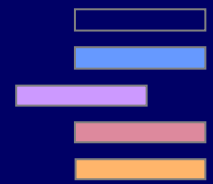


A recent study of small-scale providers by the World Bank estimates that such providers serve about 25% of the urban population with water in Latin America and East Asia, and 50% in Africa; estimates are as high as 80% for sanitation in urban Africa

Water	Rural	Small Towns	Urban
Construction of wells (both hand dug and machine drilled)	X	X	X
Construction of storage tanks	X	X	X
Construction of (sometimes illegal) connections to utility managed systems		X	X
Plumbing	X	X	X
Selling of equipment and spare parts	X	X	X
Maintenance of pumps (particularly mechanical/electrical)	X	X	X
Non-piped water distribution (tankers, donkey carts, push carts, etc)	X	X	X
Water kiosks (often linked to utility managed systems)			X
Small pipe networks with house or group connections – sometimes with treatment		X	X
Sanitation			
Construction of latrines and septic tanks	X	X	X
Selling latrine materials (latrine pans, pipes, slabs, etc.)	X	X	X
Pit and septic tank emptying		X	X
Privately operated bath houses and toilets		X	X
Selling of hygiene products (soap, paper, brushes etc.)	X	X	X

Small businesses already provide many goods and services into the WS&H sector. They are often described as “the engine of future growth” for national economies. Their continued and enhanced role is crucial and has the potential to be better supported by government policy and external assistance. They have a key role for all user groups with some spending power (i.e. all except the most severely and chronically poor / destitute).

# The formal private sector has struggled to meet expectations in serving the poor



The WS&H sector is the least profitable of all the 'utilities'. Rates of return are typically orders of magnitude lower than for other sectors such as telecoms. The sector is also highly prone to political interference.

Initiatives such as Water and Sanitation for the Urban Poor (WSUP) and other experiences within concessionary contracts highlight important lessons for the private sector, including:

- importance of multi-sector partnerships and working with civil society and public sector;
- innovation in technologies and flexibility in standards to reduce costs, e.g. small-bore sewerage systems;
- innovation in approaches to meet poor consumer's needs: e.g. more frequent and lower tariffs that are affordable; self-help construction to lower connection costs.

Formal private sector players have a number of roles in WS&H, although these are largely in urban markets:

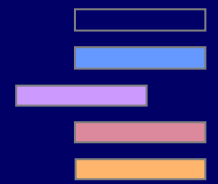
- National and sub-national utility operators, franchisees and other forms of business, largely based in construction, drilling and manufacturing of parts, equipment and material.
- For the past 20 years multi-national water companies often European or US-based, have been encouraged to enter into concessionary and management contracts in urban centers in developing countries. High expectations of new investment and reaching out to poorer consumers in urban slum areas generally have not materialized.
- Despite the political and economic obstacles to expansion of service delivery, some companies (e.g. Thames Water, Suez) have invested in innovative and flexible approaches to working with the poor – the challenge is how to scale these up.

Total international private sector investment is estimated to be between 7 and 10% of total external investment, but has been mainly focused on Latin America and SE Asia – between 1990 and 1997 **less than 0.2%** of all private foreign investment went to countries in sub-Saharan Africa.

Formal private companies face many challenges:

- low and long rates of return on investments
  - political interference in governance issues
  - resistance to tariff increases
  - political instability and contractual risk
- The 'water wars' in Cochabamba, Bolivia involving Bechtel is a high profile case of what can go wrong.

# Governments are key to meeting the challenges of WS&H but must be supported effectively



The increasing trend towards **decentralization** of service provision, including WS&H, is creating new lines of responsibility and accountability between levels of Government. The increasing pace of decentralization in many countries has led to **capacity problems in the short- to medium-term**, due to partial decentralization processes or (political) resistance to change.

**Government is central to progress and change.** If Government is weak, inadequately resourced, or opposed to change, little progress is possible. On the other hand, if **Government is a strong and committed player, much is possible.**

For example, the government of **India** initiated a major sector reform process in 1999, resulting in a roll-out of a national level decentralized and scaled-up community-managed rural water supply program that means India is currently on-course to reach the MDG target for water supply.

**Some interventions require particular attention to Government attitudes, practices and standards** – for example, that there is an obligation to serve slum tenants; the possibility of changes to conventional (industrialized country) engineering standards in order to enhance access. Changing attitudes within government is not easy, and in some cases collaborating with a **political champion** within the system can be more productive than external pressure.

# NGOs have a varied role, but are often limited in their ability to go to scale



Many NGOs take an increasing advocacy role, often with human rights focus, and stimulate demand for service improvements

Some of the larger international NGOs act as funding agencies in their own right and can have significant policy influence in certain countries

Often in a strong position to enable **innovation** and pilot new or innovative approaches and technologies

Many NGOs and locally based community organizations play very important roles in the provision of WS&H and piloting of new ideas, but they need support to:

- Translate lessons from 'islands of success' to higher level policy and strategy directives;
- Build more effective linkages to other stakeholders, especially to local and central Government and private sector businesses.

1. Introduction

2. The problem

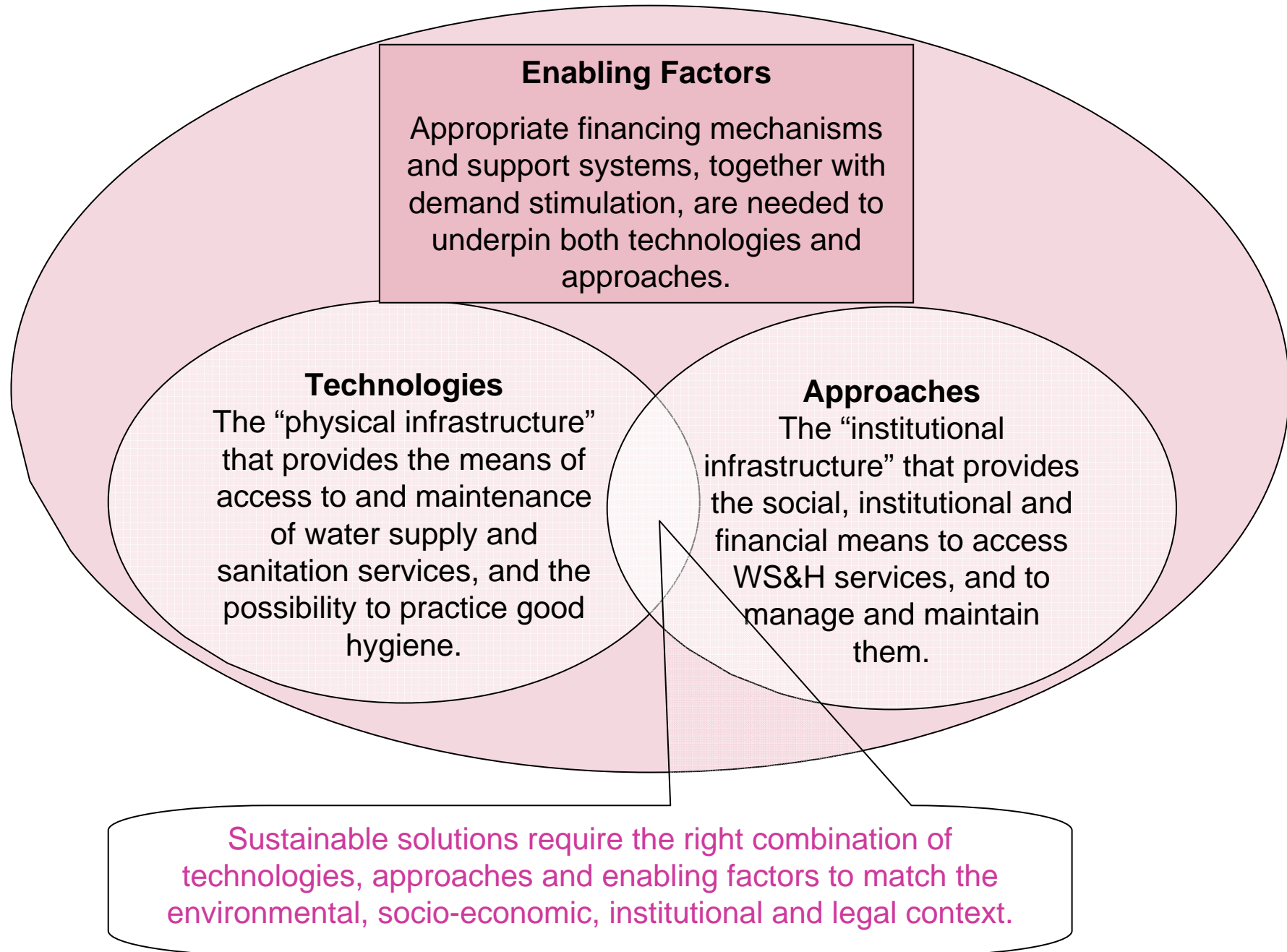
3. The Landscape

4. Potential opportunities

- 3.1 Technologies, approaches and enabling factors
- 3.2 Landscaping of approaches
- 3.3 Landscaping of technologies

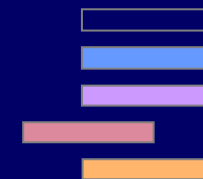


# 3.1 Technologies, approaches and enabling factors

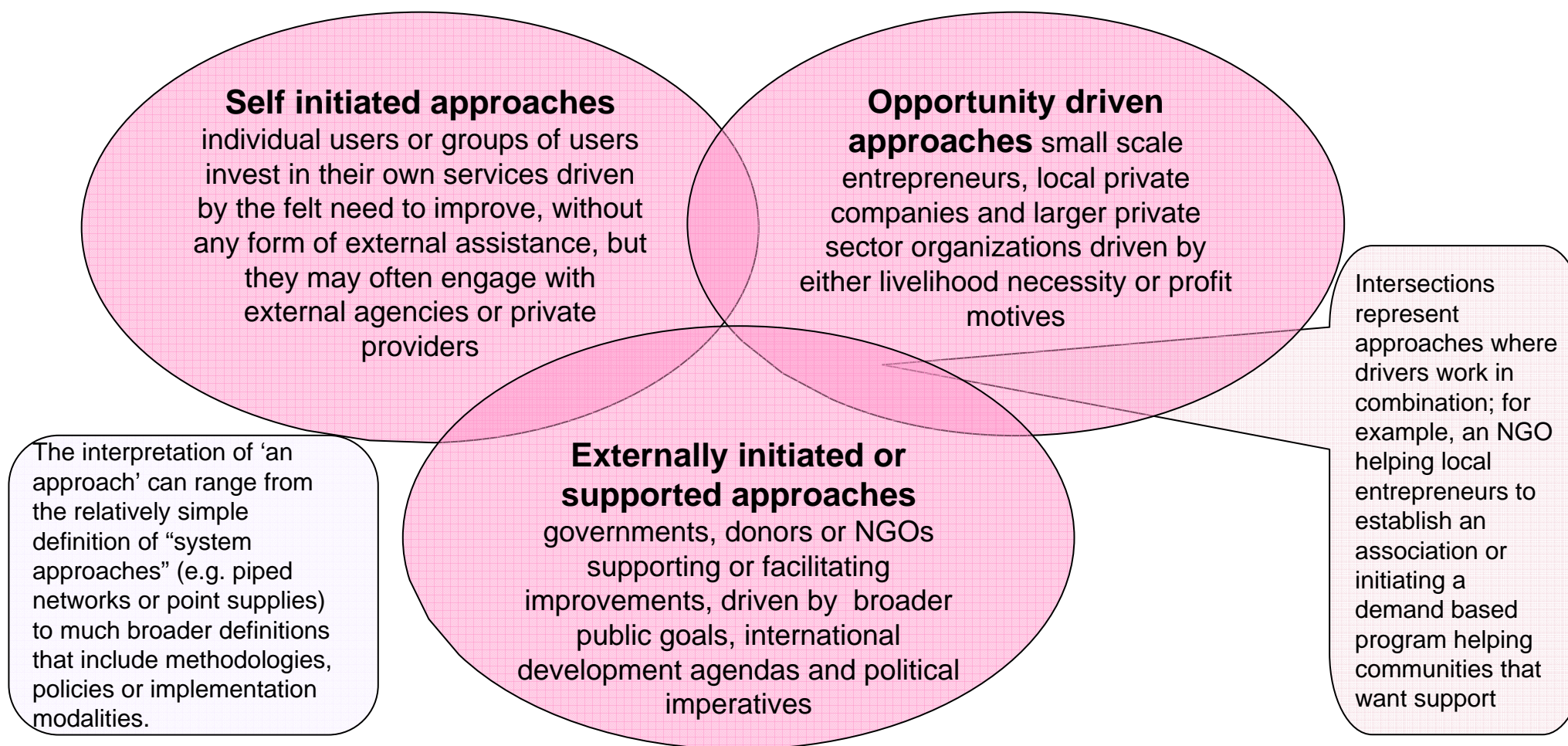




## 3.2 Landscaping of approaches



### Overview of service delivery approaches:



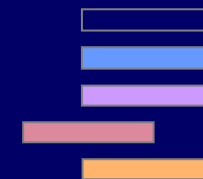
We use the term **approach** for the three **service delivery approaches**, each one with a distinct driver. Each approach includes different Enabling Factors relating to financing, demand stimulation and support systems (legislation, supply chain etc.). **The best approach in a particular context depends on the nature of the need, the available technology and the strengths of each of the stakeholders**

# Understanding the drivers behind approaches helps to identify appropriate interventions



Approach	Driver	Examples	Challenges	Strategy implications
Self initiated	User's felt or perceived needs and benefits for an improved service. For water supply: convenience, productive uses and income earning potential, time-saving, cleanliness, increased value of plot or house. For sanitation: convenience, cleanliness/removal of smells etc., safety and privacy (especially for women and girls), 'modernity' and status (less commonly productive uses).	Individual household well; household latrine. Community well or spring improvement.	Lack of technical oversight and design problems. Largely unregulated. Lack of access to finance and advice, lack of spare parts, problems with major repairs, internal conflicts etc.	Government authorities need to recognize self-help as an important contributor to change. Assistance needs to be given with great care, to avoid stifling user initiatives. Compromises between professional and end-user goals need to be sought.
Opportunity driven	Small-scale local entrepreneurs driven by livelihood opportunities. Larger, private utilities (often involving international companies or subsidiaries) driven by profit motive, increasing market share and sometimes public image (corporate social responsibility).	Well digging for cash or barter. Handcart deliveries of water to consumers. Latrine or septic tank emptying Concessionary contracts; build, operate, and transfer contracts; Management contracts.	Lack of technical oversight and design problems. Lack of access to finance and advice. Weak or absent regulation Political instability and high levels of sovereign risk. Long return periods on investment .	Small businesses need to be supported through start-ups, with business, marketing and technical know-how. International private business needs to negotiate very explicit poverty-focused targets with national Governments. Clearer appreciation of risks is needed.
Externally initiated and supported	International lending banks are driven by a combination of development goals and shareholder interests. For most bilateral donors the driver is based on international development goals (currently the MDGs) and increasing coverage. Governments are driven by issues of national interest, development and improving public welfare, but also by political imperatives and corruption. NGOs are largely driven by (humanitarian) development goals and a rights based perspective.	Poverty reduction strategies, matching-funding, Sector Wide Approaches (SWAPs) and direct operational programming. Public utilities for urban areas and operational programs for rural areas; national public health campaigns. Operational programs; capacity-building of local partners; micro-financing.	Public opinion and pressure in home country may affect aid policies. Lack of adequate financing; inability to raise sufficient tariff income. Inefficient management and technical capacities. Small-scale operations, limited reach and dependency on uncertain financing streams.	There is a real need for good quality information on coverage, service levels, impact and sustainability of externally-initiated interventions. External interventions should be targeted to the poorest, and new ways found to address the needs of these groups (e.g. through relaxation of "minimum" technical standards) .

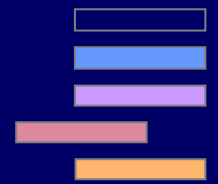
# The landscape of approaches and enabling factors for water supply



For each of the Service Delivery Approaches (SDAs), Enabling Factors (EFs) are mentioned that are often applied in combination with the approach. A detailed analysis of each SDA and EF is made in the stand alone landscaping document

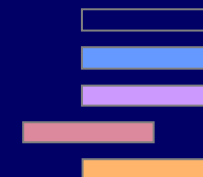
	Service delivery approaches	Enabling Factors		
		Financing (Fin)	Demand stimulation (Dem)	Support systems (Sup)
<b>Self-initiated</b>	Self service Community controlled water providers	Self-financing Loans/credit Revolving Funds Cost sharing Recovery O&M cost Social Development Fund	Hygiene promotion Marketing by entrepreneur Demonstration projects Participatory approaches Demand responsive	Supply chain Legislation Institutional Support Mechanism Information support systems Associations of committees Learning alliances and projects
<b>Opportunity driven</b>	Small Scale water providers (SSP) Private utility managed system Subcontract with utility	Loans/credits Guarantees Output based aid Cross subsidies Differential tariffs Revenue financed extension	Marketing by provider, utility or possible franchiser Benefiting from other programs such as hygiene promotion Demonstration projects	Legislation Supply chain Franchised water providers Organizational reform Partnership approaches Capacity development (network) Information support systems
<b>Externally initiated and supported</b>	Municipality / Public utility managed system Regional Schemes Central Government programs NGO and donor programs	Cost sharing Loans/credits/Guarantees Output based aid Cross subsidies Differential tariffs Innovative financing	Marketing by utility Multiple use Hygiene promotion Demonstration projects Demand responsive Gender sensitive	Legislation Supply chain Organizational reform Institutional Support Mechanism Partnership approaches Capacity development (network) Information support systems Learning alliances and projects

# “Trends” in assessed approaches and enabling factors



<b>Service delivery approaches</b>	<ul style="list-style-type: none"> <li>• Similarities exist in approaches between water supply and sanitation, but the former are more institutionalized; sanitation is less advanced and much more a household issue.</li> <li>• Increasingly combinations of approaches (drivers) are used creating partnerships between government, private sector and/or NGOs.</li> <li>• Opportunities for private sector involvement are growing, as government agencies change their role from provider to facilitator and regulator.</li> </ul>
<b>Financing</b>	<ul style="list-style-type: none"> <li>• Clear change is occurring in the area of financing, moving towards users paying a larger share (at least operation and maintenance costs), because earlier grant-based interventions proved unsustainable. In sanitation several actors are switching from a subsidy-based approach for hardware to one based on financing elements of promotion, advice and credit instead.</li> <li>• Volunteer-based interventions are not sustainable and are shifting to incentive-based interventions.</li> <li>• Financial resources from donors are moving away from project support towards budgetary support. This appears to improve efficiency, but has the downside of reducing potential for innovation as research often has a very low priority for national governments.</li> <li>• Pro-poor and gender sensitive approaches still receive only lip-service rather than meaningful support in many cases.</li> </ul>
<b>Demand stimulation</b>	<ul style="list-style-type: none"> <li>• Interest in demand stimulation is growing as supply driven interventions have not proved to be very successful.</li> <li>• Health-based promotion of service improvement has been the main way of demand stimulation but a clear shift is taking place towards more marketing approaches based on convenience and status, as well as through demonstrations.</li> </ul>
<b>Support systems</b>	<ul style="list-style-type: none"> <li>• In many countries legislation does not support the growing potential of private sector interventions.</li> <li>• (Facilitated) partnership approaches are increasingly being seen as a way of achieving synergies between different actors through ‘win-win-win’ scenarios.</li> <li>• There is growing interest in the potential of amalgamating associations or committees of water providers into higher-level organizations.</li> <li>• Institutional reform is being applied by some public utilities. Further support of this reform is needed as earlier expectations of privatization, is not materializing because of political tension and low profitability.</li> <li>• Limited access to objective information and advice is a major constraint; lack of innovation remains weak for all actors resulting in a considerable economic loss because of inadequate solutions.</li> <li>• Promising experience exists with learning alliances, learning projects and capacity building networks.</li> </ul>

# Promising approaches identified in the landscaping exercise



<b>Service delivery approaches</b>	<ul style="list-style-type: none"> <li>• <b>Self-improvement</b> has great potential particularly in sanitation but requires better support.</li> <li>• Considerable untapped potential exists for <b>private sector interventions</b> particularly when working more in partnership with government and civil society.</li> <li>• Public utilities are the main suppliers in many countries; <b>strengthening utility reform</b> will improve performance and with proper cross subsidies may help to expand services to poor people in slums.</li> </ul>
<b>Financing</b>	<ul style="list-style-type: none"> <li>• There is growing understanding that sustained service delivery depends on <b>user payments</b>, but stimulation of users, and 'polluter pays principle' is essential.</li> <li>• <b>Innovative financing</b> including exploring sustainable credit facilities, rotating funds and output-based subsidies, but also creating a more sustainable financial basis by adopting <b>multiple use</b> of water (productive uses) needs further development.</li> <li>• <b>Pro-poor</b> and <b>gender sensitive</b> financing including cross subsidies need to be promoted at scale.</li> </ul>
<b>Demand stimulation</b>	<ul style="list-style-type: none"> <li>• Comparative analysis is needed of different <b>hygiene marketing</b> based interventions to promote service improvement and improve hygiene behavior including their potential to reach the poor.</li> </ul>
<b>Support systems</b>	<p>There is a need to:</p> <ul style="list-style-type: none"> <li>• Promote <b>improved legislation</b> to support the growing potential of private sector interventions.</li> <li>• Strengthen <b>partnership approaches</b> to benefit from the different strengths of different actors.</li> <li>• Stimulate the formation of <b>associations of water providers</b> to reach economies of scale.</li> <li>• Explore possibilities of <b>franchising</b> to improve service delivery by private sector and ensure its quality.</li> <li>• Strengthen <b>institutional reform</b> including putting emphasis on staff capacity and incentives to adopt pro-poor and gender sensitive interventions.</li> <li>• Identify strong <b>political 'champions'</b> who can lobby for change from within the political establishment.</li> <li>• Strengthen <b>supply chains</b> in support of enhanced implementation and maintenance.</li> <li>• Improve <b>access to information</b> and advice will improve quality of interventions, reduce costs, enhance possibilities for 'user control' and limit possibilities for corruption.</li> <li>• Expand existing experiences with <b>learning alliances</b>, learning projects and <b>capacity building networks</b>.</li> <li>• Create mechanisms such as '<b>challenge funds</b>' to enhance scalable innovation in the sector based on involvement of all actors in setting the research agenda and the learning.</li> </ul>

## 3.3 Landscaping of technologies

**Technologies** – can be described in functional terms such as water lifting, water treatment, excreta disposal; or in terms of artifacts such as pumps, pipes, latrines, hand-washing water dispensers, soap.

