

KfW Water Symposium 2009

Financing Sanitation

"Improving Hygiene awareness and sanitation"



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Acronyms

AAWSA	Addis Ababa Water and Sewerage Authority, Ethiopia
AISA	Aguas del Illimani
BMBF	Federal Ministry of Education and Research
BOD	Biological Oxygen Demand
CAERN	Companhia de Águas e Esgotos do Rio Grande do Norte
CLTS	Community-Led Total Sanitation
DC	Developing Country
DTF	Devolution Trust Fund, Zambia
GDP	Gross Domestic Product
GoB	Government of Bolivia
GOI	Government of India
GPOBA	Global Partnership Output Based Aid
GTZ	Gesellschaft für Technische Zusammenarbeit
ha	Hectare
HBC	Hygiene Behavior Change
IBNORCA	Bolivian Institute for Technical Norms and Standards
IC	Industrialised Country
IDA	International Development Association
LAC	Loan Approval Committee
MDG	Millennium Development Goals
MFI	Micro Finance Institution
MOA	Motivation, Opportunities, Abilities
NGO	Non-Governmental Organization
NWASCO	National Water Supply and Sanitation Council, Zambia
ODA	Official Development Assistance
ODF	Open-Defecation Free
ONEA	Office Nationale de l'Eau et de l'Assainissement (Burkina Faso)
PF	Poor Flush
PHAST	Participatory Hygiene and Sanitation Transformation
PPHWS	Public Private Partnership for Handwashing with Soap
PPP	Public Private Partnership
SDC	Sanitation Demand Creation
SPARC	Society for the Promotion of Area Resource Centres
SRF	Sanitation Revolving Fund
STC	Supply and Treatment Centre
SWRESP	Safe Water and Rural Environmental Sanitation Program (Vietnam)
TDS	Total Dissolved Solids
TSC	Total Sanitation Campaign
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
USIT	Urban Sanitation Improvement Team
VIP	Ventilated Improved Pit
WB-WSP-LAC	World Bank Water and Sanitation Program of Latin American Countries
WHO	World Health Organization
WSB	Water Service Board, Kenya
WSP	Water Service Provider
WSTF	Water Sector Trust Fund, Kenya
WWTP	Wastewater Treatment Plant

SESSION 1

Financing Change in Personal Hygiene Behavior and Demand Creation for Sanitation

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ABSTRACT

A rapid review of past experiences in developed countries and the evolution of methods used in developing countries, including successes and failures, in changing hygiene and sanitation behaviors are presented. We examine relative costs and impacts where these data are available and consider institutional arrangements and actors, as well as approaches for linking hygiene behavior change and sanitation demand creation (so called software investments) with hardware investments. Finally, we explore considerations and opportunities for development banks and other financing agencies to become engaged in the scale-up of hygiene behavior change and sanitation demand creation approaches which have demonstrated success.

INTRODUCTION

Investments to improve hygiene and sanitation in developing countries produce substantial health gains (see Annex 1, Table 1) and have been shown to yield important economic benefits¹. *Hygiene behavior change* (HBC) is essential to valorising the health impacts of improved water supply and sanitation infrastructure while *sanitation demand creation* (SDC) is a prerequisite for sustaining sanitation improvements. This paper provides an overview of sanitation demand creation and hygiene behavior change approaches for low income populations in developing countries. It draws from past and present experiences from different regions of the world. The review seeks to inform development banks' investment opportunities for financing these software sanitation investments in developing countries.

The key domains considered by this paper include:

- 1) creating household demand for (investment in) improved sanitation facilities
- 2) promoting sustained use of improved sanitation facilities (stopping open defecation)
- 3) changing key hygiene behaviors in the home, particularly:
 - hand washing with soap at key times
 - safe disposal of infant feces
 - safe drinking water use and storage.

Useful behavior change background and concepts

Behavior change strategies must consider at least three essential elements: i) individuals making the change must have sufficient *motivation* (*M*) to change; ii) any necessary materials, tools, information, and ingredients, referred to as *opportunities* (*O*), to make and sustain the change must be accessible to individuals; iii) individuals must possess the

¹ See Economics of Sanitation Initiative reports (WSP-EAP2008) and Cairncross & Valdmanis (2006).

requisite *abilities*, resources, and skills (A) to take advantage of available change opportunities². The *MOA* framework has value as a flexible diagnostic tool to understand existing sanitation adoption and usage behaviors, habits and routine practices for hand washing, child stool disposal, and safe water use and storage, and as a framework for developing sanitation demand creation and hygiene behavior change programs. Theories and practice from the fields of health behavior, behavior change communications, social science, consumer behavior and economics, marketing, psychology, risk perception, and more recently neuroscience, have and continue to provide knowledge and new insights into individual behavior.