No technology operates outside of a **context** (users, national policies, natural environment) and in the absence of **approaches** and **enabling factors**. Consequently technologies can only be assessed or evaluated in relation to these aspects.

Technologies must be culturally and socially acceptable, affordable, and easy to operate, manage, and maintain.

Technology evaluation needs to take account of at least the following aspects:

- Affordability in capital and recurrent terms (by end-users directly, ideally; alternatively to Government or NGO programs which are subsidizing technologies for the very poor);
- Manageability by the network of user-group and support organizations which must maintain the technology – not exceeding the level of complexity which the support infrastructure can handle;
- Physical robustness;
- availability of replacement and spare parts in-country;
- Conformity to national policies;
- “Fit” to national infrastructure (including roads, energy and communications);
- Sustainability in natural resource terms.



# Developing the landscape of technologies



- Because technology cannot be divorced from the context in which it is to operate, nor from the approach which is used to support or manage it, painting the technology landscape in general terms has somewhat limited value.
- Moreover, the general categories of technology (such as dominant/proven, emerging, 'blue-skies') which fit a single and fairly homogeneous context, have to be re-defined for a more generic (but highly variable) 'developing world' context. Technologies which can be described as "proven" in the USA or Europe for example may only be emerging in some developing countries.
- Nevertheless, some general features of the technology 'landscape' can be drawn, most usefully in relation to the functional requirements of technologies under a hierarchy of headings.





## Five broad headings:

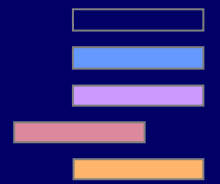
- Water resources — a particular need for better monitoring and data access
- Water supply } many proven technologies, some opportunity for technology R&D
- Water treatment } (research and development) , but main need is for cost reduction and improved ease of management
- Sanitation } technologies could be improved, but main need is for
- Hygiene } application of better approaches

## Affordability

- The 400m chronically poor can only afford very small quantities of very low-cost (if necessary subsidized) items
- Credit may assist the 1.2bn on less than \$1 a day
- But (re-) payment often relies on seasonal or intermittent “income” which may not be readily convertible to cash

## Support

All technology needs a supporting (‘soft’) infrastructure of ready access to spare or replacement parts, energy, and in some cases consumables such as chemicals. Building of capacity to deliver this support must be built into all technology interventions.



## Water Resources

There is a potential opportunity to “leapfrog” under-funded water resource monitoring systems which rely heavily on unmotivated human operators, by adopting advanced sensors and communications technologies. This would require large investments however, far in excess even of those which Governments are presently willing or able to support.

Community level monitoring of water resources, source functionality and water quality is a promising area which has largely been neglected to date.

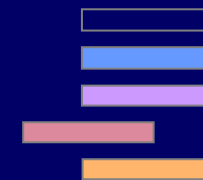
## Water Sources

Two areas of technology are of particular relevance to the poor:

- rainwater harvesting (of very widespread applicability, at least as a partial solution);
- very low cost water well drilling (utilized with great success for productive and domestic water use in Bangladesh, Bolivia, India, Madagascar, Nepal, Niger, and Nigeria)

## Water Lifting

The management of water pumping (especially from groundwater) is a particular priority. This has technology implications in relation to handpumps and solar pumps (on which up to 2bn people could rely, now or in the near future).



## **Water Storage**

Very low cost water containers suitable for safe storage in the home, or in larger capacities suitable for household rainwater storage, could impact on very large numbers of the unserved.

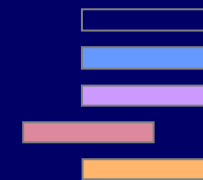
The need is for containers of 10-100 liters capacity for use inside the home, and reservoirs up to 10,000 liters outside the home, both at a price of no more than 1 US cent per liter capacity. These need to be easily transportable, able to protect water quality, and able to deliver water conveniently.

## **Water Delivery**

Piped water supply technology is generally well-established. However, improvements to metering – to improve accuracy and reduce cost – would contribute to more effective management of town and city water supplies.

## **Water Treatment**

There is no lack of “proven” or piloted technologies, and much of the innovation in water supply is currently taking place in this aspect. However, little of the innovation is well adapted to developing country contexts, and even less is driven by expressed demand. Many of today’s advanced packaged treatment systems are energy-demanding, fragile, and create dependence. Nevertheless some interesting technologies are emerging.



## **Excreta Disposal**

The main technology emphasis for improved excreta disposal for the poor must lie with on-site and low-cost technologies – pit latrines, pour-flush latrines, eco-san, and small-bore sewerage. There is probably little scope for improving these technologies.

Waste stabilization ponds and reed beds can provide manageable sewage treatment solutions.

It may be that bio-additives could be developed which could digest latrine pit contents to the extent that very infrequent or no emptying is required. This would represent a very significant advance, but the prospects are not yet encouraging.

## **Wastewater, Storm-water and Solid Waste Disposal**

Key technologies include:

- wastewater re-use
- solid waste re-use and recycling
- composting of organic waste

## **Hygiene and Hygiene Promotion**

Few technologies are needed for hygiene practices, other than those offered by improved water and sanitation services.

However, the following technologies need promoting or developing:

- handwashing water dispensers
- soaps and soap alternatives
- materials for menstrual management
- children's nappies and potties
- low-cost (including wind-up) radios
- equipment for visualization of 'germs'

1. Introduction

2. The problem

3. The Landscape

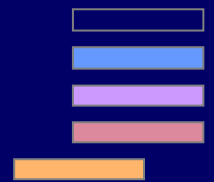
4. Potential opportunities

4.1 Opportunities for change

4.2 Common aspects of the Opportunity Areas

4.3 The main Opportunity Areas

## 4.1 Opportunity Areas - impact is easy Scale and sustainability are the big challenge



To achieve impact in the short-term and at small scale is relatively easy. Many projects and programs achieve this, although in most cases the ‘overhead’ costs are not fully understood or reflected. ***The challenge is to go to scale in a sustainable manner.***

**Going to scale** may only be achievable through carefully designed approaches that avoid the mistakes of past top-down investments; these may include a range of strategies based on varying levels of subsidy, but all must be based on a better understanding of what end-users really want in the first place. The first of these must involve only small subsidies or levels of support, or it will be self-defeating. The second taps into the buying power of end-users, and is therefore also financially efficient for external agents of change. Externally initiated (Government/donor) programs can only achieve scale if they are better targeted to those who cannot be reached by the alternative approaches.

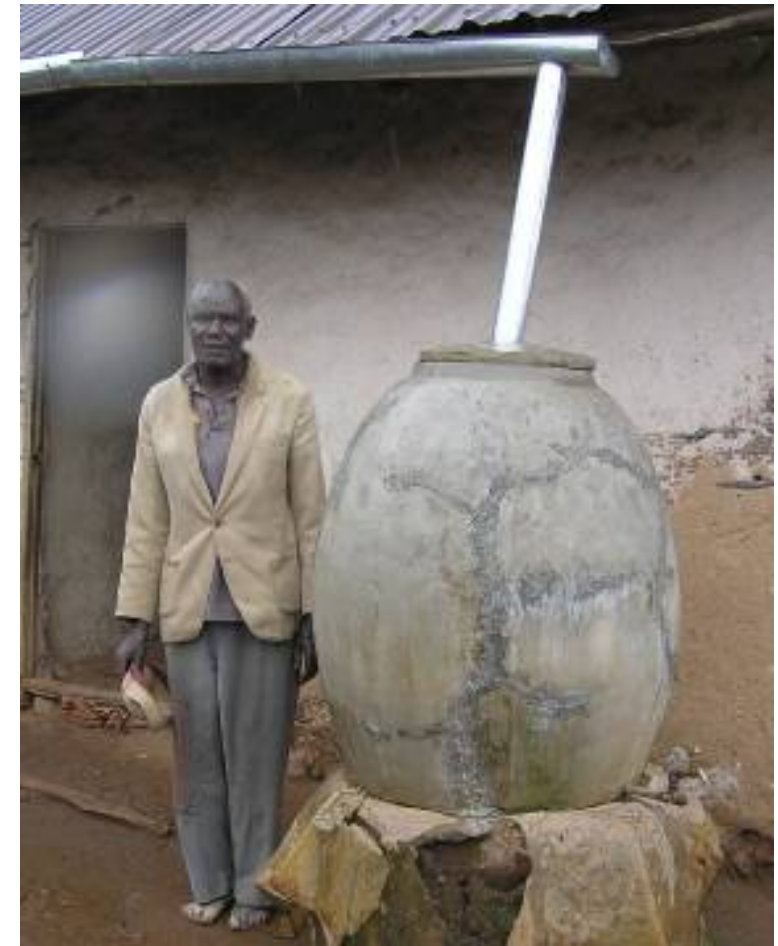
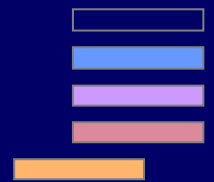


Photo: R. Carter



# Opportunity Areas - impact is easy Scale and sustainability are the big challenge



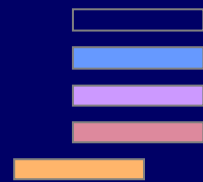
**Sustainability** adds the time dimension to impact. It is concerned with whether systems “continue to work over time”. This functional sustainability requires that people value, utilize, finance, care for, repair, improve and eventually replace the technologies on which they rely. Investment in non-sustainable systems is wasted. Investment in and promotion of sustainable systems enhances institutional capacity and the self-esteem of end-users, in a virtuous circle.



Photos: H. Lockwood, Nicaragua, 1997

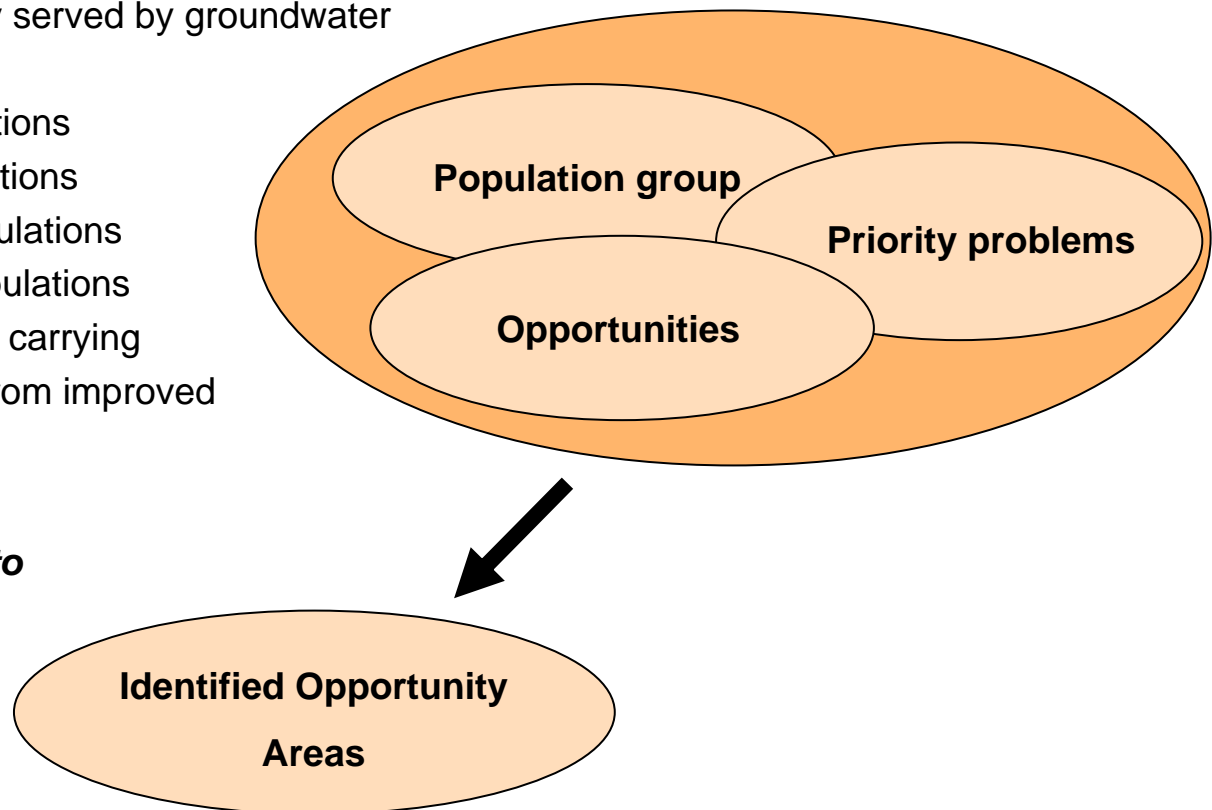


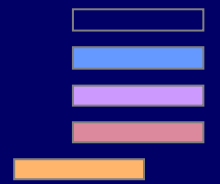
# Opportunities for change



## Overview

- In order to identify specific areas in which positive and sustainable change could be made at scale, an intermediate step was necessary. The idea of **Problem Arenas** emerged. These are large populations, sharing a broadly common set of problems, and offering multiple opportunities for constructive intervention, based on a combination of promising approaches and technologies.
- ***Problem arenas are multi-dimensional and overlapping. They represent a step in a process, not an end in themselves.***
- The Problem Arenas include:
  - Populations served or potentially served by groundwater
  - Sanitation for rural populations
  - Sanitation for small town populations
  - Sanitation for urban slum populations
  - Water supply for small town populations
  - Water supply for urban slum populations
  - Populations dependent on water carrying
  - Populations who would benefit from improved hygiene behaviors
- Defining ***problem arenas is a means to the end of narrowing down on key Opportunity Areas.***



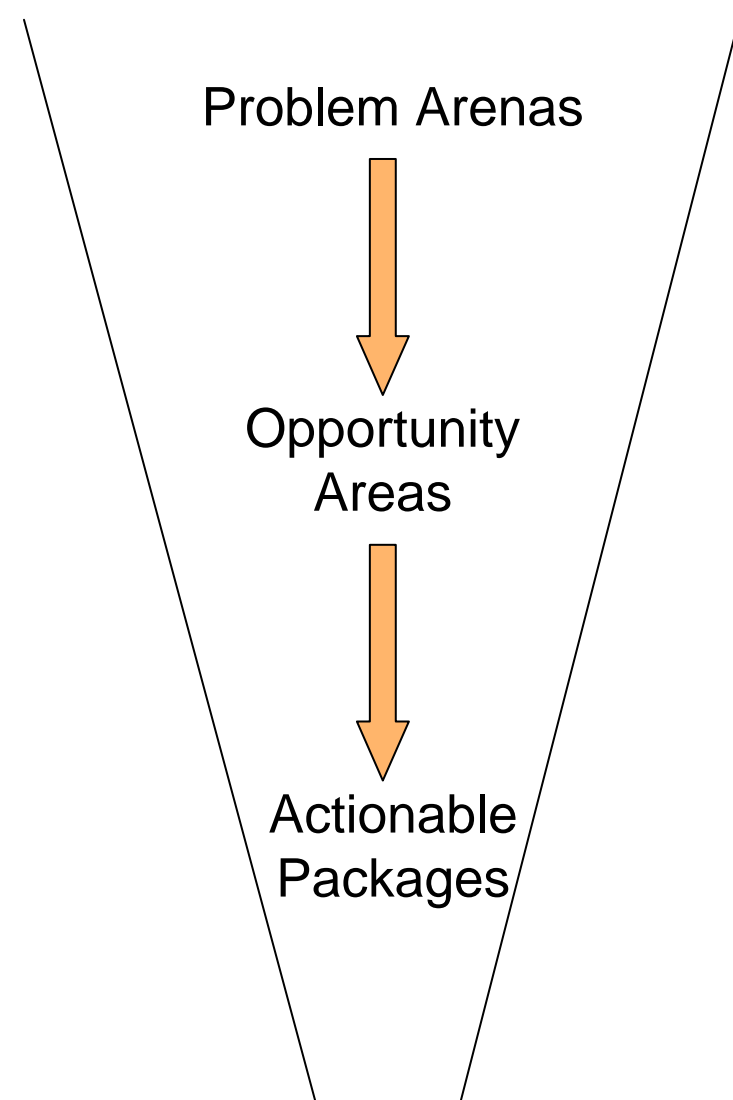


## Overview

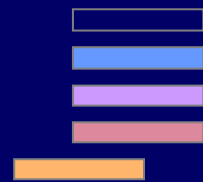
From the 8 major Problem Arenas identified, it became clear that technologies and approaches needed to be combined in various ways in what we then called Opportunity Areas. A total of 29 Opportunity Areas are set out below.

The long list of Opportunity Areas corresponds to rather generic contexts (e.g. urban slums, small towns), while further detailing of the Opportunity Areas indicates how these could be turned into context-specific, actionable, packages, in particular locations, with particular partners.

They have been derived through dialogue and debate within the study team, and from considering the inputs of a group of External Practitioners.



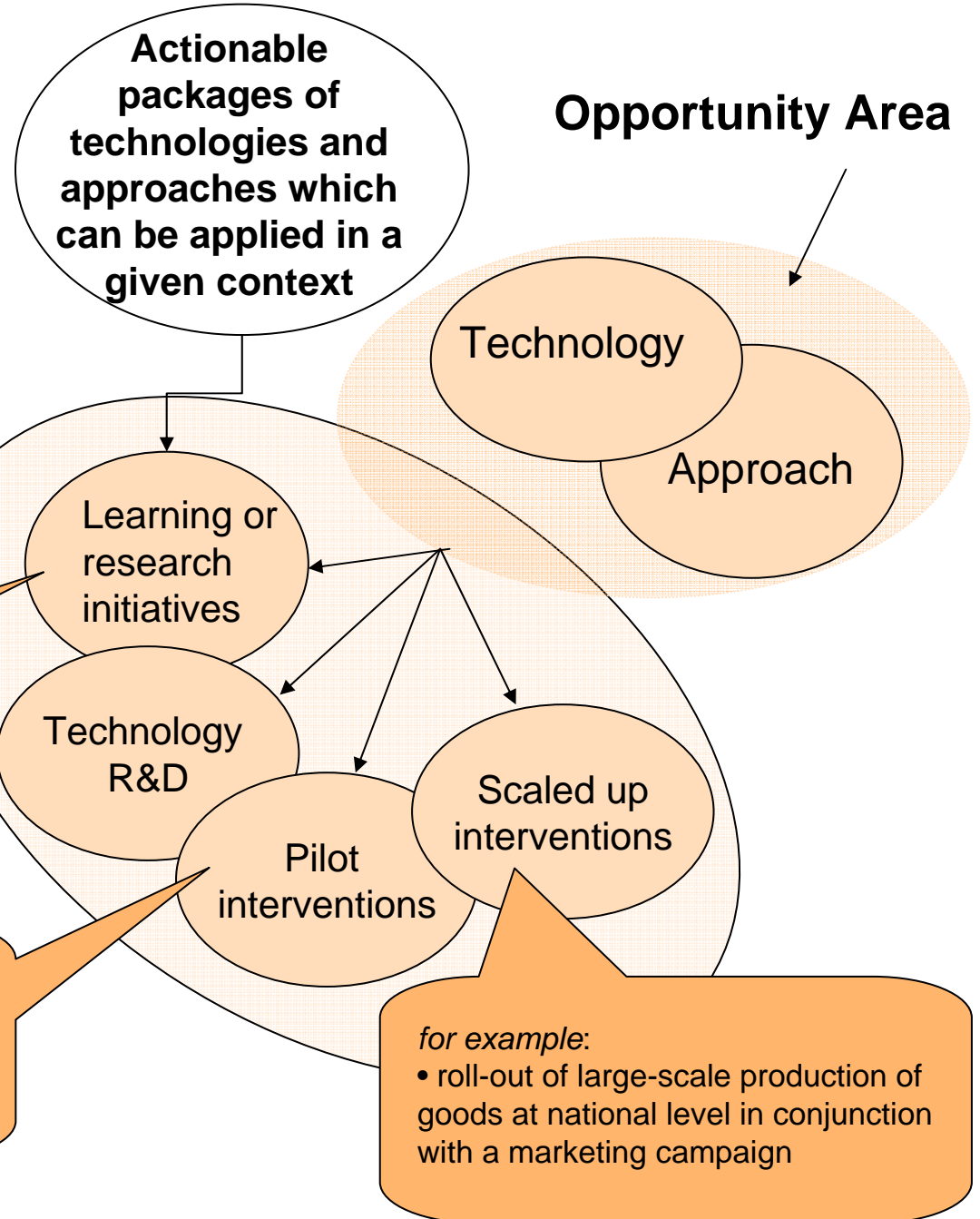
# What is an Opportunity Area?



Opportunity Areas are drawn from consideration of the Problem Arenas, together with the “Menu” of Technologies and Approaches drawn out of the landscaping process.

Opportunity Areas are combinations of technologies and approaches, applicable to certain contexts.

While the landscaping process and the identification of Problem Arenas both involve significant elements of professional judgment and intuition (combined with analysis and peer review), Opportunity Areas are more susceptible to detailed analysis.



*for example:*

- action research into small-scale providers of water in urban context
- market analysis

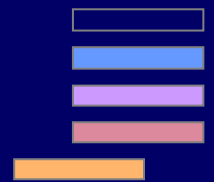
*for example:*

- a mix of interventions at pilot level combining market development with local production of goods and technical advice to small scale providers

*for example:*

- roll-out of large-scale production of goods at national level in conjunction with a marketing campaign

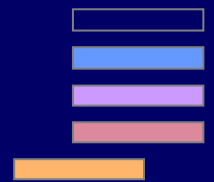
## 4.2 Common aspects of the Opportunity Areas



A number of bundles of technologies and approaches repeat across several contexts, for example,

- Provision or upgrading of on-site latrines with self-help approaches - repeats three times in rural sanitation, small town sanitation and urban slum sanitation respectively;
- Total Sanitation approaches - repeats twice in rural sanitation and small town sanitation respectively;
- Franchised water vending – repeats twice in small town water supply and urban slum water supply respectively;
- Household water treatment - repeats twice in small town water supply and urban slum water supply respectively.

# Examples of promising technologies that are common to more than one Opportunity Area



## Hygiene

- Non-soap alternatives for hand-washing
- Mass media technologies such as wind-up radios, for hygiene promotion

## Sanitation

- Improved on-site latrine designs (non-stick or easy-clean latrine slabs and pans); cost reductions to ventilate improved pit (VIP) latrine designs;
- School-friendly sanitation facilities including child-friendly latrine designs and facilities for menstrual management
- Bio-additives to digest contents of pit latrines (blue-skies technology)

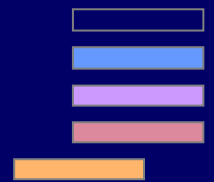
## Water supply

- Very low cost rainwater harvesting and household level water storage technologies
- Reduced cost technologies for groundwater access and water lifting (including true village-level operation and maintenance (VLOM) pumps and solar pumping)
- Improved devices to reduce burden of water carrying
- Point-of-use and community-level treatment technologies for removal of pathogens, arsenic, fluoride and iron – low cost, easy maintenance with solutions for safe disposal of by-products
- Improved metering in piped supplies
- Improved leakage detection and limitation in piped supplies

## Water resources

- Remote monitoring and telemetry for rainfall, river levels, lake levels and groundwater levels

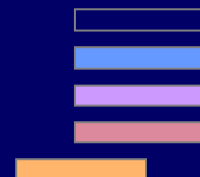
# Examples of promising approaches that are common to more than one Opportunity Area



- **Innovative financing mechanisms** – including cross subsidies and targeted micro-loans to allow poorer consumers to access goods and services; and targeted micro-financing (to low service providers, often from the informal sector, to access capital to operate and supply goods and services).
- **Output based aid** – to enhance performance efficiency of utilities and private sector by creating incentives.
- **Commercial marketing** – to increase demand for goods and services targeted to the poor including services by the private sector and those of public utilities.
- Institutional and organizational **reform** – to improve performance efficiency of utilities and community based water providers. This may be encouraged by formation of associations. Knowledge and information support systems – to improve technology selection and enhance system performance.
- Networking for **capacity development** and **learning** including learning alliances and learning projects – to enhance capacity building, documentation, dissemination and replication. Partnership approaches – civil society/community organizations, public and private sector coming together to resolve challenges.
- **Flexibility** in regulations, standards and tariffs – to adapt formal service provision for poor consumers with very small amounts of disposable incomes.
- **Franchised approaches** – (for both water supply and sanitation services) to develop branded, quality assured products adapted for markets including very poor consumers with very small amounts of disposable incomes.
- **Multiple use approaches** – seeking to address a broader range of needs relating to water use, beyond the narrow conventional focus on health benefits, to include small-scale economic activities.
- **Minimum water use** – as an approach in water-scarce areas of the world, but also to make systems more viable in all areas, as well as to water-borne sewerage systems.

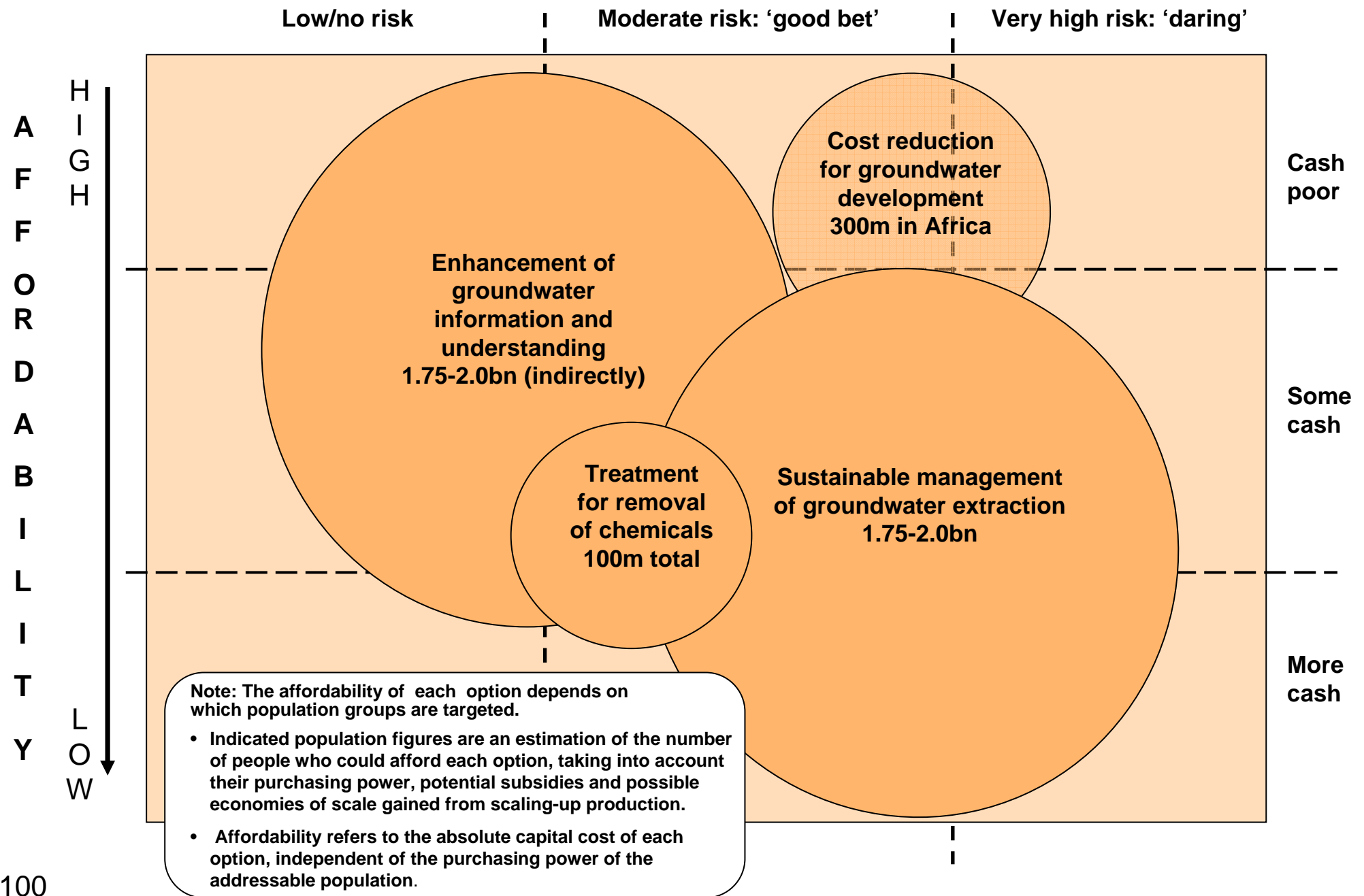
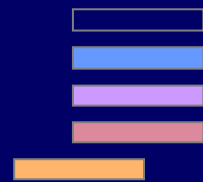


# 4.3 The main Opportunity Areas

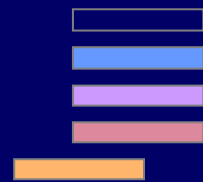


Problem Arenas	Opportunity Areas – actionable packages of approaches and technologies
<b>i. Populations served or potentially served by groundwater</b>	<ul style="list-style-type: none"> <li>• cost-reduction for groundwater development</li> <li>• sustainable management of groundwater extraction</li> <li>• enhancement of groundwater information and understanding</li> <li>• treatment for chemical removal</li> </ul>
<b>ii. Sanitation for rural populations</b>	<ul style="list-style-type: none"> <li>• provision/upgrading of on-site household solutions through self-help (repeats in small town and urban)</li> <li>• non-latrine based excreta disposal</li> <li>• Total Sanitation approach (repeats in small towns)</li> <li>• school sanitation (repeats in small towns)</li> </ul>
<b>iii. Sanitation for small town populations</b>	<ul style="list-style-type: none"> <li>• provision/upgrading of on-site household solutions through self-help (repeats in rural and urban)</li> <li>• Total Sanitation approach (repeats in rural)</li> <li>• entrepreneurial sanitation service provision</li> <li>• school sanitation (repeats in rural)</li> </ul>
<b>iv. Sanitation for urban slum populations</b>	<ul style="list-style-type: none"> <li>• condominial/reduced cost sewerage</li> <li>• provision/upgrading of on-site household solutions through self-help (repeats in rural and small towns)</li> <li>• commercially franchised sanitation and hygiene points</li> <li>• entrepreneurial services for disposal of faecal sludge</li> <li>• bio-additive for on-site sanitation solutions</li> </ul>
<b>v. Water supply for small town populations</b>	<ul style="list-style-type: none"> <li>• improvement of existing water service provision</li> <li>• commercially franchised water vendors</li> <li>• point of use household water treatment (repeats in urban)</li> </ul>
<b>vi. Water supply for urban slum populations</b>	<ul style="list-style-type: none"> <li>• utility reform for universal service (including cross-subsidies)</li> <li>• commercial/NGO franchising and intermediation for slum retailing</li> <li>• complementary services for the very poor and destitute</li> <li>• point of use household water treatment (repeats in small towns)</li> </ul>
<b>vii. Populations dependent on water carrying</b>	<ul style="list-style-type: none"> <li>• improved household water carrying</li> <li>• household and contracted water carrying and/or vending</li> <li>• rainwater harvesting and storage</li> </ul>
<b>viii. Populations who would benefit from improved hygiene behaviors</b>	<ul style="list-style-type: none"> <li>• demand acceleration for commercial provision of hygiene products</li> <li>• social marketing for hygiene behavior change for the poor</li> <li>• non-soap low-cost alternative hand-washing products</li> </ul>

# i. Summary of Opportunity Areas for groundwater – approximately population set 1.75 to 2 billion people

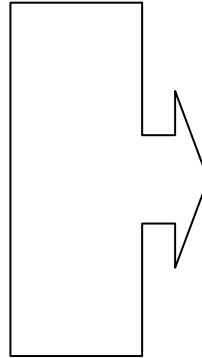


# i. Opportunity Areas for populations served, or potentially served, by groundwater



Approximately 500m people rely on open wells. 1bn people use handpumped groundwater sources. Another 250m use, or could use motor-pumped or solar pumped wells.

- In Africa it is estimated that 1m new boreholes need to be drilled before 2015; conventional drilling costs in Africa are extremely high, at US\$10-15,000; very low cost drilling methods have a proven track record in niche areas, and there is significant scope for expansion.
- Groundwater-based rural and small town piped water supplies can be easier to manage and less costly than surface water.
- Groundwater knowledge, understanding and management are generally weak.
- Some specific groundwater constituents (arsenic, fluoride) present significant health problems or cause people to reject safe sources (e.g. iron).



Alternative strategies, combining different approaches and technologies, focusing on:

- cost reduction, especially in Africa;
- improved management of hand-pumped and motor-pumped supplies;
- capacity-building of groundwater; professionals, through better monitoring, information, and understanding;
- treatment for specific toxic constituents (arsenic and fluoride)

## Cost reduction for groundwater development

- Potential to enable access for 300m in Africa alone.
- Very low cost technologies are known, but need refinement.
- Ideal for small enterprises and for multiple-use. Good experience in Niger, Nigeria, Madagascar.
- Small reductions in conventional drilling costs could have a large impact. Technical solutions are known.
- Emphasis on public sector re-orientation and capacity-building.

## Sustainable management of groundwater extraction

- Key to sustainability in target groups of rural and small town populations.
- Widespread failure of handpump O&M puts this option in question; nevertheless, models exist, and pilots could be taken to scale.
- An alternative to communal handpumps is motorized pumping solutions, including solar pumping.

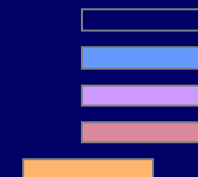
## Enhancement of groundwater information and understanding

- Can indirectly benefit enormous numbers.
- Groundwater is the least understood of all water resources.
- Much valuable information from drilling programs is lost because of the weak supervision and/or the absence of management information systems.
- Little monitoring of groundwater quality and water levels takes place.

## Treatment for removal of chemicals

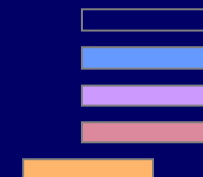
- Problem affects significant numbers, especially in rural systems.
- Household solutions are possible, but communal (managed) solutions are probably more likely to succeed.
- In the case of arsenic and fluoride, field test kits need to be more widely available for monitoring.
- In all cases, technologies exist, but management, maintenance and filtrate disposal pose challenges.

# i. Promising technologies and approaches packages for populations served or potentially served by groundwater



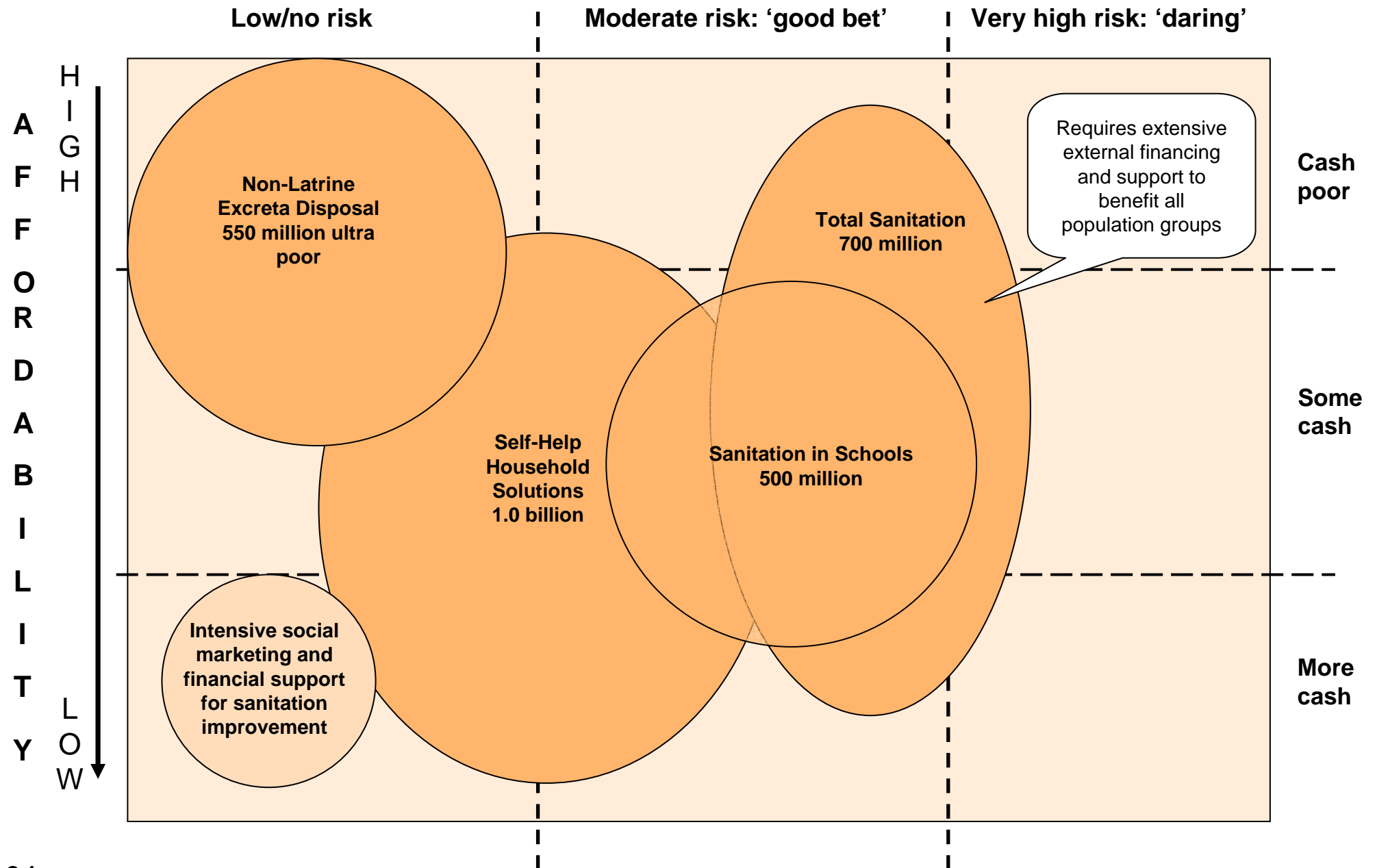
Opportunity Areas	Cost reduction for groundwater development	Sustainable management of groundwater extraction	Enhancement of groundwater information and understanding	Treatment for removal of chemicals
<b>Estimated Addressable Populations</b>	<ul style="list-style-type: none"> <li>• Approx 300 million in Africa alone where the issue of high cost is most acute, and access/coverage worst.</li> </ul>	<ul style="list-style-type: none"> <li>• 1.75-2.0bn – all those using or potentially using groundwater; particularly relevant for rural and small town populations.</li> </ul>	<ul style="list-style-type: none"> <li>• 1.75-2.0bn – all those using or potentially using groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>• 100 million or more exposed to toxic levels of As or F, or levels of Fe which lead to source rejection (often in favor of bacteriologically inferior supplies).</li> </ul>
<b>Existing Technologies</b>	<ul style="list-style-type: none"> <li>• Mainly medium and large conventional drilling rigs.</li> </ul>	<ul style="list-style-type: none"> <li>• Public domain handpumps; some electric, diesel, and solar pumps.</li> </ul>	<ul style="list-style-type: none"> <li>• Manual instrumentation for water level monitoring; laboratory analysis of water quality; paper-based or non-existent information systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Household or Community level coagulation/settlement and filtration systems.</li> </ul>
<b>Innovative Technologies</b>	<ul style="list-style-type: none"> <li>• Very low cost technologies (auguring, sludging, jetting, percussion).</li> </ul>	<ul style="list-style-type: none"> <li>• More widespread use of motorized pump systems; large scale promotion of solar pumping technology.</li> </ul>	<ul style="list-style-type: none"> <li>• Modern sensors; satellite telemetry; computerized management information systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Some further refinement still needed to increase efficacy, reduce cost, and make maintenance easier.</li> </ul>
<b>Existing Approaches</b>	<ul style="list-style-type: none"> <li>• Contracting out from local Government to private contractors. Direct supervision by under-resourced local Govt.</li> <li>• Often donor funded; users rarely pay more than a token contribution to capital cost.</li> </ul>	<ul style="list-style-type: none"> <li>• Community management of handpump systems (often failing).</li> <li>• (Less commonly) motorized pumping systems with community-employed caretaker.</li> </ul>	<ul style="list-style-type: none"> <li>• Largely ineffective public sector management of data acquisition, storage and dissemination.</li> </ul>	<ul style="list-style-type: none"> <li>• Household management; communal management; public authority management.</li> </ul>
<b>Innovative Approaches</b>	<ul style="list-style-type: none"> <li>• Entrepreneurial very-low cost drilling.</li> <li>• Flexibility in (out-dated) national standards.</li> </ul>	<ul style="list-style-type: none"> <li>• Privately managed motorized and piped systems for large villages and small towns.</li> <li>• Privately maintained or properly supported (community managed) handpump systems – institutional support mechanisms.</li> </ul>	<ul style="list-style-type: none"> <li>• Private sector management of data and information services.</li> </ul>	<ul style="list-style-type: none"> <li>• Private sector (community-managed) operation and maintenance.</li> </ul>