Common ingredients and elements of behavior change approaches for hygiene and sanitation include: communications campaigns, participatory learning, social (mass, community) mobilization, consumer education, health education, and use of incentives and sometimes sanctions. Nearly always for sanitation demand creation, and occasionally for hygiene behaviors, the above elements must also be effectively coupled and coordinated with supply-side strategies to address lack of opportunities and abilities to access appropriate affordable services and products for the target behavior. These might include strategies that: (i) reduce household transaction costs in accessing good products and services, (ii) expand supply chains to reach target populations, (iii) improve the product/service offer to better match identified needs, purchase power, situation and preferences of low income households (e.g., by changing service levels, miniaturizing, changing pricing structures, introducing new payment options, etc.), and (iv) provide access to household financing and credit for sanitation.

From a societal or community-level perspective, it may become necessary and effective to add sanctions to the behavior change ingredient mix, such as the use of the law, regulations, and enforcement to achieve desired results. This can be justified when public externalities of non-compliance with the desired behavior are large and the private or personal benefits of changing are insufficient to motivate voluntary change by the target group. However, it is rarely considered effective to use law and sanctions without providing opportunities and assuring abilities exist for target populations to adopt the targeted change.

Hygiene and sanitation improvement motivations

A considerable amount of work has been done to identify the private benefits of improving hygiene behaviors and sanitation which motivate individual behavior change among low-income populations in developing countries. Motivators for handwashing with soap at key times have been linked to disgust, nurture, social norms, sensory cues, and reduced infectious disease transmission, the latter more pronounced during acute disease threats such as SARS or Swine flu³. Motivators for investment in household sanitation include improved cleanliness, comfort, convenience, disgust, family safety, privacy, status/pride, social norms/pressure, and health improvements⁴. Motivators for treating drinking water or improving quality often concern aesthetic benefits of improved taste, smell and appearance, in addition to status, social norms and reduced disease risk. Infectious disease risk reduction tends to be just one of a set of typically more salient motivators which deliver positive, tangible, immediate and certain benefits, while disease risk reduction can often be uncertain, unpredictable and future-oriented. While private motivations for safe child fecal disposal and safe drinking water use and storage are less studied, non-health benefits including disgust and cleanliness, nurture, status, and social norms, consistently found as motivators of other hygiene and sanitation behaviors, are likely to be important for these as well. It is notable that societal reasons for investing in improved hygiene and sanitation concern mostly reducing disease burdens, public health costs, and improving environmental conditions and deviate considerably from the private non-health benefits of these changes. The power of private non-health benefits should and can be effectively mobilized to achieve targeted behavior changes in low income populations.

Role of education

A consistent determinant of positive hygiene behaviors and sanitation demand is formal education. Good hygiene behaviors in the home closely correlate with education level of the mother. Thus, a recognized long-term behavior change strategy is to invest in higher levels of education for the poor in developing countries, with particular attention to the educational needs of girls. In the shorter term, behavior change and demand creation communication strategies must use effective ways to specifically reach less educated poorer population groups.

² Rothschild (1999).

³ See Scott et al. (2007) and Curtis et al. (2009) for developing country studies.

⁴ Jenkins & Sugden (2006), Jenkins & Curtis (2005), Allan (2003), Kar (2003).

Culture, gender and behavior

Important cultural dimensions and taboos are often associated with existing hygiene and defecation practices, norms, and preferences across social groups and settings⁵ and must therefore be given adequate attention in development and adaptation of promising hygiene behavior change and sanitation demand creation approaches in new settings, to effectively reach poorer less educated segments. Cultural and taboo aspects of hygiene and sanitation behaviors are often intertwined with gender-based roles, power, and responsibilities in the home and community. Women and girls have sanitation and hygiene needs, preferences, roles and responsibilities which often differ substantially from those of men, and these differences need to be understood and addressed early into the design of programs⁶. Thus gender analysis and cultural adaptation are important ingredients for developing effective interventions for hygiene and sanitation behavior change for the poor.

APPROACHES TO CHANGE PERSONAL HYGIENE AND HOUSEHOLD SANITATION BEHAVIOR

We begin with a review of historical changes and approaches in personal hygiene and household sanitation from Europe and the USA⁷. Next we examine development of approaches and experiences addressing hygiene and sanitation among low income populations in developing countries beginning in the 1980's.

Historical approaches and experience from developed countries

Beginning in the 1800s, the *sanitary revolution* in Europe and the USA gained increasing momentum, coming of age in the second half of the century. *Driven in by urban public health concerns* over infectious disease epidemics of cholera, typhoid, yellow fever, and reactions to filth and poverty in rapidly growing cities, the revolution was characterized by major investments in sanitary public infrastructure (city sewers), development of the first public health departments, creation of sanitary services for municipal waste collection, and the passage of numerous sanitary regulations and enforcement, led and funded largely by municipal and state governments and local tax moneys. Premised on scientific misunderstanding of infectious diseases as caused by 'miasmas' from feces and rotting matter, efforts focused on major urban drainage and clean-up of fecal, solid and liquid wastes responsible for the 'putrefying odors' thought to cause infectious diseases. Regulations and municipal services were developed to enforce better on-site sanitation practices, including requirements for pit emptying. Efforts reflected local government initiative and political leadership. Investments relied on local taxes, bonds and the power of regulation and enforcement rather than private household demand.