# i. Promising technologies and approaches packages for populations served or potentially served by groundwater



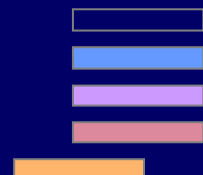
Opportunity Areas	Cost reduction for groundwater development	Sustainable management of groundwater extraction	Enhancement of groundwater information and understanding	Treatment for removal of chemicals
<b>Nature of impacts</b>	<ul style="list-style-type: none"> <li>• Largely in terms of improved access and coverage for the unserved or poorly served. Groundwater is generally a safe (untreated) resource if developed properly. Time saving and convenience benefits. Possible economic benefit from improved access.</li> </ul>	<ul style="list-style-type: none"> <li>• The key to sustainability of water services in extensive areas of Africa and Asia which are dependent on groundwater. Time saving and convenience benefits.</li> </ul>	<ul style="list-style-type: none"> <li>• Indirect, but hugely significant in terms of targeting investment, reducing costs, and enhancing likelihood of sustainability.</li> </ul>	<ul style="list-style-type: none"> <li>• Health improvement: reduction of arsenicosis, fluorosis, and diarrhoeal infections (the latter caused by users rejecting iron-rich ground water in favor of polluted surface water).</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>• Risk of environmental impacts if the resource is poorly understood or poorly managed.</li> </ul>	<ul style="list-style-type: none"> <li>• Relatively few proven examples exist of sustainable groundwater O&amp;M in the developing world. The main risk of intervention therefore is financial.</li> </ul>	<ul style="list-style-type: none"> <li>• The only risk is the financial risk of failing to deliver effective groundwater management information systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Inability to manage treatment systems.</li> <li>• Environmental risks from disposal of filtrate.</li> </ul>
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>• The key issue is the maintenance of the pumping technology. This requires sound management and financing, with strong support from public and private sectors.</li> </ul>	<ul style="list-style-type: none"> <li>• The single most important aim of intervention here is the provision of sustainable services. If new approaches and technologies succeed in institutional and financial terms, the prospect for sustainability is high.</li> </ul>	<ul style="list-style-type: none"> <li>• Key issue is the technical and managerial capacity and resourcing of groundwater authorities or private sector information managers.</li> </ul>	<ul style="list-style-type: none"> <li>• Maintenance is the key. The usual issues of functional sustainability apply (motivation, maintenance system, recurrent cost recovery, and on-going support).</li> </ul>
<b>Leverage</b>	<ul style="list-style-type: none"> <li>• Present high drilling costs in Africa may drive Governments and donors out of this sector. Conversely, significant cost reductions could raise the profile of this key sub-sector.</li> </ul>	<ul style="list-style-type: none"> <li>• The attractiveness of intervention in this area is that it is specifically targeted at safeguarding the (expensive) investments made to increase coverage.</li> </ul>	<ul style="list-style-type: none"> <li>• Less easy than some direct interventions which are perceived to meet immediate needs, but perhaps more suited to external support agencies with highly developed ICT skills.</li> </ul>	<ul style="list-style-type: none"> <li>• As a health-related matter, possibly greater than for some other areas of possible intervention through increased donor support.</li> </ul>

# ii. Summary of Opportunity Areas for sanitation for rural populations - approximate population set 2.1 billion





## ii. Opportunity Areas for rural sanitation



- Total rural population without improved sanitation estimated to be some 2.1 billion people, most of whom live in Asia (1.6 billion).
- The proportion of the population living in rural areas is expected to reduce slowly, due to urbanization, but will still remain significant by 2015.
  - About 10 -20% live in chronic poverty and are unlikely to be able to afford to pay for any improved services.
  - Sanitation is often a low priority in rural areas, but can be a significant health risk due to open-air defecation.
  - In some societies women and girls in rural areas suffer from cultural taboos regarding sanitation that can be detrimental to their health.
  - Existing systems are almost entirely on-site (latrines); some communal facilities exist, but often suffer from poor management.
  - In many countries in south Asia excreta is an important economic resource.

Alternative strategies, combining different approaches and technologies, both innovative and focusing on known, but under-utilized interventions.

Differentiated by:

- user groups – targeting poor and less poor
- onsite rather than offsite solutions
- cost/affordability
- water required for operation

### Provision/Upgrading of household solutions through 'self-help'

- Targeting large segment of poorer rural households.
- Based on on-site rather than off-site sanitation solutions.
- Existing designs/materials need to be improved to lead to step-change in unit cost, performance and acceptability.
- Existing demand creation must be reinforced and accelerated with innovative approaches.
- Improved access to finance essential part of package.

### Non-Latrine-based excreta disposal

- Targeting the poorest populations who have zero prospect of funding onsite improvements.
- Shallow burial of excreta.
- Water not required for operation.
- Requires acceptance and ongoing commitment to approach by local policy-makers.
- Public health benefits, but end-users will need ongoing motivation and monitoring.

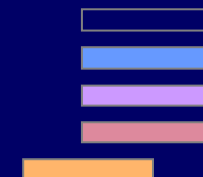
### Total Sanitation approach

- Promotes improved Total Sanitation\_(demand creation) through community self-help and local neighborhood and local government financing schemes.
- Recent successes exist (Maharashtra) through use of innovative approaches learned by experience.
- Strategy still requires long-term monitoring to measure true benefits and impacts.
- 'Total' behavioral change programs require very long-term commitment and ongoing monitoring.

### School sanitation

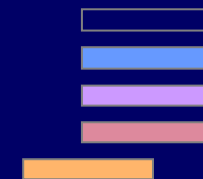
- Schools known to be key entry-point for learning benefits of sanitation, long-term behavior change and sanitation ladder.
- Knock-on benefits in female school attendance, resulting in educational and economic benefits for whole families, and in strong ongoing demand creation.
- External financing and planning essential for start-up.
- Long-term O&M costs can be problematic.

## ii. Opportunities: promising technologies and approaches packages for sanitation for rural populations



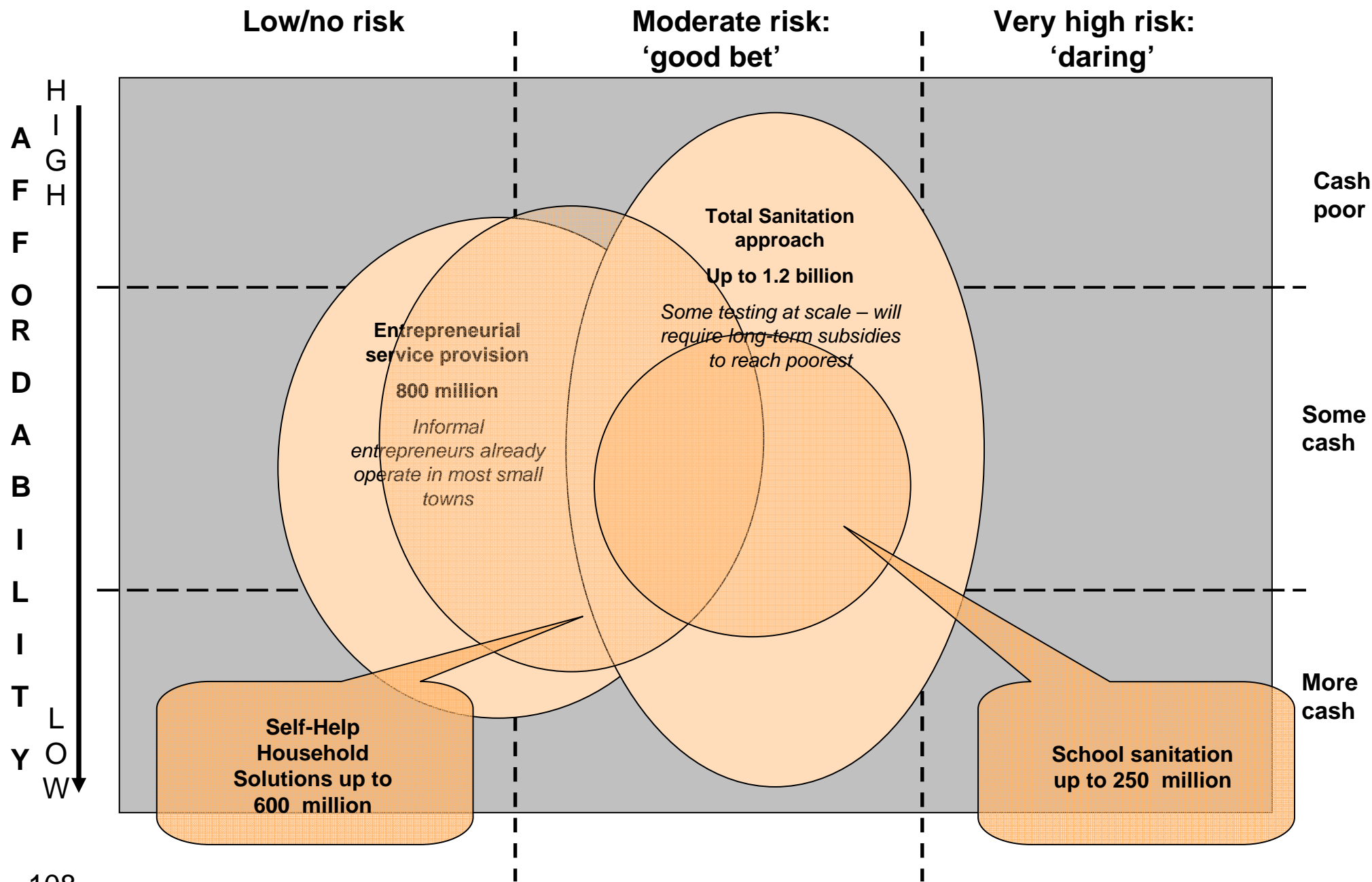
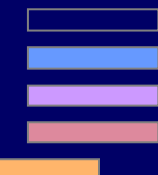
Opportunity Areas	Provision/Upgrading of household solutions through 'self-help'	Non-Latrine based Excreta Disposal	Total Sanitation Approach	School Sanitation
<b>Estimated Addressable Population</b>	<ul style="list-style-type: none"> <li>Likely to benefit up to 50% of rural population, (about 1.0 billion), but excludes the ultra poor.</li> </ul>	<ul style="list-style-type: none"> <li>Actionable for ultra poor and populations having little or no purchasing power; approximately one quarter of the unserved (550 million).</li> </ul>	<ul style="list-style-type: none"> <li>Realistically would apply in about one third of all rural populations (700 million). Best suited for concentrated villages; reaches cross-section of all groups.</li> </ul>	<ul style="list-style-type: none"> <li>Target up to 500 million school children; indirect benefit of influencing other family members.</li> </ul>
<b>Existing Technologies</b>	<ul style="list-style-type: none"> <li>Sanplats, VIP latrines, pour-flush latrines standard design/materials.</li> </ul>	<ul style="list-style-type: none"> <li>Shallow burial – using hoes, shovels, sticks for burial.</li> </ul>	<ul style="list-style-type: none"> <li>Existing technologies promoted – no new or standardized technologies prescribed.</li> </ul>	<ul style="list-style-type: none"> <li>Sanplats, VIP latrines, pour-flush latrines, standard design/materials.</li> </ul>
<b>Innovative Technologies</b>	<ul style="list-style-type: none"> <li>Non-stick, plastic, glass reinforced plastics, Ecosan (costs need to be order of magnitude lower), composting of excreta.</li> </ul>		<ul style="list-style-type: none"> <li>Low-cost (wind-up) radios to assist dissemination programs.</li> </ul>	<ul style="list-style-type: none"> <li>Non-stick, plastic, glass reinforced plastics, Ecosan (costs need to be order of magnitude lower).</li> </ul>
<b>Existing Approaches</b>	<ul style="list-style-type: none"> <li>Demand creation through public health awareness, social marketing, participatory methods, demonstration systems, recycling.</li> </ul>	<ul style="list-style-type: none"> <li>Virtually none, because of not being accepted as a serious alternative to 'improved' sanitation. Is now promoted as part of Total Sanitation programs to eliminate open defecation.</li> </ul>	<ul style="list-style-type: none"> <li>Accelerated and continuous demand creation through social and commercial marketing, Requires financial support, and external planning.</li> </ul>	<ul style="list-style-type: none"> <li>Need to develop more child friendly designs.</li> <li>Existing school sanitation programs include hygiene promotion linked to demonstration facilities; inter-departmental coordination.</li> </ul>
<b>Innovative Approaches</b>	<ul style="list-style-type: none"> <li>Expansion of entrepreneurial-based sanitation services. Innovative local materials cost/procurement models. Women accepted as masons/constructors. Targeted cash/kind assistance Commercial marketing in densely populated contexts.</li> </ul>	<ul style="list-style-type: none"> <li>Promoting acceptance of this approach amongst policy-makers as a serious option. Raising awareness of public health benefit of reducing open defecation.</li> </ul>	<ul style="list-style-type: none"> <li>Focus on entire community not individual households. Requires demonstrations of collective benefit and high-levels of interaction. Financing mechanisms to include subsidies for poorer groups.</li> <li>Inter-sectoral coordination with health, education and local government departments.</li> </ul>	<ul style="list-style-type: none"> <li>Focus on demand creation. Emphasis on curriculum integration. Linking to families and broader community for ownership and management responsibility,</li> </ul>

## ii. Opportunities: promising technologies and approaches packages for sanitation for rural populations

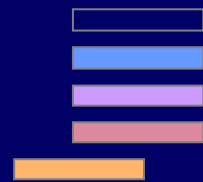


Opportunity Areas	Provision/Upgrading of household solutions through 'self-help'	Non-Latrine based Excreta Disposal	Total Sanitation Approach	School Sanitation
<b>Nature of Impacts</b>	<ul style="list-style-type: none"> <li>• Self-help can lead to better health, privacy, dignity, sense of status, and further benefit as households move up the sanitation ladder.</li> </ul>	<ul style="list-style-type: none"> <li>• Largely health and environmental sanitation benefits through elimination of open-air defecation.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved current and future health, dignity, privacy. Small economic benefit through recycling of solid waste materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved current health, privacy, dignity, female school attendance. Big improved future economic benefit through female education. Indirect beneficial influence on school family households.</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>• Low risk as self-motivation to improve living environment is strong. Some risk of poorly designed systems failing. Risk of entrepreneurial pit emptying not being economically viable.</li> </ul>	<ul style="list-style-type: none"> <li>• Success depends on adequately funded awareness programs and commitment and flexibility of local disseminators and policy-makers.</li> </ul>	<ul style="list-style-type: none"> <li>• Risks associated with continuous funding streams required for aspects of approach and buy-in of local politicians, traditional leaders and government. Risk of lack of importance attached to concept.</li> </ul>	<ul style="list-style-type: none"> <li>• Success depends on commitment/ability to invest and manage adequately, ideally carried out in parallel with Total Sanitation programs.</li> </ul>
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>• Good chance of sustained change and improvement if linked to self-improvement of housing and associated status, enhanced by local neighborhood/government promotional programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainability will depend on long-term motivation and monitoring, because no obvious end-user perceived benefit without improved awareness.</li> </ul>	<ul style="list-style-type: none"> <li>• Behavioral change requires unflinching total commitment, dedication, and monitoring. Successful Total Sanitation experience shows whole community involvement and belief to be vital.</li> </ul>	<ul style="list-style-type: none"> <li>• Weak without ongoing finance, since no/low budgets within schools. But good entry-point for sustainability, both through community organization and political/religious self-help groups.</li> </ul>
<b>Leverage</b>	<ul style="list-style-type: none"> <li>• Financial and innovative support for improving designs, and significantly lowering costs, can leverage activities of local entrepreneurs.</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate investment for persuading policy-makers to accept the value of this approach, and for funding wages of program disseminators, all linked to incentives for local communities.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential for leveraging donor/public funds only where strong success models exist. Local private sector may pick up on some elements, such as recycling.</li> </ul>	<ul style="list-style-type: none"> <li>• Donors increasingly recognizing importance of this approach. Provides possible linkages between WS&amp;H and education and health budgets, thereby leveraging public funding.</li> </ul>

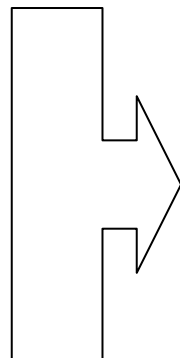
### iii. Summary of Opportunity Areas for small town sanitation – approximate population set 1.2 billion (750 million without services)



# iii. Opportunity Areas for small town sanitation



- Small town population amounts to some 1.2 billion people including 750 million without access to improved sanitation.
- Current services include combination of on-site and off-site systems; relatively few (highly subsidized) sewer systems exist and even fewer with waste water treatment; some communal systems – tend to often be poorly managed.
- Sanitation and hygiene are often not prioritized; this might change if potential value of urine and excreta residues were to be accepted and used.
- Demand is differentiated - small (richer) segments of towns and larger (poorer) populations.
- Better understanding demand for sanitation is important as it is often more of a priority for women.
- Hygiene promotion as the key to behavior change.
- Hygiene promotion is often done through NGO inputs, but other drivers (convenience, privacy, status) seem more important.