The *hygiene revolution* in Europe and the USA was a more *gradual, evolutionary and decentralized process* that spanned 150 years, reflective of the much more difficult task of changing private personal behaviors often grounded in deep-seated social and cultural norms. Personal hygiene first became the focus of transformation towards the end of the 18th century. Promotion of soap use came much later; its popular consumption for personal hygiene and bathing began to take off towards the end of the 19th century. The hygiene revolution was infused by social and moral up-lift agendas led by new secular and civic groups who popularized links between physical hygiene and moral purity to change social norms, and viewed urban filth, poverty, and disease as intertwined evils. Early examples included the publication of educational self-help literature, emphasizing cleanliness, avoiding bad odours, and hygiene behavior but initially not soap use⁸. Teachers, clergy, philanthropists and other civil organizations and leaders took up the role of spreading these ideas, influenced by the American philosophy that everybody can and should improve his living conditions.

The *use of cleaning agents* for hygiene can be traced to ancient times. The Romans practiced hygiene using ash and urine as detergents. To support wide-spread use of urine, official urine collection was organized and regulated in many roman cities. Earliest soap use can be traced to olive soap production in the 8th century Arab world and later to Marseille in the 14th century. In most of Europe and North America, soap remained a relative luxury and unaffordable for the poor until the late 19th century when cheaper soap production (Leblanc and Sovay soda processes) was coupled with abundant cheap sources of oil from whale and palm. Reduction and eventual removal of taxes on soap also played an important role in reducing costs and increasing consumption in countries like England.

⁵ Elmendorf & Buckles (1980).

⁶ See for example the review by Pearson & McPhedran (2008).

⁷ This review draws on historical research by J.A. Tarr et al. (1984), Siegert (1980) and Aeillo et al. (2008).

⁸ The German book "Noth-und Hülf-Büchlein für Bauersleute" [Plight and Help Booklet for Peasants] first printed in 1788 is an example. By the early 19th c., it was one of the most popular non-religious books in print with an estimated 400.000 copies.

Transformation of personal hygiene practices accelerated rapidly when commercial soap manufacturing companies entered the scene near the turn of the 19th century. Commercial advertising and marketing to change consumer and personal hygiene behavior coupled with lower cost soap helped drive the soap revolution. Motivated by profits and a vision, their entry on the scene and subsequent growth in soap consumption was facilitated by increased access to indoor bathrooms⁹ and in-door plumbing, rising household purchasing power, and the on-going social, physical and moral improvement and reform campaigns sweeping Europe and North America. Increasing wealth no doubt played a crucial role; as consumer purchasing power increases, so does soap consumption¹⁰. The German chemist Liebig has suggested that soap consumption provides a good indicator for the increasing wealth of a nation. Rising soap consumption is consistently correlated with declining infant mortality rates across diverse geographies and time frames¹¹.

Rural areas did not always benefit from the above revolutions. In the USA, the rural sanitary and hygiene revolution occurred much later and requiring a separate concerted initiative specifically for rural communities by federal attention and resources. Efforts were aimed at poverty alleviation and improving public health, among other goals, and aided by large federal investments in rural electrification that helped transform rural home life by allowing access to in-home piped pressurized water and in-door plumbing. Key elements included public sector-funded rural health extension and outreach programs, coupled with commercial supply and marketing of in-door sanitary and hygiene (e.g., washing machines) products and services.

Origins of approaches in developing countries

To understand approaches to hygiene behavior change and sanitation demand creation among low income populations in developing countries, it is useful to rapidly review water supply and sanitation development in the post-independence era.

At independence, developing countries *inherited colonial approaches* to sanitation, which often shared a basis in the use of by-laws, enforcement, and sanctions instituted by colonial administrations to enforce sanitary conditions. The colonial legacy can be seen to varying extents and ways. Very high rates of traditional latrine coverage and use in Kenya now, and in Uganda, prior to its civil war, reflect habituation from household latrine enforcement over generations, initiated by the British and maintained after independence. Institutionalized public toilets for the majority of Ghana's population (the corollary lack of household latrines) and dependence upon bucket latrine technology until recently are also rooted in Ghana's colonial legacy but reflect injection of the perverse incentives of post-independence political processes. Typically, colonial administrations invested in limited public infrastructure and low service levels, for example, bucket latrines in urban areas, while largely ignoring hygiene behavior change and education needs for the large majority of rural poor.

The *1980s International Water Supply and Sanitation Decade*, in large measure, concentrated on fulfilling needs for innovative, new, and more appropriate lower-cost technologies to serve neglected poor populations in developing countries. Major advances were made in new low cost latrine and water supply technologies, especially for rural populations. However, the bulk of investments were put into *supply-driven hardware* construction programs for improving water supply infrastructure, and to a much lesser extent on household latrines. Sanitation demand and hygiene behavior were largely neglected, with a few exceptions¹².

Sanitation demand and hygiene behavior awareness

Awareness in the 1990s of the critical need and value of sanitation demand and hygiene behavior to achieve impact and sustain infrastructure investments stimulated experimentation and emergence of three new behavior change and demand creation approaches.

1. *Mass Social Mobilisation* is an action-oriented at-scale communications approach which mobilizes leaders from all sectors and all levels of society, starting at the highest levels, to focus attention and priority on solving a shared social problem using multiple channels and types of communication and social engagement. Implemented in Bangladesh

⁹ In the US, 71% of urban and 33% of rural households had an indoor bathroom in the late 1920s with indoor bathroom; in Germany 20% of households had an indoor bathroom in 1950 (König 2000, p. 240).

¹⁰ Per capita soap consumption in England increased from 3.6 lbs/year in 1801 to 8 lbs/year in 1861, and nearly doubling again by 1891, aided by the reduction in 1833 and complete repeal in 1853 of the British soap tax (Aeillo et al. 2008).

¹¹ Aeillo et al. (2008).

¹² For an excellent review of the decade see Cairncross (1992).

in the 1990s at national scale¹³, it mobilized national attention on the very low and poor levels of sanitation across the country and motivated action by all levels of society to improve it. The approach can be adapted to different scales, including community scale, and complements individual-oriented behavior change approaches.

2. **Participatory Hygiene and Sanitation Transformation (PHAST)** is a flexible sets of tools for use in a group-based structured process based on participatory rural appraisal and participatory learning theory and methods. PHAST was developed to help rural communities change any number of inadequate sanitation conditions and hygiene behaviors within their community. Rigorous testing of the PHAST approach was undertaken in the late 1990's, leading to up-take and widespread application in many countries by numerous actors.
3. **Social Marketing** is a well-established at-scale mainly individual-oriented behavior change approach used in developed countries that is applied to a single well-defined behavior or idea and target group. It is the use of commercial marketing techniques to promote the adoption of a behavior that will improve health or well-being or the acceptance of a social cause or idea for which the benefits of adoption accrue to individuals or society as a whole¹⁴. Social marketing was testing in three projects¹⁵ in the 1990's to varying degrees of rigor:
 - **Saniya Project, Burkina Faso (1995–1998)**, to increase handwashing with soap rates of mothers and child caregivers in the city of Bobo-Dioulasso.
 - **Padear Project, Benin (1996–2000)**, to increase demand for and installation of household latrines: targeted at rural household heads in three Departments.
 - **ONEA Project, Burkina Faso (since 1995)**, to improve on-site sanitation for households lacking a city sewer connection in Ouagadougou, based on a strategic sanitation plan.

Significant successes were achieved with each of the above methods and projects, although scale and scope differed. Bangladesh's social mobilization sanitation campaign, Benin's sanitation social marketing project, and Burkina Faso's ONEA project were each coupled with supply-side strategies to enhancing local provision of low-cost improved household sanitation facilities in response to increased demand. PHAST projects have generally been considerably smaller in scope and scale than mass social mobilization and marketing projects, due to greater face-to-face facilitation and time requirements of the community-by-community intensive participatory learning and action planning process. During PHAST communities sometimes decide to address problems outside the funding mandate or do nothing, creating difficulties for single-focus sanitation and hygiene investment projects.

Changes in community water and sanitation supply projects

In parallel with the above innovations, changes were undertaken in the design of water and sanitation supply projects during the 1990s, particularly in the use of subsidies for construction:

- latrine construction was sometimes integrated into rural community water supply provision projects, for example, as a pre-condition for getting water supplies,
- social intermediation by Non-Governmental Organisations (NGOs) was initiated to help communities organize and choose water supply and sanitation technology, under a *demand-responsive approach*,
- attention was paid to sustainability of hardware subsidies for sanitation, including creative delivery mechanisms and new partners (see Background Paper 2),
- funding for health, hygiene and sanitation education (e.g., PHAST) or demand promotion (e.g., social mobilization, social marketing, and social intermediation) was more frequently included within water and sanitation infrastructure investment projects,
- government-run and operated construction was replaced by private sector provision.

Advances since 2000

The years since 2000 can be characterized as the 'coming of age' of demand creation and behavior change approaches for sanitation and hygiene. The first half of the decade saw increasing experimentation, innovation, adaptation, and

¹³ See Heierli & Frias (2007).