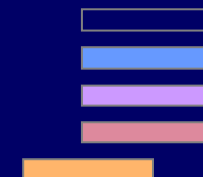
- Alternative strategies, combining different approaches and technologies.
- Differentiated by:
- on site versus off-site solutions
  - cost/affordability
  - water required for operation
  - level of management required

- Total Sanitation Approach**
- Can reach all socio-economic population groups in towns through different services.
  - Requires joint action by all actors (municipality, NGOs, private sector and users) to improve the situation.
  - Integrated approach which looks at all sanitation aspects, but primarily at excreta disposal.
  - Experience exists, especially in South Asia, but further piloting is needed which, if successful, can be a real breakthrough.
  - Will need subsidies for the poorer groups within population.

- Entrepreneurial sanitation service provision**
- Can reach large cross-section of population, except for very poorest, unless subsidized.
  - Informal entrepreneurial approaches exist but could benefit from:
    - development of low cost and easy to clean latrine models;
    - better active supply chains and flexible financing mechanisms;
    - improved technical and marketing capacity of entrepreneurs;
    - broader marketing support;
    - more and better financing facilities for small-scale providers.

- A number of Opportunity Areas for sanitation from other contexts also apply to small towns, these include:
- franchised communal facilities - (toilets and bathing facilities (urban slum); this may also be facilities managed by specific users groups receiving some benefits;
  - improved utility service and coverage (urban slum water supply);
  - provision or upgrading of on-site latrines through self-help strategies (rural sanitation);
  - schools sanitation approaches (rural sanitation).

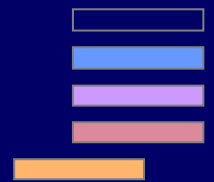
### iii. Opportunities: promising technologies and approaches packages for sanitation in small towns



Opportunity Areas	Total Sanitation approach	Entrepreneurial service provision
<b>Estimated Addressable Population</b>	<ul style="list-style-type: none"> <li>• Total unserved population of 750 million, as well as remaining population (450 million) who would benefit from cleaner environment and better services.</li> </ul>	<ul style="list-style-type: none"> <li>• Some 600 million (80% of total unserved population of 750 million) most of which will be best served with a private latrine, and an additional 200 million having facilities, but facing pit emptying problems.</li> </ul>
<b>Existing Technologies</b>	<ul style="list-style-type: none"> <li>• A wide range of technologies exist for excreta disposal (dry systems to water based sewer systems) and solid waste.</li> </ul>	<ul style="list-style-type: none"> <li>• Pit latrines, VIP, pour-flush, septic tanks</li> <li>Emptying devices: buckets, vacuums.</li> </ul>
<b>Innovative Technologies</b>	<ul style="list-style-type: none"> <li>• Cost reduction of sewer systems (e.g. condominial systems), wet and dry toilets (locally produced non stick, fiberglass, ecosan etc.) is needed to enhance performance and impact.</li> </ul>	<ul style="list-style-type: none"> <li>• Low-cost simple solutions for both facilities and emptying devices (cost reduction and hygienic handling and disposal of excreta).</li> <li>• Research required to develop and test low cost (dry) options.</li> </ul>
<b>Existing Approaches</b>	<ul style="list-style-type: none"> <li>• Participatory methodologies such as PHAST.</li> <li>• Capacity development through exchange visits.</li> <li>• Improved integrated city planning.</li> </ul>	<ul style="list-style-type: none"> <li>• Training of local masons e.g. in sanitation construction.</li> <li>• Sanitation marts (supply chains).</li> <li>• Hygiene promotion through social and commercial marketing.</li> </ul>
<b>Innovative Approaches</b>	<ul style="list-style-type: none"> <li>• Leadership development.</li> <li>• Partnership arrangements.</li> <li>• Credit systems and subsidies.</li> <li>• Training of entrepreneurs.</li> <li>• Supply chain development.</li> <li>• Learning alliances to enhance cost reductions and stimulate learning and documentation across small towns nationally.</li> </ul>	<ul style="list-style-type: none"> <li>• Sanitation marketing based on stimulating incremental improvements (sanitation ladder).</li> <li>• Training entrepreneurs in sanitation marketing and implementation.</li> <li>• Supply chain improvement.</li> <li>• Access to credit facilities from banks and other mechanisms such as women's credit groups.</li> <li>• Targeted subsidies.</li> </ul>

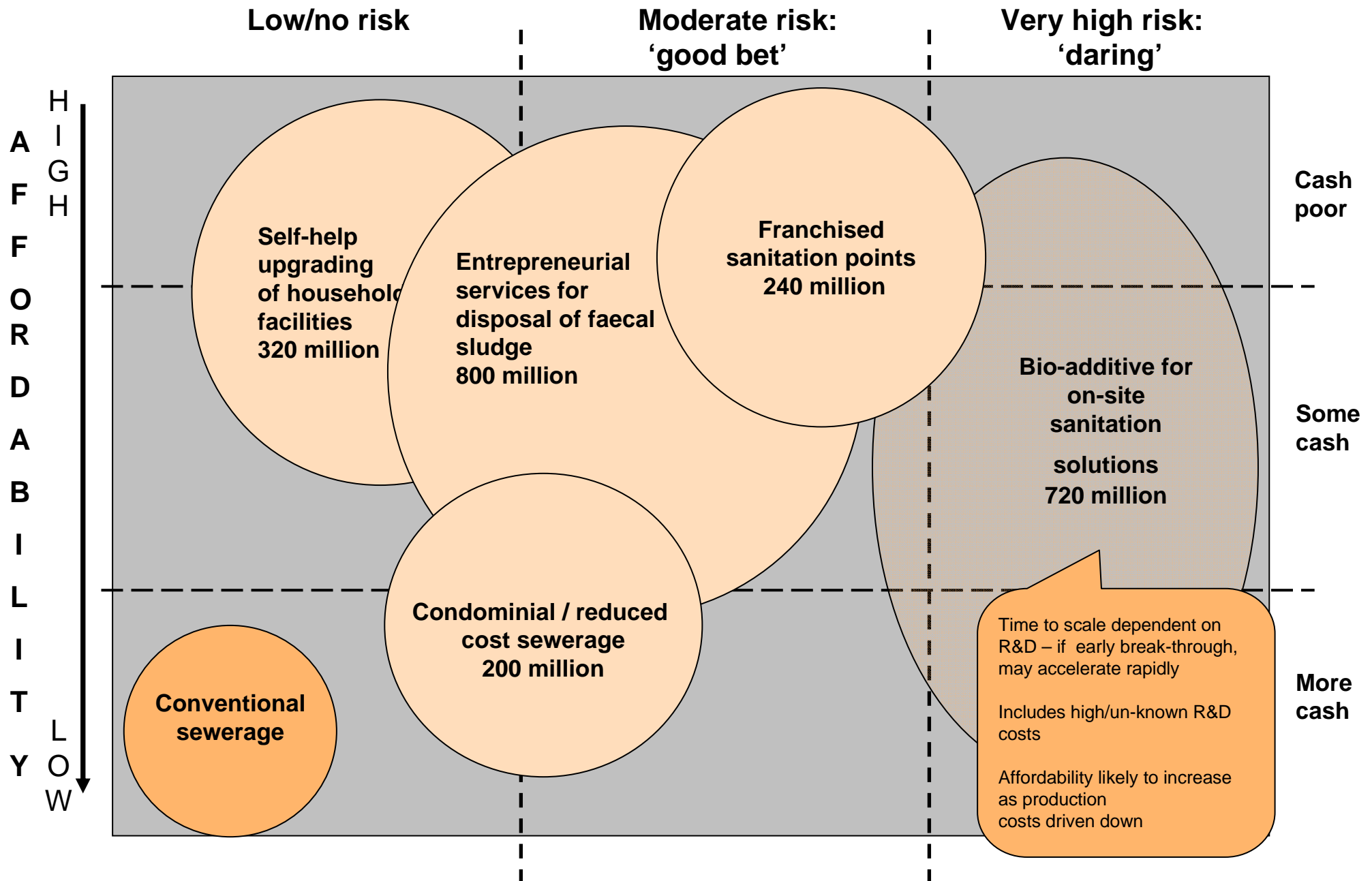
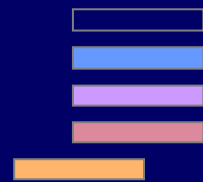


### iii. Opportunities: promising technologies and approaches packages for small town sanitation

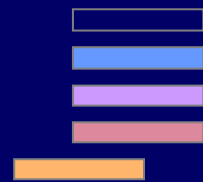


Opportunity Areas	Total Sanitation approach	Entrepreneurial service provision
<b>Nature of impacts</b>	<ul style="list-style-type: none"> <li>• Health, dignity and environmental benefits for community. Target group includes entire population with emphasis on those without facilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Health, dignity and environmental benefits for community. Target groups: people without facilities and with facilities that need maintenance.</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>• Strong external driver/initiation; success relies on partial subsidies. Some risk of not reaching the poorest, who tend to be less well organized.</li> </ul>	<ul style="list-style-type: none"> <li>• Low risk if politicians accept 'polluter pays' principal; High risk of not reaching the poor without subsidies and demand creation.</li> </ul>
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>• Maintenance and use of facilities may not be sustained unless facilities meet user needs and open field defecation is eliminated. Financial sustainability requires subsidies for the poorest.</li> </ul>	<ul style="list-style-type: none"> <li>• With improved awareness of importance and convenience of sanitation, demand for services will be self-sustaining, provided supply chain works and loans can be obtained.</li> </ul>
<b>Leverage</b>	<ul style="list-style-type: none"> <li>• If more successful cases were to be established, many governments/donors may be willing to support this model.</li> </ul>	<ul style="list-style-type: none"> <li>• Donors and governments will be encouraged to provide support for credits if good/efficient services are delivered and costs are reduced.</li> </ul>

# iv. Summary of Opportunity Areas for urban slum sanitation - approximate population set 800 million

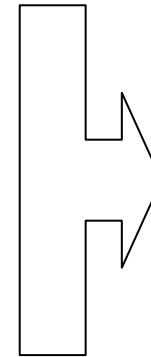


# iv. Opportunity Areas for urban slum sanitation



Total global slum population without improved sanitation estimated to be some 800 million people:

- Conventional sewered networks generally only serve a tiny proportion of the urban poor.
- Some 70% of the urban poor can (potentially) afford lower cost services (either off-site, networked connections or, principally, improved on-site solutions).
- About 30% live in chronic poverty and are unlikely to be able to afford to pay for improved services, but could potentially afford lower cost options.
- Primary demand for improved water supply, especially improved access; lower demand for sanitation.



Alternative strategies, combining different approaches and technologies

Differentiated by:

- on site vs. off-site solutions
- cost/affordability
- water required for operation

## Condominial /reduced-cost sewerage

- Targeting higher income-end of urban slum population, in regularized slums.
- Requires flexible approaches to design, construction and operation.
- Needs good collaboration between residents and authorities/ utilities.
- Some experience already exists, e.g. Pakistan, Brazil.

## Provision/Upgrading of on-site household solutions through self-help

- Targeting large segment of poorer households.
- Based on on-site sanitation solutions.
- Existing designs and materials can possibly be improved.
- Demand creation and improved access to financing are essential.

## Commercially franchised sanitation and hygiene points

- Potential to reach the very poorest segments of the population.
- Suitable in very high density slums and for populations unable to afford on-site latrines.
- Commercial approach with emphasis on branded quality.
- Existing NGO/CBO (community-based organization) success stories.

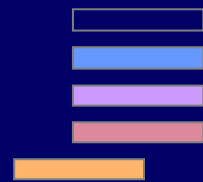
## Entrepreneurial services for disposal of faecal sludge

- Simple mechanical emptying of latrines; reduces need for manual emptying and promotes dignity for low castes.
- Safe disposal of resulting sludge is potentially problematic.
- Requires viable market.
- Opportunities for entrepreneurship in pit emptying.
- Pilots in Africa & Asia.

## 5. Bio-additives for on-site sanitation solutions

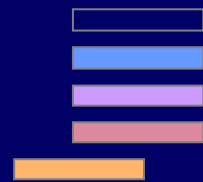
- If taken to market could revolutionize on-site solutions for huge numbers of the poor.
- Blue-sky technology with massive breakthrough potential.
- Could revolutionize on-site solutions.
- Could lead to increased productive uses for excreta.

# iv. Opportunities: promising technologies and approaches packages for urban sanitation



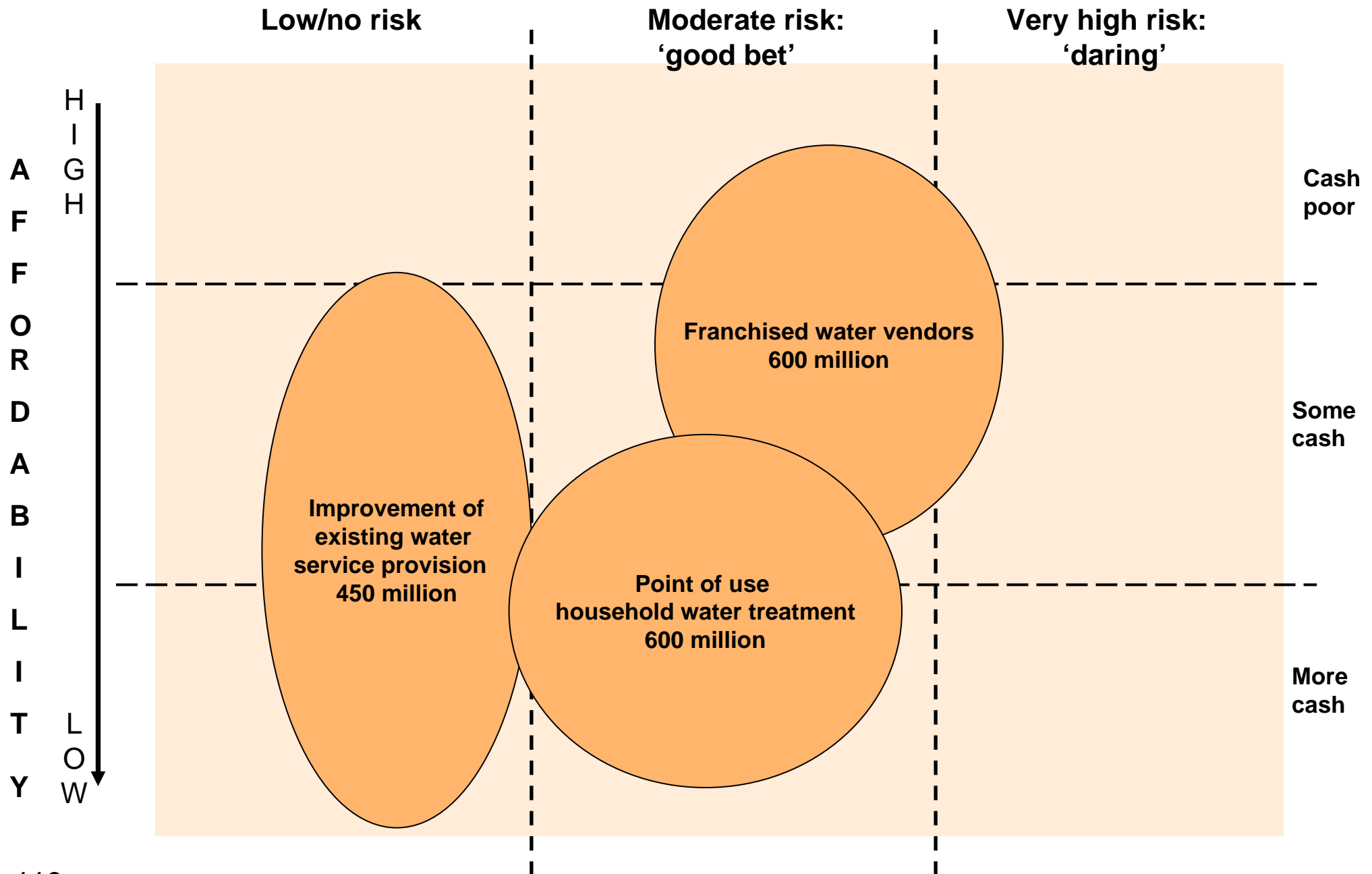
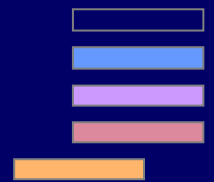
Opportunity Areas	Condominial / reduced cost sewerage	Provision/Upgrading of household solutions through 'self-help'	Commercially franchised sanitation and hygiene points	Entrepreneurial services for disposal of faecal sludge	Bio-additive for on-site sanitation solutions
<b>Estimated Addressable Populations</b>	<ul style="list-style-type: none"> <li>• Approx 200 million, comprising some higher income residents in regularized slums.</li> </ul>	<ul style="list-style-type: none"> <li>• 320 million comprising approx 40% of the higher-end urban poor.</li> </ul>	<ul style="list-style-type: none"> <li>• Approx 240 million; about 30% of the poorest slum population.</li> </ul>	<ul style="list-style-type: none"> <li>• 800 million or more with on-site facilities in dense slums.</li> </ul>	<ul style="list-style-type: none"> <li>• 720 million; 90% of slum population using on-site solutions.</li> </ul>
<b>Existing Technologies</b>	<ul style="list-style-type: none"> <li>• Low-cost sewerage designs including condominial systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Pit/ventilated/pour-flush latrines.</li> </ul>	<ul style="list-style-type: none"> <li>• Block pit/pour-flush latrines and septic tanks or sewer connections; including shower facilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Vacutug and / or mechanical / manual pit emptying. Needs dissemination.</li> </ul>	
<b>Innovative Technologies</b>	<ul style="list-style-type: none"> <li>• Potential for alternative designs and new pipe material; e.g. Teflon lining.</li> </ul>	<ul style="list-style-type: none"> <li>• Non-stick pans, light-weight, easy to clean pans and slabs.</li> </ul>			<ul style="list-style-type: none"> <li>• Bio-additive, enzyme or even GM (genetically modified) worm to radically accelerate and improve faecal sludge decomposition.</li> </ul>
<b>Existing Approaches</b>	<ul style="list-style-type: none"> <li>• Community management of planning, design, construction and operation.</li> <li>• Flexible/affordable tariff structures and payment methods.</li> </ul>	<ul style="list-style-type: none"> <li>• Social/commercial marketing to develop designs &amp; encourage uptake.</li> <li>• Promote incremental Improvement.</li> </ul>	<ul style="list-style-type: none"> <li>• Social/commercial marketing to encourage uptake.</li> <li>• Public subsidies may be required for initial set-up.</li> </ul>	<ul style="list-style-type: none"> <li>• NGO-assisted establishment of local entrepreneurs.</li> <li>• Subsidized / commercial loans for capital purchases.</li> </ul>	
<b>Innovative Approaches</b>	<ul style="list-style-type: none"> <li>• Legalizing slums to ensure stable investment markets.</li> <li>• Partnership approaches between resident communities, authorities &amp; utilities.</li> <li>• Adapting national regulations to allow lower technical standards.</li> </ul>	<ul style="list-style-type: none"> <li>• 'San-credit' – small-scale loans, specific to sanitation up-grading.</li> <li>• Adapting national regulations to allow alternative technologies.</li> </ul>	<ul style="list-style-type: none"> <li>• Commercial management of public facilities – branding and quality control.</li> </ul>	<ul style="list-style-type: none"> <li>• Subsidized emptying to maintain clean environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Branded production with commercial distribution and sales networks.</li> <li>• Possible 'piggy-backing' onto existing commercial enterprises.</li> </ul>

# iv. Opportunities: promising technologies and approaches packages for urban sanitation



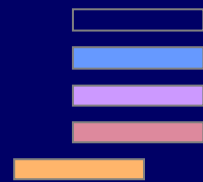
Opportunity Areas	Condominial / reduced-cost sewerage	Provision/Upgrading of household solutions through 'self-help'	Commercially franchised sanitation and hygiene points	Entrepreneurial services for disposal of faecal sludge	Bio-additive for on-site sanitation solutions
<b>Nature of impacts</b>	<ul style="list-style-type: none"> <li>• Largely in terms of improved public health, convenience, dignity and time saved for on-site facility. If sewage disposal is safe, considerable environmental improvements.</li> </ul>	<ul style="list-style-type: none"> <li>• Self-help can lead to better health and impacts relating to dignity, privacy and safety; benefits will increase as households move up the 'sanitation ladder'.</li> </ul>	<ul style="list-style-type: none"> <li>• Direct impact on public health and environmental sanitation in slum neighborhoods; also privacy and dignity gains for poorer residents.</li> </ul>	<ul style="list-style-type: none"> <li>• Great improvement in environment in dense slums. Public health impact for poor residents dependent on overflowing latrines.</li> </ul>	<ul style="list-style-type: none"> <li>• Big potential impact on environment by lessening volume of excreta in slum areas, with associated public health gains. If successful high potential economic benefits from re-use of residues in agriculture.</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>• Successful execution will depend on cooperation between communities and authorities / utilities, combined with strong community cohesion. Maybe unaffordable capital cost.</li> </ul>	<ul style="list-style-type: none"> <li>• Low risk as self-motivation to improve living environment is strong; some risk of poorly designed systems failing and lack of capacity for pit emptying etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Risk of capital investment for financiers; very low income levels of users may make model non-viable in some locations.</li> </ul>	<ul style="list-style-type: none"> <li>• Affordability of service – availability of subsidies for poorest residents. Safe disposal measures needed for resulting sludge – potentially environmental concerns.</li> </ul>	<ul style="list-style-type: none"> <li>• Potentially very high risk on unknown investment costs required for R&amp;D and product development; potential risk of environmental pollution from residues.</li> </ul>
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>• Strong community cohesion required. If right tariff structures and regulatory frameworks can be established, good prospects for financial sustainability. Legalization of slum areas is essential.</li> </ul>	<ul style="list-style-type: none"> <li>• High chances of sustainability if linked to self-improvement of housing. Legalization of slum areas is important driver for self-improvement.</li> </ul>	<ul style="list-style-type: none"> <li>• Financial sustainability linked to willingness to pay and sufficient customer base in each slum location. Management support will be guaranteed through franchising system.</li> </ul>	<ul style="list-style-type: none"> <li>• Promotion required to increase uptake. Costs must be viable in local context, but if demand exists is likely to be sustained on commercial basis.</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainability possible in long-term with local production and distribution; financial viability linked to pushing down unit costs to very low levels.</li> </ul>
<b>Leverage</b>	<ul style="list-style-type: none"> <li>• If proven as a viable option, national governments and/or private sector likely to invest.</li> </ul>	<ul style="list-style-type: none"> <li>• Support to improved designs and demand acceleration can leverage activities of local private sector suppliers</li> </ul>	<ul style="list-style-type: none"> <li>• Establishing and proving model for very low income population may draw in multi-national players to expand /replicate in other countries.</li> </ul>	<ul style="list-style-type: none"> <li>• Local private sector likely to invest if markets can be developed sufficiently.</li> </ul>	<ul style="list-style-type: none"> <li>• Early risk-taking in R&amp;D could leverage large amounts of investment through private and/ or public sector providers after proof of concept stage.</li> </ul>

# v. Summary of Opportunity Areas for small town water supply – approximate population set 1.2 billion





# v. Opportunity Areas for small town water supply



Total small town population estimated at 1.2 billion people according to UN, 2004, but will double in 15 years. Population includes approximately 250 million with house connections but many with inadequate service; about 600 million with handpumps, standposts and protected wells and some 350 million without access to improved water supply.