¹⁴ For in-depth understanding & implementation of social marketing see Kolter & Roberto (1989), Andreasen (1995), and Weinreich (1999).

¹⁵ See Curtis et al. (1997, 2001) for the Saniya Project, Reif & Clegbeza (1999) for the Padear Project, and WSP-Africa (2002) for the ONEA Project.

learning as 1990s approaches spread. The Millennium Development Goal 2002 sanitation target added crucial attention and momentum to such efforts, including demand for rigorous impact evaluation, cost-effectiveness analysis, and scaling-up. Since the 1990's innovations of social mobilisation, PHAST, and social marketing, several new promising approaches for achieving sanitation demand creation and hygiene behavior change have established records of success. These include the following (see details in Annex 6.2):

4. **Community-Led Total Sanitation (CLTS)**. From Bangladesh, this innovative community-oriented approach focuses on stopping open defecation without use of hardware subsidies. It has spread rapidly, with Ethiopia (Southern Nations) and India (Total Sanitation Campaign) the most notable examples of CLTS adaptation in terms of scale and impact.
5. **Sanitation Marketing**. Combining social and commercial marketing, this is a coordinated partnership approach to create household demand while simultaneously catalyzing the expansion of market-based supply of sanitation products and services to better meet the needs of unserved low-income populations. It has been successfully implemented in Vietnam and Benin and is currently underway by a number of other countries.
6. **Public Private Partnership for Handwashing with Soap (PPPHWS)**. The PPPHWS approach partners government with soap companies to implement national-scale coordinated social marketing and commercial soap marketing to increase handwashing with soap at key times. Evolved from the Saniya Project, it was tested with considerable success in Ghana and has since spread to over eight countries.
7. **Community Health Clubs**. This is broad-based integrated health education and behavior change approach that includes sanitation and hygiene among other health education themes led by public health staff. It applies participatory group learning methods similar to PHAST with the added structure of 'club' membership. Developed and tested in Zimbabwe, it has been taken up in a limited number of relatively small scale projects.
8. **Microfinance and Credit Institutions Partnering**. An important barrier to sanitation uptake for the poor is the difficulty of saving up the capital to build a toilet. This can also be true for purchase of durable household water treatment devices. Partnering with microfinance and credit Institutions is a strategy gaining increasing interest (see Background Paper 2).

Examples of large scale implementation

We review recent and on-going at-scale implementation of different SDC programs, three of them rural, from India, Ethiopia and Benin, and one urban from Burkina Faso. The first two draw on elements of CLTS, while the latter two adapt the sanitation marketing approach.

India's Total Sanitation Campaign (TSC)

In an effort to reform its long-running Central Rural Sanitation Programme, India launched TSC in 1999¹⁶. Central Rural Sanitation Programme was a supply-driven heavily subsidized construction program without investment in sanitation demand change or hygiene behavior change that resulted in limited overall impact to rural latrine coverage and usage despite its massive size and duration. TSC emphasises awareness creation and demand generation as leading elements to mobilize communities to build latrines on their own. States and local governments use a variety of Information, Education, and Communication methods are used, including conventional posters, pamphlets, mass media, and inter-personnel activities, as well as the Community-Led Total Sanitation (CLTS) methods aimed at creating open-defecation free communities. Hardware subsidies for household toilets continue, often at reduced levels from Central Rural Sanitation Programme and sometimes limited to below-poverty-line households. In adapting CLTS, the entrenched Indian national rural household hardware subsidy program has been difficult to eliminate. TSC also funds rural sanitation marts and productions centres to provide local access to low cost latrine components and materials when unavailable in communities. The latter was used in Bangladesh and catalyzed a competitive rural latrine supply industry¹⁷.

A new element was added to TSC in 2003–04: use of financial incentives, prestigious awards, and competition for communities to achieve open-defecation free (ODF) and sanitized status. It has been highly effective in mobilizing communities and their leadership to accelerate the speed and scale of coverage changes since 2004. Key challenges of the incentive approach remain, including:

¹⁶ This synopsis draws from an evaluation of TSC in five Indian States by WaterAid (2008).

¹⁷ See Luong (1994) and Heierli & Frias (2007).

- need for independent verification of open-defecation free and sanitised status, to avoid distortions to the behavior change process,
- need for on-going monitoring and renewed mobilization to sustain open-defecation free conditions and initial levels of latrine usage,
- neglect of accompanying hygiene behaviors such as handwashing with soap.