- Demand is differentiated by socio-economic profile of populations within towns; small (richer) segments of towns and larger less-well off populations who cannot afford high levels of service.
- Potential for economies of scale, particularly if also combining with satellite villages.
- Small towns lack revenue streams, appropriate management models and professional capacities more common in larger urban systems.

Alternative strategies focus on combining technologies and approaches, with special emphasis on strengthening management models and professional capacities to profit from economies of scale and diversified demand. Differentiated by size, location (Latin America has more piped systems), wealth, water source (groundwater versus surface water) and technology (pumped versus gravity supply).

## Improvement of existing water service provision

- Targeting more affluent population with house connections and poorer sections through group connections (standposts shared by a group of households).
- Seeks to improve efficient water use (system repairs, metering and water saving devices).
- Strengthen system management, back-up support and user control.
- Enhance revenue collection including multiple water use and differential tariffs.
- Some successful cases exist of partial improvements but requires more systematic execution.

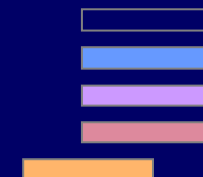
## Commercially franchised water vendors

- Targeting total population with low cost quality water.
- Local entrepreneurs treat and sell drinking water in containers (or house delivery).
- Franchising guarantees quality control and back-up services (possibly by electronic means).
- Access to loans is key component of package.
- Experience with water vending exists, but few include water treatment and none have adequate quality control.
- Potential to benefit from piggy-backing on large-scale private sector logistics and distribution systems.

## Point of use household water treatment

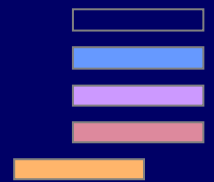
- The poorer sections in the community with some cash may be able to afford household water treatment.
- New treatment technologies are becoming available, some have been researched, with moderate results and others are still under development.
- Major challenge remains to ensure final water quality and continuous user care; if this can be solved at low cost good prospects may exist.

# v. Opportunities: promising technologies and approaches packages for small town water supply



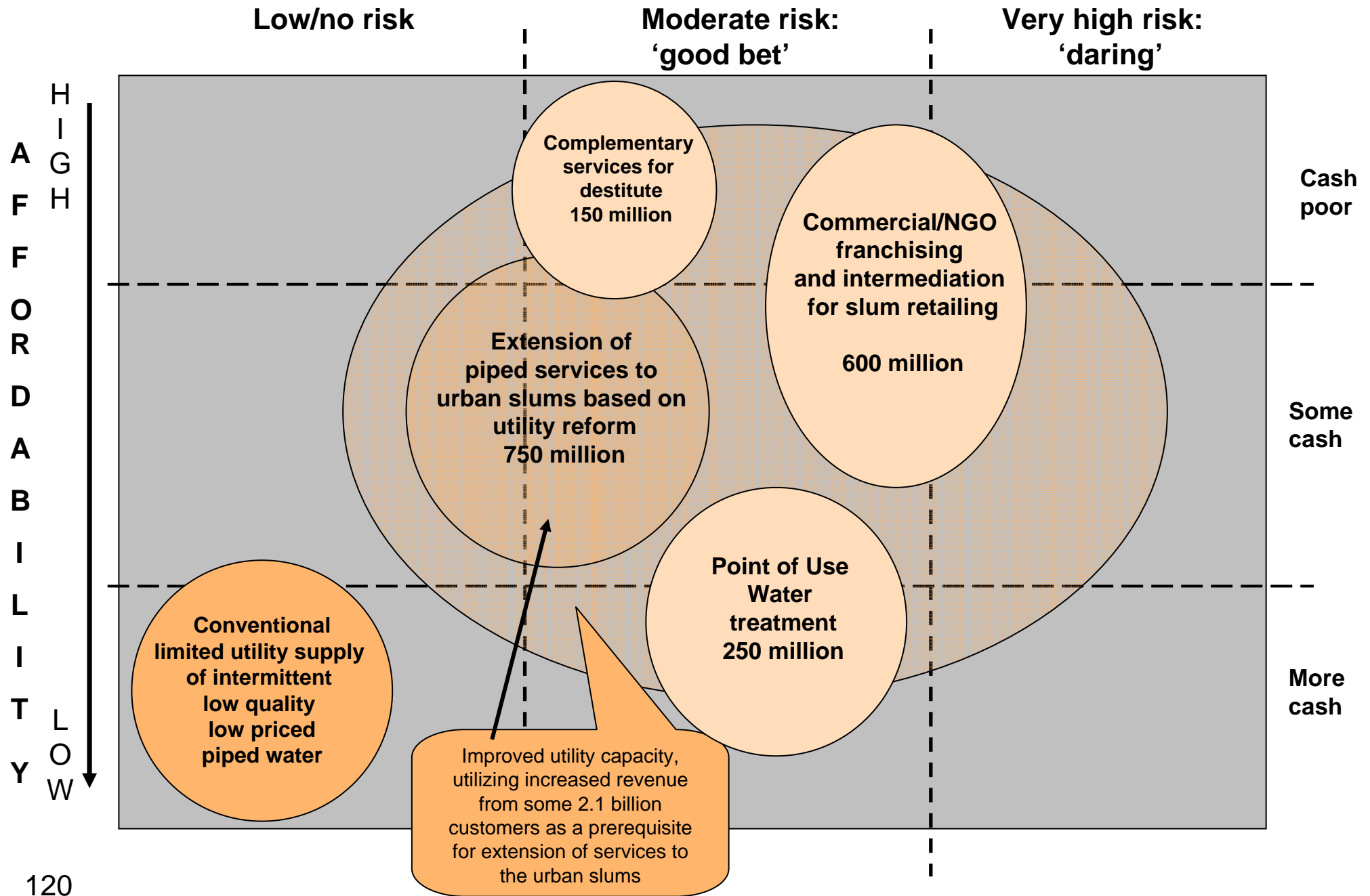
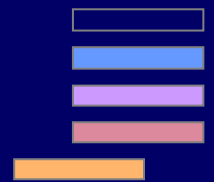
Opportunity Areas	Improvement of existing water service provision	Commercially franchised water vendors	Point of use household Water treatment
<b>Estimated Addressable Population</b>	<ul style="list-style-type: none"> <li>• 450 million people with poorly functioning house connections and public standposts.</li> </ul>	<ul style="list-style-type: none"> <li>• Estimated 700 to 800 million people without access to quality drinking water.</li> </ul>	<ul style="list-style-type: none"> <li>• 600 million people without access to quality drinking water that can potentially afford to treat water.</li> </ul>
<b>Existing Technologies</b>	<ul style="list-style-type: none"> <li>• Water leak detection.</li> <li>• Water saving devices.</li> <li>• Water metering.</li> <li>• Water treatment.</li> </ul>	<ul style="list-style-type: none"> <li>• Water transported by donkeys, carts, trucks. Drawing water from surface and ground sources or from utility network.</li> </ul>	<ul style="list-style-type: none"> <li>• Standard treatments include: Boiling, bio-sand filters, ceramic filters, chlorine, SODIS etc.</li> </ul>
<b>Innovative Technologies</b>	<ul style="list-style-type: none"> <li>• Need for development of lower cost / low-maintenance water metering.</li> </ul>	<ul style="list-style-type: none"> <li>• Small low cost water treatment systems</li> <li>• Very low cost water testing kits for quality control.</li> </ul>	<ul style="list-style-type: none"> <li>• Potentially innovative technologies: arsenic filters, defluoridation units, coating of storage containers.</li> </ul>
<b>Existing Approaches</b>	<ul style="list-style-type: none"> <li>• Public service delivery by municipal water companies – lacks back-up support.</li> <li>• Self supply.</li> <li>• Informal water vendors.</li> </ul>	<ul style="list-style-type: none"> <li>• Municipal water companies (often inadequate service).</li> <li>• Water vendors (but often costly and no quality guarantee).</li> </ul>	<ul style="list-style-type: none"> <li>• Supply chain of ceramic filters.</li> <li>• NGO promotion of bio-sand filters and SODIS.</li> <li>• Hygiene promotion of boiling.</li> </ul>
<b>Innovative Approaches</b>	<ul style="list-style-type: none"> <li>• Greater flexibility in management models (associations of service providers, mixed private-public enterprises, franchising to the private sector etc.).</li> <li>• Group connections.</li> <li>• Learning projects and alliances.</li> <li>• Multiple use approaches.</li> <li>• Minimize water consumption.</li> </ul>	<ul style="list-style-type: none"> <li>• Franchised quality-controlled water treatment and selling.</li> <li>• Small scale water treatment.</li> <li>• Micro credits for providers.</li> <li>• Subsidies targeted to the poorest.</li> <li>• Commercial marketing.</li> <li>• Learning projects.</li> </ul>	<ul style="list-style-type: none"> <li>• Improving supply chain including different options.</li> <li>• Marketing through entrepreneurs.</li> <li>• Low cost water quality testing (services).</li> </ul>

# v. Opportunities: promising technologies and approaches packages for small town water supply

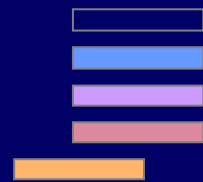


Opportunity Areas	Improvement of existing water service provision	Commercially franchised water vendors	Point of use household Water treatment
<b>Nature of impacts</b>	<ul style="list-style-type: none"> <li>• Largely in terms of improved public health, convenience, and time saved for poorer populations obtaining access to group connections.</li> </ul>	<ul style="list-style-type: none"> <li>• Impact on improved health and some convenience as need for household treatment is overcome.</li> </ul>	<ul style="list-style-type: none"> <li>• Impact on improved health.</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>• Successful execution will depend on attitudes of policy makers and service providers, combined with adequate investments in capacity-building, back-up support and financing.</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate to high risk as it may require legislation, may compete with existing water mafia, will require a good franchising model and users need to be willing to pay for good quality drinking water.</li> </ul>	<ul style="list-style-type: none"> <li>• High risk of failure unless technologies become more reliable and people can more easily test water quality or their equipment. Users need to be willing to pay the cost of replacing components and sustain the effort.</li> </ul>
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>• Good prospects if right tariff structures and incentives can be established. Can be further enhanced by encouraging clustering of municipalities under one service provider.</li> </ul>	<ul style="list-style-type: none"> <li>• High chances of sustainability in view of growing concern of users for water quality and limited alternatives to safe tap water. Quality guaranteed through franchising system.</li> </ul>	<ul style="list-style-type: none"> <li>• Financial sustainability linked to willingness to pay for clean drinking water and absence of safe (lower cost) alternatives.</li> </ul>
<b>Leverage</b>	<ul style="list-style-type: none"> <li>• Improving service models and existing system will allow to reach more people, at similar operational cost hence making soft loans from donors and banks more attractive.</li> </ul>	<ul style="list-style-type: none"> <li>• Some good examples developed in learning projects with approval of government will create experience that will enhance the opportunities for future soft loans to introduce the concept into other geographic areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Person to person promotion may enhance market which may bring the cost down and in case of positive impact donors may subsidize systems for poor households.</li> </ul>

# vi. Summary of Opportunity Areas for urban slum water supply - approx. population set 1.2 billion

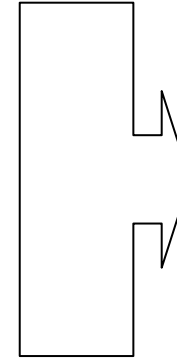


# vi. Opportunity Areas for urban slum water supply

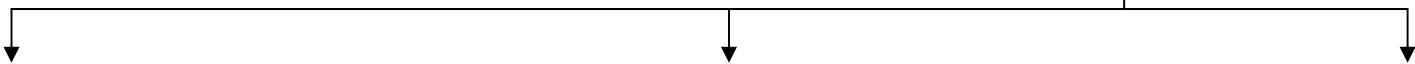


Total urban slum population estimated by UN Habitat to be 1.4 billion by 2015:

- Of this total, 750 million will be unserved in 2015.
- Conventional piped networks serve approx 40% of the urban poor but usually with non-potable water.
- Small scale illegal vendors may also supply water.
- Some 80% of the urban poor can (potentially) afford differentiated piped services of potable water.
- The 20%, 'very poor' and 'destitute' are unlikely to be able to afford to pay for improved services.



Alternative strategies, combining utility reform with franchised or intermediary slum retailing with service and price differentiation by different types of connection and consumption levels including: group/street and informal household connections, prepaid meters, fixed discharge/trickle supplies, kiosks/regulated on-sellers.



## Utility reform for universal service (including cross subsidies)

- Increasing prices and service levels to non-poor customers to provide revenue base for investment in low income areas.
- Business process re-engineering through capacity-building, IT investments and staff incentives.
- Utility recognition of Universal Service Obligation (USO) willing to extend supplies to slums even in advance of legalization of slum areas.
- Flexible approaches to design and construction, including adaptation of technical standards.
- Successful pilots already functioning – for example WSUP; have tended to be the Public Private Partnerships.

## Commercial/NGO franchising and intermediation for slum retailing

- Marketing approach using group/street connections.
- Informal household connections to remote meters.
- Fixed discharge/trickle supplies; prepaid meters.
- Kiosks/regulated on-sellers.
- Regulated franchised water vending and distribution including quality control.
- Access to loans required.
- Existing NGO/CBO success stories, even more sustainable where linked to reformed utilities.
- Experience of water vending exists but does not usually include water treatment and quality control.

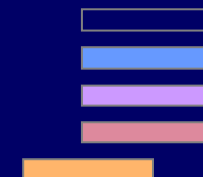
## Complementary services for the 'very poor' and 'destitute'

- Recognizing total poverty and lack of affordability.
- Requires long-term cross-subsidies.
- Ensuring drinking water fountain access at kiosks.

## Point of use household water treatment (see Small towns water supply)

- Relevant to slum populations but only for people at upper end of spectrum who have some cash; i.e. some 200 to 250 million.

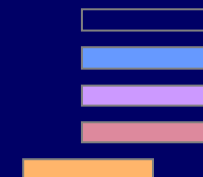
# vi. Opportunities: promising technologies and approaches packages for urban slum water supply



Opportunity Areas	Utility reform for universal service (including cross subsidies)	Commercial/NGO franchising and intermediation for slum retailing	Complementary services for the 'very poor' and 'destitute'
<b>Estimated Addressable Population</b>	<ul style="list-style-type: none"> <li>• Potentially addresses up to 750 million slum dwellers without piped supply; implies addressing entire urban population, including non-slum- receiving poor quality piped water supply (2.1 billion) as part of reform.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential to reach approximately 80% of the unserved slum population in 2015, or about 600 million.</li> </ul>	<ul style="list-style-type: none"> <li>• Up to 20% of the 2015 slum Population un-served, or 150 million, unlikely to be able to afford even differentiated piped water.</li> </ul>
<b>Existing Technologies</b>	<ul style="list-style-type: none"> <li>• Ranging from conventional water treatment and distribution technologies to self-managed point sources, carriers, bags and polluted ground/surface sources.</li> </ul>	<ul style="list-style-type: none"> <li>• Tankers and self-managed point sources.</li> <li>• Intermittent piped supply and stand posts.</li> <li>• Bulk water from utilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Intermittent supply at standposts; polluted sources.</li> </ul>
<b>Innovative Technologies</b>	<ul style="list-style-type: none"> <li>• Range of IT-based management information (Global positioning systems//Management information systems etc.) to empower management.</li> <li>• Access to sustainable potable water through non-conventional pipe network (over ground etc.).</li> </ul>	<ul style="list-style-type: none"> <li>• Point of use water treatment.</li> <li>• Kiosks/regulated on-sellers.</li> <li>• Franchised shower and toilet facilities.</li> <li>• Drinking water fountains at water kiosks.</li> </ul>	<ul style="list-style-type: none"> <li>• Drinking water fountains at water kiosks.</li> <li>• Subsidized use of franchised shower and toilet facilities.</li> </ul>
<b>Existing Approaches</b>	<ul style="list-style-type: none"> <li>• Public provider, 'producer capture' approach.</li> <li>• Refusal to serve 'illegal areas'.</li> </ul>	<ul style="list-style-type: none"> <li>• Vendor purchase or self – management.</li> </ul>	<ul style="list-style-type: none"> <li>• Largely ignored at present.</li> </ul>
<b>Innovative Approaches</b>	<ul style="list-style-type: none"> <li>• Reform of utilities: 24/7 supply allied to a customer oriented marketing approach to ensure cost recovery.</li> <li>• The Water Academy to promote capacity-building for professionals.</li> <li>• Challenge Funds to start the process.</li> <li>• Flexibility in regulation and tariffs to allow cross-subsidize.</li> <li>• Modified technical standards to extend services to un-served.</li> <li>• Adoption of universal service obligation principle.</li> <li>• Efficient water use including household savings and use of alternative sources.</li> </ul>	<ul style="list-style-type: none"> <li>• Franchised selling and distribution of potable water to ensure quality.</li> <li>• Users supplement from other sources.</li> <li>• Partnership approaches.</li> <li>• Efficient water use including household savings and use of alternative sources.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure availability of minimum quantities of water.</li> <li>• Cross-subsidies.</li> </ul>