Rural Sanitation Promotion in Southern Ethiopia

Initiated by the health bureau of the Southern Region, this program mobilized health and local government personnel and rural communities and households to stop open defecation by taking the first step on the sanitation ladder. Southern Regional State with a population over 14 million, has succeeded in raising latrine coverage from 15% to 85% in 3 years (2002–2005), without hardware subsidies or substantial external finance¹⁸. Key strategies included pilot testing, a cascading process of advocacy from top to bottom of the health structure and among politicians and civil servants, achievement of consensus on broad-based high impact low-cost preventive health actions starting with household latrines, use of community volunteer promoters, particularly women, and flexible appropriate technology. Government cadre and community health workers engage in systematic door-to-door promotion to raise awareness, provide technical advice, and promote latrine building without hardware subsidy. Strong political leadership, clear performance targets, close attention to training, supervision and monitoring, and holding government workers and civil servants accountable for performance outcomes have helped make the program a success. The approach is spreading to other areas in Ethiopia as sanitation coverage becomes increasingly a performance indicator for elected local administrators. Questions remain about sustainability of traditional pit latrines that require on-going household investment to maintain.

National Rural Sanitation and Hygiene Promotion Program (PHA), Benin

Emerging from the 1990's Padear Project, Benin's national program combines sanitation marketing strategies to increase household investment in improved latrines with hygiene behavior change focussed on 3 outcomes: latrine usage, cleaning, and maintenance; handwashing with soap after defecation; safe drinking water use and storage. The program involves a highly structured tested approach in which government outreach workers engage communities and train and supervise community volunteers to conduct an 18 month sequence of promotional and educational activities within their community. Social marketing messages, consumer technology education, and technical support are used to create demand for sanitation while streamlined PHAST-like participatory tools are used to address hygiene education and behavior changes. Door-to-door household visits are the core communication channel, supported by limited community mobilization. Supply-side strategies expand local market access to a range of low cost improved latrine options and precede launch of promotion in new target areas. Community monitoring of progress, effective field staff, and close supervision of field activities are key elements of success. Between 2005 and 2007, the PHA program reached approximately 10% of the rural population in 5 Departments with a 10 percentage point increase in improved latrine coverage within the 18 month cycle¹⁹. National results of hygiene changes are not yet available.

The Ouagadougou Strategic Sanitation Program, Burkina Faso

The National Water and Sanitation Office (ONEA) of Burkina Faso is the lead actor in an innovative concept of going to scale with sanitation in the capital city of Burkina Faso, Ouagadougou. The Strategic Sanitation Program includes components promoting household sanitation using social marketing methods and building a structured market for related goods and services.

ONEA selected NGOs for social marketing activities based on competitive bidding and trained these NGOs. The aim is to convince households to build and improve their own sanitation amenities. Main characteristics are

- ***A wide range of choice.*** Households can choose among different technical options, e.g. rehabilitation of traditional latrines (average cost 34 EUR), ventilated improved pit latrines (average cost 270 EUR), double pit pour flush latrines (average cost 142 EUR), showers with soak pits (average cost 46 EUR) and soak pits (average cost 43 EUR).
- ***Households contract directly with local masons.*** Who have been trained by the program. Due to this direct contractual relation, masons are clearly responsible for the quality of their work.
- Households receive a ***voucher to acquire cement.*** The program thus subsidises a part of the equipment cost.

¹⁸ WSP-Africa (2007).

¹⁹ Jenkins & Kpinsoton (2008).

Between 1992 and 2008, 110 000 latrines and other sanitary facilities have been built. Access to improved sanitation facilities increased from 5% to 55%. However, half of the households opted for the rehabilitation of existing latrines instead of upgrading to VIP latrines or flush latrines. This limits the overall health impact.

Incentives and sanctions as strategies

Financial and other incentives to help achieve performance outcomes have emerged as an important strategy, with many variants under India's TSC program, and in Ethiopia for job performance. Examples of output-based cash subsidies at community, individual household, and producer levels coupled with sanitation demand promotion activities can be found elsewhere (see Background Paper 2). At community level, competitions and awards can be used to achieve multiple simultaneous related outcomes across a range of hygiene behaviors (as in India). Competitive budgetary incentives and sanctions are being tried by national government to motivate district government to improve sanitation performance in Uganda under the decentralization process²⁰.

The final phases of Thailand's rural sanitation program used a combination of sanctions and incentives to help achieve universal latrine coverage²¹. Some districts in Uganda are using sanitary by-law enforcement coupled with Community-Led Total Sanitation to stimulate households to build a basic sanitary latrine.

Costs of projects

Systematic approaches for collecting cost information and standard metrics for comparing costs, impacts and outcomes across projects and approaches are sorely lacking to be able to assess cost-effectiveness of investments in SDC and HBC. Rigorous evaluation of cost-effectiveness would greatly assist financing decision-making and greater attention to this issue is needed²².

Limited costing information from a small sample of projects (see Annex 6.1, Table 2) shows the software component cost per "adopter" of changed hygiene behavior ranged from a low of EUR 1.27 to high of EUR 7 per beneficiary. Across the sample, indicators for hygiene behavior vary considerably, as do the size of adopter households. Hygiene campaigns change hygiene behavior only to a certain extent. Some projects focus on "cheap" changes, in particular hand washing, while others try to enhance demand for better sanitation facilities at household level.