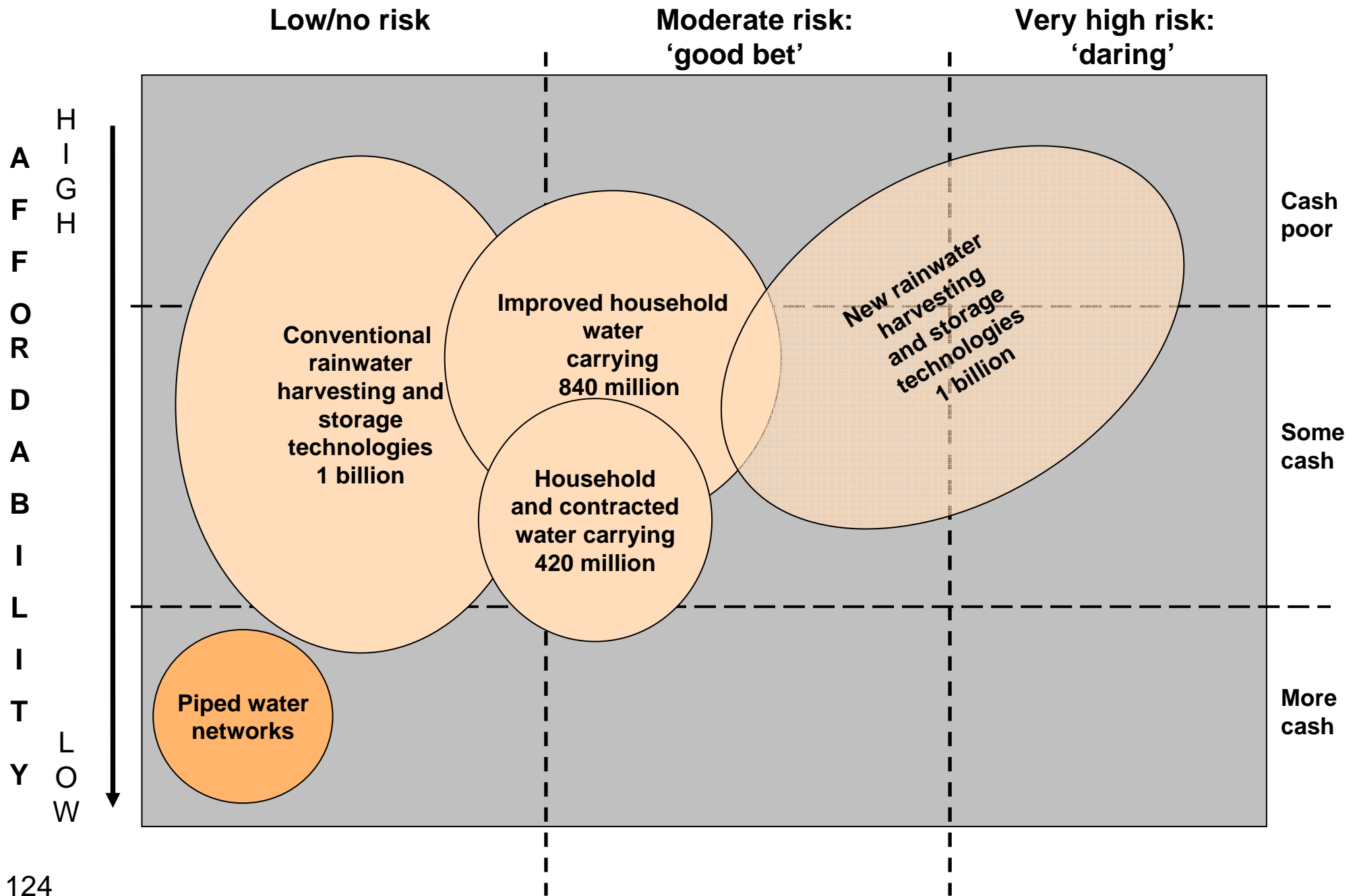
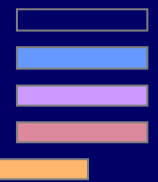


# vi. Opportunities: promising technologies and approaches packages for urban slum water supply

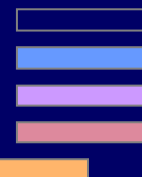


Opportunity Areas	Utility reform for universal service (including cross subsidies)	Commercial/NGO franchising and intermediation for slum retailing	Complementary services for the 'very poor' and 'destitute
<b>Nature of impacts</b>	<ul style="list-style-type: none"> <li>• Improved public health through better water quality and increased supply.</li> <li>• Convenience and time savings accrue to the poor through access to a variety of safe connections.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved health and some convenience as need for household treatment is reduced.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved health, dignity and convenience for destitute.</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>• Success dependent on attitudes of policy makers and service providers and flexibility.</li> <li>• Slums not being recognized for political reasons.</li> <li>• Needs adequate investments in capacity-building, back-up support and financing.</li> <li>• Water scarcity increases.</li> <li>• Increase in wastewater to be addressed.</li> </ul>	<ul style="list-style-type: none"> <li>• Regulation is required.</li> <li>• May compete with existing water mafia.</li> <li>• Requires appropriate franchising model.</li> <li>• Users need to be able and be willing to pay for services including improved drinking water.</li> <li>• Risk of re-contamination in transport or in storage.</li> </ul>	<ul style="list-style-type: none"> <li>• Successful execution will depend on attitudes of policy makers and service providers.</li> <li>• Needs on-going sector reform and regulation.</li> <li>• Some people cannot afford to pay even if subsidized.</li> </ul>
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>• Good prospects if right tariff structures and incentives can be established.</li> <li>• Can be further enhanced by benchmarking of utilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Good prospects through user concern and demand for water quality and restricted or unavailable access to safe tap water.</li> <li>• Guaranteed quality at source through regulation of franchised outlets and services.</li> </ul>	<ul style="list-style-type: none"> <li>• Financial sustainability dependent on cross-subsidy from richer customers.</li> <li>• Dependent on sector reform, appropriate regulations and technologies.</li> </ul>
<b>Leverage</b>	<ul style="list-style-type: none"> <li>• Improved utility service will reach more people, at similar operational cost hence making soft loans from donors and banks more attractive.</li> </ul>	<ul style="list-style-type: none"> <li>• Pilots developed in learning projects with government approval will create experience to enhance opportunities for future soft loans to introduce the concept in other areas.</li> <li>• Regulated and improved operating environment can leverage activities of local private sector suppliers and entrepreneurs.</li> </ul>	<ul style="list-style-type: none"> <li>• Unlikely to attract leveraged finance as is a 'welfare' intervention; cross-subsidies may accrue from reformed utilities.</li> </ul>

vii. Summary of Opportunity Areas for population dependent on water carrying – population set approximately 2.1 billion + relatives



# vii. Opportunity Areas for populations dependent on water carrying



Total global population dependant on water carrying is estimated to be some **2.1 billion women and children**, mainly in rural areas and small towns:

- Young boys are sometimes involved in water carrying but men rarely are; this is typically a female role
- Distances are considerable (from 500m to more than 10 km), causing long term back and neck injuries and negative impacts on health and income (less water available for hygiene, garden, etc)
- Time spent collecting and carrying water considerably reduces time available for: household tasks, child care, education, growing food, income generating activities and rest. Saving time and energy on water carrying would have multiple benefits
- Women are generally poorer than men, and widows, divorced and disabled women are often amongst the poorest of the chronic poor

Alternative strategies, combining different technologies and approaches

Differentiated by:

- improved interventions to reduce carrying burden and its impacts on users health and income
- innovative interventions to bring water closer to homes
- innovative interventions to stimulate entrepreneurial approaches to water carrying

**Note:**

Women and children represent only a proportion of the people in each household. Although strategies to reduce the water-carrying burden would primarily benefit women and children, considerable benefits are likely to accrue to their families as well. Thus, an estimated total of 3.2 billion people relying on distant sources could benefit from alternative water carrying strategies.

**Improved household water carrying**

- Targeting higher income end of rural / small towns population.
- Improved water containers (Hippo-rollers or equivalent technologies).
- Possible use of subsidy / micro-loans for poor households.
- Possibility of local manufacture.
- Links to safe water storage.

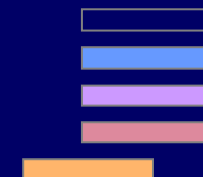
**Household and contracted water carrying and/or vending**

- Intermediate technologies for transport (bicycle trailers, ox and donkey carts) leading to:
- Possible multiple-uses by households for water transport and also for transport of crops, materials, etc.
- Possible entrepreneurial transport and sale of water.
- Increased participation by men in water collection responsibilities.
- Micro-credit, especially for poor, to stimulate demand.

**Rainwater harvesting and storage**

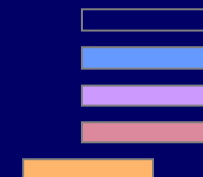
- Potential to reach the poorest segments of the population.
- Potential for local manufacture and sale of hardware.
- Requirement for water transport is reduced for part or all of the year.
- Would greatly improve family quality of life and productivity.
- Possibility of micro-credit, especially for poor, to stimulate demand.

# vii. Opportunities: promising technologies and approaches packages for populations dependent on water carrying



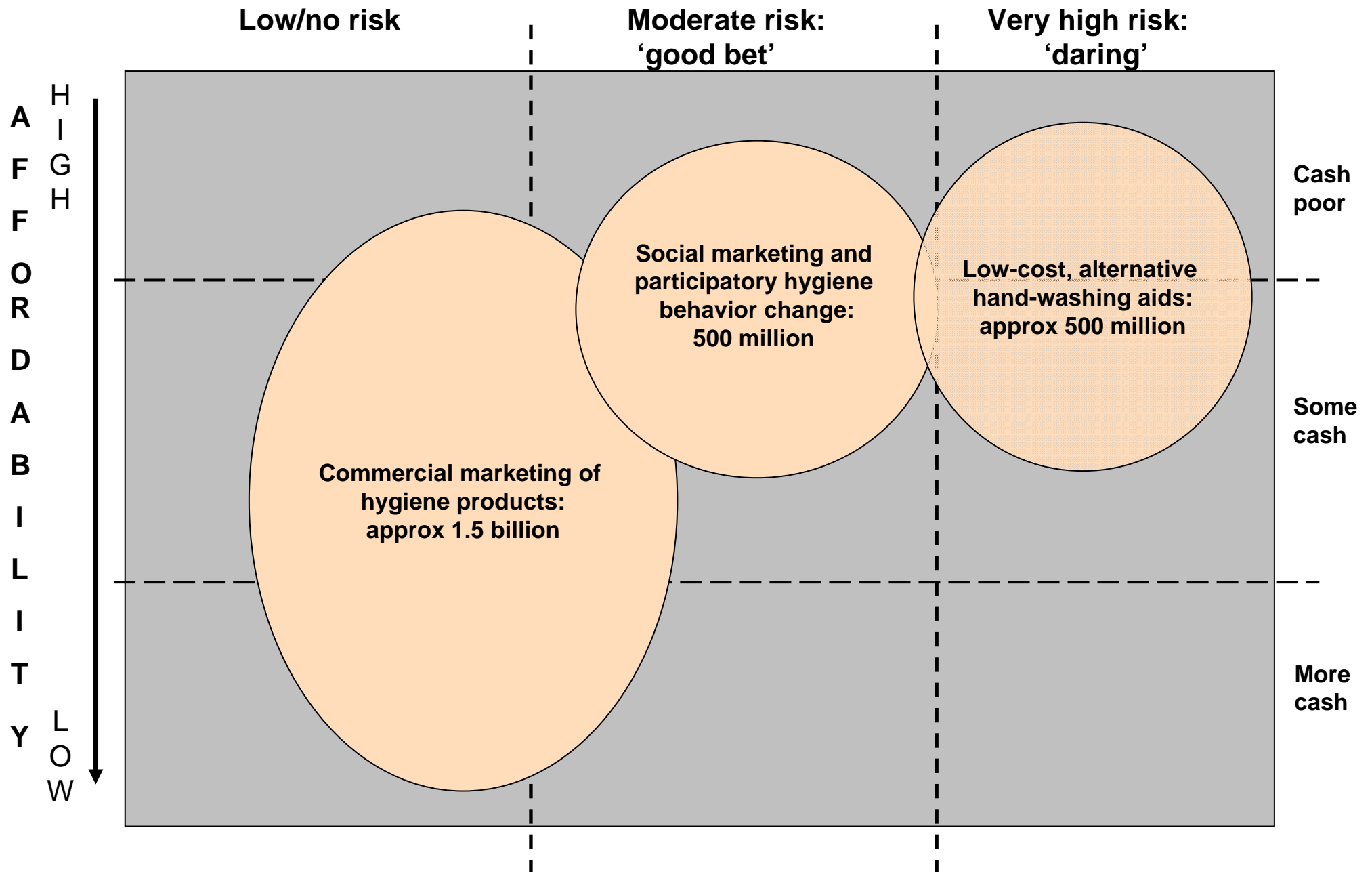
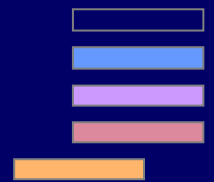
Opportunity Areas	Improved household water carrying	Household and contracted water carrying and/or vending	Rainwater harvesting and storage
<b>Estimated Addressable Population</b>	<ul style="list-style-type: none"> <li>• 840 million or about the 40% richest population having to carry water.</li> </ul>	<ul style="list-style-type: none"> <li>• Approx 420 million or about 20% of people relying on far sources, especially in small towns.</li> </ul>	<ul style="list-style-type: none"> <li>• Around 1 billion can potentially receive a minimum of 4 l/d drinking water (4l/d) &gt; 6 months; 371 million can receive 10l/d all year.</li> </ul>
<b>Existing Technologies</b>	<ul style="list-style-type: none"> <li>• Jerry cans, buckets, clay pots, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Water trucks, donkey carts, bicycles, small handcarts.</li> </ul>	<ul style="list-style-type: none"> <li>• Guttering, corrugated roofing, piping, concrete or plastic rainwater jars, sub-surface or above surface reservoirs.</li> </ul>
<b>Innovative Technologies</b>	<ul style="list-style-type: none"> <li>• Hippo-rollers, new designs for cheaper jerry cans providing safe storage.</li> </ul>	<ul style="list-style-type: none"> <li>• Modified bicycle trailers, hand carts and donkey carts.</li> <li>• Very low cost water quality testing kits.</li> </ul>	<ul style="list-style-type: none"> <li>• Modified existing technologies or new collapsible, robust jars/tanks.</li> </ul>
<b>Existing Approaches</b>	<ul style="list-style-type: none"> <li>• Local production and sale of existing containers.</li> </ul>	<ul style="list-style-type: none"> <li>• Local production and sale of existing technologies.</li> <li>• Some water vendors, especially in small towns.</li> </ul>	<ul style="list-style-type: none"> <li>• Local production through CBOs, women groups.</li> <li>• Training, subsidies through NGOs.</li> <li>•</li> </ul>
<b>Innovative Approaches</b>	<ul style="list-style-type: none"> <li>• Local production and sale of innovative containers.</li> <li>• Social / commercial marketing to encourage uptake.</li> <li>• Subsidies / micro-loans to enable poorer households to afford the technologies.</li> <li>• Possible “piggy-backing” onto existing commercial enterprises.</li> </ul>	<ul style="list-style-type: none"> <li>• Local production and sale of innovative technologies.</li> <li>• Subsidies / micro-loans to enable poorer users to afford these technologies.</li> <li>• Water quality control through vendors.</li> <li>• Regulation of prices through local institutions.</li> <li>• Possible “piggy-backing” onto existing commercial enterprises.</li> </ul>	<ul style="list-style-type: none"> <li>• As for improved water carrying containers, including mass production of low cost collapsible jars/tanks.</li> <li>• Wide promotion of, and training for, rainwater harvesting and storage especially in rural areas and small towns.</li> </ul>

# vii. Opportunities: promising technologies and approaches packages for population dependent on water carrying



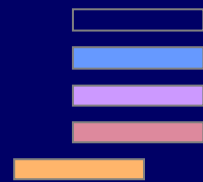
Opportunity Areas	Improved household water carrying	Household and contracted water carrying and/or vending	Rainwater harvesting and storage
<b>Nature of impacts</b>	<ul style="list-style-type: none"> <li>• Reduced burden of water collection and carrying (time and energy, economic impacts).</li> <li>• Improved health and quality of life benefits would potentially accrue to some 840 million women and children.</li> <li>• Benefits would also accrue to their family members.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced burden of water collection and carrying (time and energy, economic impacts).</li> <li>• Improved health and quality of life.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced burden of water collection and carrying (time and energy, economic impacts).</li> <li>• Improvements to water quality and quantity; also improved health, and quality of life.</li> </ul>
<b>Risks / uncertainties</b>	<ul style="list-style-type: none"> <li>• Start-up production costs.</li> <li>• Adoption rates.</li> <li>• Availability of micro-credit.</li> <li>• Continuity of production and maintenance.</li> <li>• May not be available to poorest unless prices decrease.</li> </ul>	<ul style="list-style-type: none"> <li>• Adoption rates by men to relieve women and children of water collection and carrying burden.</li> <li>• Continuity of production and maintenance.</li> <li>• May not be affordable to poorest.</li> <li>• Dependent on entrepreneurial interest for sustained operation and maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• Need for reliable rainfall – unknown long-term consequences of climatic variability for future rainfall patterns.</li> <li>• Water may not be clean enough for drinking without treatment/first flush system.</li> <li>• Most suitable construction materials may not be affordable by poorest.</li> <li>• Acceptability to population.</li> </ul>
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>• Likely to be sustainable if unit costs can be reduced to within range of affordability for poorer groups.</li> </ul>	<ul style="list-style-type: none"> <li>• Likely to be sustainable if customer base established - local production and low operation and maintenance costs will improve prospects.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimal operation and maintenance costs after first flush throughput – likelihood of sustainability therefore high once capital costs have been met.</li> </ul>
<b>Leverage</b>	<ul style="list-style-type: none"> <li>• Support to: improve designs, demand creation and production acceleration can leverage activities of local private sector suppliers and entrepreneurs.</li> </ul>	<ul style="list-style-type: none"> <li>• Support to: improve designs, demand creation and production acceleration can leverage activities of local private sector suppliers and entrepreneurs.</li> </ul>	<ul style="list-style-type: none"> <li>• Support to improve design and range of materials used, demand creation and production acceleration can leverage activities of local private sector suppliers and entrepreneurs.</li> </ul>

# viii. Summary of Opportunity Areas for improved hygiene behaviors - approximately population set 3 billion



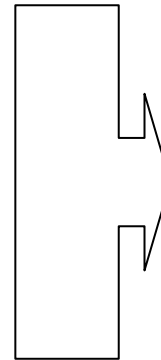


# viii. Opportunity Areas for improved hygiene behaviors



Total population without improved hygiene behavior estimated to be at least 3 billion:

- 1.2bn without proper sanitation; 1bn using potentially unsafe water, and approximately 800 million who have improved facilities but do not practice proper hygiene.
- Roughly 500 million of this total are ultra-poor, with very limited means to purchase hygiene products.
- No reliable global data exists for key practices (hand washing at critical times, hygienic use of latrines and safe water collection, storage and drawing) but studies from several countries show very poor hand-washing practices, including after defecation, as being critical pathways for disease transmission.



- Alternative strategies, combining different approaches and technologies and careful assessment of effectiveness and sustainability
- Strategies must link water supply and sanitation 'hardware' with behavior change (Hygiene Improvement Framework)
- Hand-washing is improved by making it easier
- Differentiated by:
  - culture/country context
  - cost and affordability
  - input requirements

## **Demand acceleration for commercial provision of hygiene products**

- Demand creation for public health through social marketing; mainly mass media.
- Targeting middle and higher income groups amongst the poor.
- Link the public and private sectors to accelerate demand creation and behavior change.
- Link with improved sanitation, water supplies and waste management.
- Build on school hygiene education.

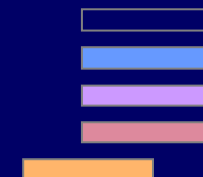
## **Social marketing for hygiene behavior change for the poor**

- Targeting 0.5bn ultra-poor.
- Partnership between government, NGOs and community organizations/ networks.
- Use locally relevant methods including mass media, health clubs, religious/ social networks etc.
- Requires innovative financing and cost-reductions to go to scale.
- Build on school hygiene education.

## **Non-soap, low-cost alternative hand-washing products**

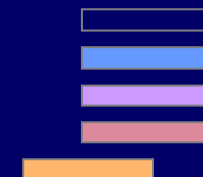
- Targeting the ultra-poor, for whom even locally produced soap is unaffordable.
- Research and development of traditional, natural products and/or new synthetics.
- Must be very low-cost and readily available.
- Promotion and marketing also required.
- 'Blue-sky' technology could have potentially huge impact.

# viii. Opportunities: promising packages of technologies and approaches for improved hygiene behaviors

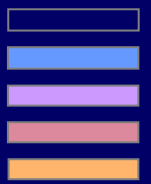


Opportunity Areas	Demand acceleration for commercial provision of hygiene products	Social marketing for hygiene behavior change for the poor	Non-soap, low-cost alternative hand-washing products
<b>Estimated Addressable Population</b>	<ul style="list-style-type: none"> <li>• Approx 1.5bn, both urban and rural, middle and upper level poor.</li> </ul>	<ul style="list-style-type: none"> <li>• Approx 500 million poorest people. Urban easier to reach than rural.</li> </ul>	<ul style="list-style-type: none"> <li>• Approx 500 million poorest people – urban and rural.</li> </ul>
<b>Existing Technologies</b>	<ul style="list-style-type: none"> <li>• Many, such as range of toilet / latrine technologies, soap, hand-washing facilities, waste bins etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Many low-cost latrine technologies, low water-use hand-washing facilities ('tippy-tap' etc), local soap etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Soap is unaffordable for the poorest.</li> <li>• Simple, local 'tippy-tap' hand washing facility may be viable.</li> </ul>
<b>Innovative Technologies</b>	<ul style="list-style-type: none"> <li>• Improvements and spread of alternative sanitation – ecosan, simple sewerage etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Possible link with non-soap hand-washing products.</li> </ul>	<ul style="list-style-type: none"> <li>• Existence and effectiveness of natural, traditional products to be researched and, if potentially cost-effective (very low cost), developed.</li> </ul>
<b>Existing Approaches</b>	<ul style="list-style-type: none"> <li>• Commercial and social marketing relying largely on mass media.</li> <li>• Need better understanding of effectiveness of recent and present strategies.</li> </ul>	<ul style="list-style-type: none"> <li>• Traditional educational approach is in opposition to social marketing and participatory approaches.</li> <li>• Very little already done outside a few small-scale programs, and innovative financing efforts in Bangladesh.</li> </ul>	<ul style="list-style-type: none"> <li>• New synthetic materials as alternative to soap.</li> </ul>
<b>Innovative Approaches</b>	<ul style="list-style-type: none"> <li>• Participatory, community approaches combined with strong private sector involvement – public-private-partnerships and existing commercial sector.</li> <li>• Strategies that mix mass and personal approaches with cost-reductions and social mobilization.</li> <li>• Capacity building and stronger role for entrepreneurs, women's groups, health clubs etc. in promotion.</li> <li>• Focus on men as well as women and children.</li> </ul>	<ul style="list-style-type: none"> <li>• Linking government with NGO and community activities (e.g. community health clubs in Zimbabwe) and social networks.</li> <li>• New forms of cross-subsidy/credit for products.</li> <li>• Combining marketing with other approaches, such as income-creation</li> <li>• Children as key agents of change, linked with school hygiene promotion.</li> </ul>	<ul style="list-style-type: none"> <li>• Widespread promotion through social marketing and distribution through multiple channels.</li> <li>• Very widespread adoption to keep price low.</li> </ul>

# viii. Opportunities: promising packages of technologies and approaches for improved hygiene behaviors

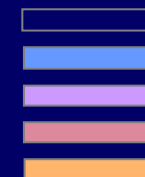


Opportunity Areas	Demand acceleration for commercial provision of hygiene products	Social marketing for hygiene behavior change for the poor	Non-soap, low-cost alternative hand-washing products
<b>Nature of impacts</b>	<ul style="list-style-type: none"> <li>• If hygiene promotion is integrated with environmental sanitation potential health benefits are enormous – diarrhoeal disease plus respiratory etc; most impact on children. Other socio-economic impacts will derive from better health to achieve development ‘lift-off’.</li> </ul>	<ul style="list-style-type: none"> <li>• Linked sanitation and hygiene improvements will yield both very significant health and other social impacts (especially dignity, privacy and safety for women and girls).</li> </ul>	<ul style="list-style-type: none"> <li>• If effective, low-cost materials, especially those needing little water, can be developed, and promoted through social marketing, health impact could be very significant.</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>• Relatively low risk in areas with growing economies.</li> <li>• Needs good understanding and dissemination of existing positive hygiene promotion experiences.</li> <li>• Promotion messages must be locally appropriate.</li> <li>• Some environmental risk from increased soap use.</li> </ul>	<ul style="list-style-type: none"> <li>• Success depends both on effective social marketing to recognize and develop self-motivated demand and on affordability of products.</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate risk in researching traditional materials – not very high cost.</li> <li>• Potentially higher cost to develop synthetic materials – need for R&amp;D investments.</li> <li>• Potential environmental risk of disposal of new synthetic materials.</li> </ul>
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>• Needs good ‘buy-in’ by private sector and effective mass media campaigns.</li> </ul>	<ul style="list-style-type: none"> <li>• Needs effective partnerships and strong government motivation.</li> <li>• Likely to need long-term financial support for subsidies.</li> </ul>	<ul style="list-style-type: none"> <li>• Needs widespread local production and distribution of locally appropriate products.</li> <li>• Financial viability dependent on pushing down costs to very low levels.</li> </ul>
<b>Leverage</b>	<ul style="list-style-type: none"> <li>• Good potential to leverage inputs from private sector as market size increases.</li> </ul>	<ul style="list-style-type: none"> <li>• New habits formed and gradual economic uplift provides market for commercial hygiene products and demand for better facilities.</li> </ul>	<ul style="list-style-type: none"> <li>• If benefits can be proven, donors and national governments may step-in to support subsidies.</li> </ul>



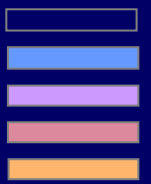
The problems associated with inadequate water, sanitation and hygiene services are huge and complex, but there are real opportunities to make a difference:

- Action in the WS&H sector creates new opportunities and freedoms for the poor, including better health, time and energy saving; privacy, dignity and safety; and improved livelihoods and education.
- When all actors cooperate together, real change can take place; national governments must take ownership of the processes, but there is a role for all – users, the private sector and civil society.
- There are no silver bullets, but plenty of opportunity for the scaled-up application of best practice which has been proven at pilot scale.
- Some of the combinations of approaches and technologies that have been tried in the past, or are being applied now, show real promise, but may require further support and innovation in areas such as financing. There are a number of new, innovative and un-tested technologies that can be explored.
- The traditional balance between rural and urban populations is changing, and a new and significant category of small town populations is emerging; meeting the challenges in these contexts will require different combinations of approaches and technologies.
- Many barriers to progress in WS&H lie outside the sector. Weak institutions and poor governance affect the ability to “do business” effectively, to bring about beneficial change, and to focus on poverty reduction.
- One of the more critical barriers to understanding the sector, and a weakness of current approaches, is the paucity of reliable data that goes beyond broad-brush figures for coverage; efforts to resolve this data gap will be complex and costly, but would be enormously useful to the overall goal of improving sustainable services.



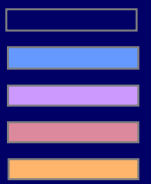
Africa AHEAD	Africa Applied Health Education and Development (an NGO based in South Africa)
ARI	acute respiratory infection
CINARA	<i>Centro de Investigación y Desarrollo en Agua Potable, Saneamiento Básico y Conservación de Recursos Hídricos</i> (a resource centre based in Cali, Colombia)
CARE	an international NGO network
CBO	community-based organization
CHC	community Health Club
CPRC	Chronic Poverty Research Centre, UK
DALYs	disability adjusted life years
EF	enabling factor
GDP	gross domestic product
GM	genetically modified
HDI	human development index
IFIs	International financing institutions
IRC	International Water and Sanitation Centre, The Netherlands
JMP	Joint Monitoring Program on Water and Sanitation(WHO/ UNICEF)
MDG	millennium development goals
NGO	non governmental organization
ODA	Official Development Assistance
O&M	operation and maintenance

# Acronyms (cont.)



PA	problem area
PHAST	Participatory Hygiene and Sanitation Transformation
PSIRU	Public Services International Research Unit, UK
R&D	research and development
SDA	service delivery approach
SSP	small scale provider
SWAP	sector wide approach
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	United States agency for international development
USO	Universal Service Obligation
VIP	ventilate improved pit
VLOM	village level operation and maintenance
WHO	World Health Organization
WS&H	water, sanitation and hygiene
WSUP	water and sanitation for the urban poor





The following references represent some of the more important documents and other information sources (websites etc.) that were consulted by the review team; the list is by no means intended to be an exhaustive representation of the sources reviewed by the team.

## Financing

OECD DAC Trends in ODA to water supply 1973-2004: <http://www.oecd.org/dac/stats/>

Aid for Water Supply and Sanitation, The International Water Academy, Secretariat of Development Assistance Committee, OECD, 2004

Slaymaker, T. and Newborne, P. (2004). *Implementation of water supply and sanitation programs under PRSPs: synthesis of research findings from sub-Saharan Africa*. Overseas Development Institute and WaterAid, London.

[http://www.odi.org.uk/wpp/publications\\_pdfs/Watsan\\_PRSP\\_text\\_ResearchReport.pdf](http://www.odi.org.uk/wpp/publications_pdfs/Watsan_PRSP_text_ResearchReport.pdf)

Annamraju, S., Calaguas, B. and Gutierrez, E. (2003), *Financing Water and Sanitation* ODI Policy Brief No. 4, Water Aid

Mehta, M. and Knapp, A. (2004), *The challenge of financing sanitation for meeting the Millennium Development Goals Vol. 1 of 1* World Bank

Winpenny, J. (2003), *Financing Water For All: Report of the World Panel on Financing Water Infrastructure* Global Water Partnership, World Water Council, 3rd World Water Forum

## Poverty

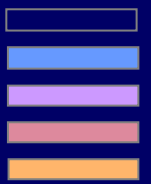
The Chronic Poverty Report 2004-05, Chronic Poverty Research Center (2004),

Note : a new chronic poverty report is being written at the moment, according to James Webster's discussion with David Hulme, former Director of the CPRC

The Chronic Poverty Research Centre (CPRC): <http://www.chronicpoverty.org>

CK Prahalad and SL Hart: "The fortune at the bottom of the pyramid"

CK Prahalad & A Hammond: "Serving the world's poor, profitably"



## **Water resources and climate**

FAO CLIMWAT (rainfall data): <http://www.fao.org/ag/AGL/AGLW/climwat.stm>

Rosegrant, M., Cai, X. and Cline, S. (2002), *Global Water Outlook to 2005 Averting an Impending Crisis* IFPRI/IWMI

ODI Water Policy Program. (2002) *The 'Water Crisis': Faultlines in global debates* ODI Water Policy Brief

Kabat, P. *et al* (eds.) (2002), *Coping with Impacts of Climate Variability and Climate Change in Water Management: A Scoping Paper* International Secretariat of the Dialogue on Water and Climate

## **Sanitation**

Mara, D. (1996). *Low-cost Urban Sanitation*. Wiley, Chichester, UK.

Ellege, M., Rosensweig, F. Warner, D. (2002), *Strategic Report 2. Guidelines for the Assessment of National Sanitation Policies* EHP

WASH, (2005) *Sanitation and Hygiene Promotion Programming Guide*, WSSCC and WHO

WSP (2004), *Ethiopian sanitation strategy to enable 100% adoption of improved sanitation and hygiene* WSP-EA

WSP (2005), *Scaling Up Rural Sanitation in South Asia – lessons learned from Bangladesh, India and Pakistan*

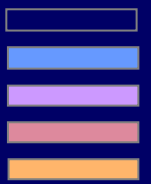
## **Hygiene promotion and health**

Esrey *et al* (1991,1996), *The effects of water supply and sanitation* WHO; Fewtrell, L. and Colford, J.M. (2004), *Water, sanitation and hygiene: Interventions and diarrhea, a systematic review and meta-analysis*,

Discussion paper for the World Bank; Cairncross, S, and Curtis, V. (2003), 'Effect of washing hands with soap on diarrhea risk in the community; a systematic review' in *Lancet Infectious Diseases* 3, 275-281

Cairncross, S. and Valdmanis, V. (2005), 'Water supply, sanitation and hygiene promotion' in Jamison DT, Breman JG, Measham AR *et al.* (eds.) *Disease Control Priorities in Developing Countries* Washington DC: The World Bank (In press).

# Main references (cont.)



## **Hygiene promotion and health cont.**

Klugman (2002, vol. 2); EHP, UNICEF/WES, USAID, World Bank/WSP, WSSCC (2004), *The Hygiene Improvement Framework: A Comprehensive Approach for Preventing Childhood Diarrhea* EHP Joint Publication No. 8, 2004

## **Rural Water Supply**

Breslin, E. (2003) *Demand responsive approaches: Why Sustainability remains elusive*, WaterAid

Davis, J. and Iyer, P. (2002). *Taking sustainable rural water supply services to scale: a discussion paper*. Bank Netherlands Water Partnership, Water and Sanitation Program, USA.

Harvey, P. and Reed, B. (2004). *Rural water supply in Africa: building blocks for hand pump sustainability*. WEDC, Loughborough University.

Lockwood, H. (2002). *Institutional support mechanisms for community-managed rural water supply and sanitation systems in Latin America*. USAID, Washington. (EHP strategic report, 6).

[http://www.ehproject.org/PDF/Strategic\\_papers/SR-6.pdf](http://www.ehproject.org/PDF/Strategic_papers/SR-6.pdf)

Schouten, T. and Moriarty, P. (2003), *Community Water, Community Management: From System to Service in Rural Areas* ITDG Publishing

## **Small Towns**

Rosensweig, F. and Perez E. (2002) *Improving Sanitation in Small Towns in Latin America and the Caribbean* Environmental Health Project, Strategic Report No. 3

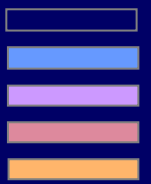
Satterthwaite, D. (2006) *Outside the Large Cities: The demographic importance of small urban centers and large villages in Africa, Asia and Latin America* (in press)

## **Water Treatment**

Managing water from the home, accelerated health gains from improved water supply, WHO (2002), @

Small Community Water Supplies, IRC Technical Paper Series 40 (2002)

# Main references (cont.)



## **Urban water supply**

Asian Water Supplies: Reaching the Urban Poor, McIntosh A, Asian Development Bank and IWA, 2003:

[http://www.adb.org/Documents/Books/Asian\\_Water\\_Supplies/asian\\_water\\_supplies.pdf](http://www.adb.org/Documents/Books/Asian_Water_Supplies/asian_water_supplies.pdf)

Thirsting for Efficiency, The economic and politics of urban water system reform, Shirley MM, Ed, World Bank, 2002

ADB (2002) Beyond boundaries. Weitz and Franceys:

[http://www.adb.org/documents/books/beyond\\_boundaries/beyond\\_boundaries.pdf](http://www.adb.org/documents/books/beyond_boundaries/beyond_boundaries.pdf)

Reclaiming Public Water, Balanya B et al, Corporate Europe Observatory, 2005

Tapping the market: the challenge of institutional reform in the urban water sector, Nickson A and Franceys R, Palgrave Macmillan, 2003

Collignon, B. and Vézina, M. (2000) Independent Water and Sanitation Providers in African Cities: Full Report of a Ten-Country Study:

[http://www.wsp.org/publications/af\\_providers.pdf](http://www.wsp.org/publications/af_providers.pdf)

New Designs for Water and Sanitation Transactions – Making Private Sector Participation Work for the Poor. WSP, PPIAF (2002) pdf:

Serving All Urban Consumers: A marketing approach to water services in low- and middle-income countries. WEDC (2004) Available free of charge from: <http://wedc.lboro.ac.uk/publications>

Very useful research reports and documents can be found from the World Bank Netherlands Water Partnership (BNWP) through

<http://wbln0018.worldbank.org/water/BNWP.nsf/webpage/Publications>

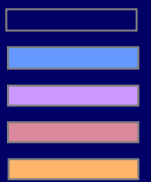
Maria Solo T. (2003), *Independent water entrepreneurs in Latin America The other private sector in water services* World Bank

## **Decentralization**

Ahmad, J. et al (2005). *Decentralization and service delivery*. World Bank, Washington. (Policy research working paper 3603):

[http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=469372&piPK=64165421&menuPK=64166093&entityID=000011823\\_20050512104803](http://econ.worldbank.org/external/default/main?pagePK=64165259&theSitePK=469372&piPK=64165421&menuPK=64166093&entityID=000011823_20050512104803)

# Main references (cont.)



## **Decentralization cont.**

Asthana, A.N. (2003). Decentralization and supply efficiency: the case of rural water supply in Central India. *Journal of Development Studies*. Vol. 39, No.4, April 2003, pp148 – 159.

Asthana, A.N. (2004). *Corruption and decentralization: evidence from India's water sector*. Paper presented at the 30th WEDC International Conference, Vientiane, Lao PDR. <http://wedc.lboro.ac.uk/conferences/pdfs/30/Asthana%20B.pdf>

Boex, J. (2003). *The incidence of local government allocations in Tanzania*. International Studies Program, Working Paper No. 03-11, Andrew Young School of Policy Studies, Georgia State University, USA.

Rosensweig, F. (ed), Fragano, F., Linares, C., Lockwood, H., Rivera, D., Trevett, A., Yepes, G., (2001). *Case studies on decentralization of water supply and sanitation services in Latin America* USAID, Washington. (EHP strategic report, 1).

Rosensweig, F. and Perez, E.A. (1999). *Decentralization of water supply and sanitation systems in Central America and the Dominican Republic*. USAID, Washington. (EHP Activity report, 76):  
[http://www.ehproject.org/Pubs/Activity\\_Reports.htm](http://www.ehproject.org/Pubs/Activity_Reports.htm)

## **Partnerships**

Public Private Partnerships for Water Supply and Sanitation; SECO, SDC, Swiss Re; 2005:  
<http://www.partnershipsforwater.net/en/partners.html>

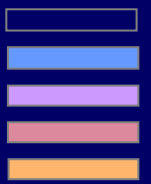
Evans, B., McMahon, J. and Caplan, K. *The Partnership Paperchase: structuring partnership agreements in water and sanitation in low-income communities*, BPD, November 2004: <http://www.bpdws.org>

Plummer, J. (2002) *Focusing Partnerships: A Sourcebook for Municipal Capacity Building in Public-Private Partnerships*. IIEED, London

Caplan, K., Simon, H., Nicol, A., Plummer J., Simpson. S. and Weiser J. (2001), *Flexibility by Design: Lessons from Multi-sector Partnerships in Water and Sanitation Projects* BPD Water and Sanitation Cluster

Curtis, V. (2002), *Health in your hands: Lessons from Public Private Partnership for handwashing with soap* WSP

# Main references (cont.)



## **Partnerships cont.**

Budds, J., and McGranahan, G. (2003), *Privatisation and the provision of urban water and sanitation in Africa, Asia and Latin America* IIED

## **Multiple Use**

Butterworth, J., Malla Reddy Y. V. and Charles Batchelor (2001) *Addressing water needs of the poor in watershed management* Water, Engineering and Development Centre

Moriarty, p (2004) *Water, sanitation and livelihoods based approaches*, World Water Day presentation, <http://www.worldwaterday.org/devpaper.html>

Nicol A. (2000), *Adopting a Sustainable Livelihoods Approach to Water Projects: Implications for Policy and Practice*. ODI Working Paper 133. Overseas Development Institute

## **General**

UN-Habitat, 2003. *Water and Sanitation in the World's Cities – local action for global goals*. Earthscan, London.

United Nations Millennium Project Task Force on Water and Sanitation (2005). *Health, Dignity, and Development: What Will It Take?* Stockholm International Water Institute and the UN Millennium Project, New York. [http://www.unmillenniumproject.org/reports/tf\\_watersanitation.htm](http://www.unmillenniumproject.org/reports/tf_watersanitation.htm)

WELL (1999), *Guidance manual on Water Supply and Sanitation Programmes* DFID.

## **Country / Regional Data**

JMP, <http://www.wssinfo.org/en/welcome.html>

downloadable Human Development Report data, UNDP, <http://hdr.undp.org/statistics/data/>

World Population, The 2004 Revision Population Database, UN Population Division (2004), <http://esa.un.org/unpp/>