A forthcoming World Bank study shows sanitation demand-related software costs ranged from 7% to 28% of the costs of the household hardware solution across six large projects (equivalent to USD 6.8 (28% of solution) to USD 144 (20%) per household). Level of service and capital costs of the projects' hardware solutions varied greatly, from an average of USD 17.4 (very basic pit latrine in rural Bangladesh) to USD 568.4 (septic system in urban Senegal).

Success reaching the poorest segments

Information on success reaching the poorest and least educated segments is not always collected by projects, making this difficult to assess. Most information is qualitative or anecdotal, and limited to sanitation. In most cases across the board, reaching the poorest has been difficult for sanitation, unless demand creation efforts are specifically designed and tailored to the informational and behavioral needs of poor and vulnerable groups, or where hardware subsidies for latrine construction, can be effectively targeted for the poor. Sanitation demand creation programs involving subsidized hardware have tended to preferentially benefit better off segments of the population²³. Ways of targeting subsidies for the poor are addressed in Background Paper 2. Hardware subsidies limited to below-poverty-line households coupled with CLTS in an experimental Total Sanitation Campaign initiative in Odessa District achieved equal or greater coverage increases among poor households²⁴. Vietnam's sanitation marketing program was able to reach the poorest about equally as others²⁵. In Ethiopia, early adopters have tended to be better off households²⁶.

²⁰ Outlaw et al. (2007).

²¹ Luong et al. (2002).

²² The World Bank recently undertook comparative analysis of sanitation financing in six projects of significant size and scope to assess lessons for how best to pay for sanitation improvements (Tremolet et al., forthcoming).

²³ Untargeted hardware subsidies in three traditional supply-driven projects in Ghana were captured by better off households (Rogers et al. 2007). See also Background Paper 2.

²⁴ Pattanayak et al. (2009).

²⁵ Frias & Mukherjee (2005).

²⁶ O'Loughlin et al. (2006).

In very poor countries, regular hand washing with soap can constitute an important cost factor for households. A study on hygiene behavior in Burkina Faso²⁷ estimated annual cost for hand washing with soap of approximately 1 USD (1999 figure) per person, half for water (0.3 litres per hand washing) and half for soap, equivalent to 0.4% of 1999 per capita GDP.

EMERGING ISSUES FOR DISCUSSION

Scaling up opportunities and challenges

Some considerations are put forth for scaling up the current approaches for hygiene behavior change and sanitation demand creation.

Participatory Hygiene and Sanitation Transformation: While PHAST provides a broad-based hygiene learning engagement method that is adaptable to local conditions, the 'one village at a time' approach presents challenges for implementation at scale and ability to maintain quality and outcomes due to its dependence on effective and skilled facilitation and follow-through. Some programs have successfully adapted a sub-set of the most effective PHAST elements into structured programs.

Community-Led Total Sanitation: CLTS concepts and the community shame/disgust/pride approach have proven to be a powerful trigger for self-financed household sanitation and latrine usage at community level. Sustainability of latrine usage and of installed facilities is not yet clear and may be limited where access to appropriate affordable products and services is poor. Success may also be contingent on favorable community conditions²⁸. It is possible community-level financial incentives, such as in India, can overcome this limitation. Like PHAST, CLTS requires effective and skilled facilitation as well as good verification systems. Questions remain on the relevance of CLTS for urban and large settlements. Handwashing with soap has been a neglected element.

Total Sanitation Campaign: The ability to effectively target the poorest for cash hardware subsidy may be unique to India. It is not clear how to transfer this to other settings. Over-emphasis on financial incentives and weak verification systems can distort and undermine the behavior change process. Risks include regression back to open defecation, in the absence of on-going monitoring and stimulus.

Social Marketing: A significant initial investment in formative research and creative communications development makes start-up costs high in a new country without follow-up commitments for scaled-up implementation. To work well, a clearly identified behavior change must be articulated and campaign messages may need to be renewed and refreshed at regular intervals, to maintain momentum after initial efforts. It can be highly effective at scale when linked with improved access to related products and services as shown for family planning and condoms in developing countries.

Public Private Partnership for Hand Washing with Soap: Historical experience shows the value and benefit to partnering with private sector soap producers and marketers to promote handwashing with soap when such partners can be found. The approach faces the start-up requirements and on-going commitments of social marketing. This may be problematic under project-based funding mechanisms. More attention may be needed to monitor ability and find creative ways of reaching poorer segments.

Sanitation Marketing: In addition to social marketing efforts, investments to improve and extend product/service offer and market access in target areas may require substantial and on-going efforts. Partnerships among government levels, NGOs, private sector suppliers, and microfinance partners are an important feature of this approach and attention given to building these early-on. Coordination and timing of demand and supply strategies among multiple partners in the start-up requires may require a professional coordination team.

Combining complementary approaches, such as CLTS and Sanitation Marketing, to increase impact and effectiveness has emerged. Such integrated programs are underway in Cambodia, Tanzania and Indonesia. Broad-based social and political mobilization was an essential ingredient of success in Ethiopia and Bangladesh, and provides an important strategy for scaling-up and strengthening other approaches.

²⁷ Curtis et al. (2001).

²⁸ Reference DFID study document on favorable conditions for CLTS.

Linking to health and education sectors

Stopping open defecation and improving community practices requires addressing school-based sanitation and hygiene behaviors as well as those at household-level. Children have proven to be effective change agents e.g. in some TSC initiatives in India and CLTS in Bangladesh. Thus, engagement with schools is an important program linkage. Furthermore, appropriate school sanitation infrastructure can also prevent premature drop-out of girls from the education system.

Working across ministries on sanitation and hygiene programs can be a challenge. Hygiene education and behavior change are often seen as health ministry domains, while sanitation infrastructure is a domain of rural development, water or other infrastructure ministries, and school infrastructure and programs are within the domain of the education ministry. An evaluation of school sanitation pilot programs²⁹ showed that complex coordination mechanisms that involve many institutions (cf. Zambia) are not very effective. On the other hand, cooperation between the ministry of basic education and a regional water and sanitation NGO³⁰ in Burkina Faso and the cooperation between the ministries of health and education and the national Water and Sewage Company in Nicaragua were quite successful. In all programs, the use and cleanliness of toilets improved considerably, but a reliable water supply, good water quality, hand washing with soap and drainage of used water remained a challenge. Among the success factors³¹ there seem to be: the provision of sanitary and water facilities together with hygiene education, embedding hygiene education in curricula, the participation of school staff and pupils, demand driven subsidies and the adaptation of facilities to local conditions.

Improving school sanitation and water supply infrastructure and behavior change programs to facilitate school-based hygiene behavior change may require separate programs linked to education sector support activities. Without this complement to household and community SDC and HBC programs, schools may remain a source of health risks and education will not fully reach its potential impact on hygiene behavior change.

Similarities, Differences, Lessons and Issues for Discussion

This review has identified a variety of effective approaches available for SDC and HBC, some of which have been implemented at large scale. We examine similarities and differences, and consider some lessons and issues from experiences applying these methods across settings.

- **Target group:** Methods differ somewhat in whether to target whole communities, sub-groups or individual households. Programs also differ in which individuals within households, such as mothers/child caretakers, heads, or children, are the focus of change. For sanitation demand creation, coordinated targeting of whole communities and their leadership (community mobilization) on the public aspects of sanitation and stopping open defecation, while simultaneously targeting individual household needs to build private latrines appears to be important for achieving high coverage.
- **Messages:** In sanitation demand creation, messages based on household non-health benefits and the use of community shame, disgust, and pride appear to be more effective and broadly relevant at motivating personal and community-wide change across cultures and settings than those about disease-risk reduction. Evidence on message content regarding other hygiene behaviors is limited. Disgust may be highly effective in triggering SCD and HBC across domains and diverse populations, as shown in recent handwashing behavior experiments in Australia³². Ghana's PPPHWS campaign found disgust and nurture more powerful than conventional disease prevention messages. Disgust may underlay effectiveness of personalized fecal exposure information (fecal contamination on own hands, in one's own water) compared to conventional hygiene messages in two recent hygiene behavior change experiments³³. Formative research and pilot testing, however, remain essential for developing culturally, gender-based and contextually relevant and effective messages, communications materials, and channels for large-scale SDC and HBC approaches.
- **Methods, channels, and sources of communication:** Evaluations show that word-of-mouth and face-to-face communications are generally the most effective methods for reaching the poor. Mass media and conventional IEC methods such as posters, TV, radio and pamphlets may be important for reinforcement of face-to-face communications and for broadly changing social norms. In Vietnam and India, door-to-door visits and

²⁹ IRC/UNICEF (2006).

³⁰ Centre Régional pour l'Eau Potable et l'Assainissement à faible coût (CREPA).

³¹ IRC/UNICEF (2006), Snel (2003).

³² Porzig-Drummond et al. (2009).

³³ See recent hygiene behavior change experiments in Dar Es Salam, Tanzania (web link) and western Kenya (web link).

community group meetings were the important sources of information and promotion. Using multiple coordinated channels is more effective than a single channel. Optimal campaign duration and number of contacts with target populations is unclear. Given the gradual and rather long process of changing societal norms and personal behaviors, campaigns will need to be renewed, improved and updated at regular intervals. Sufficient funding for and attention to monitoring and evaluation for campaign renewal should be considered in the development and design of programs.

- **Single vs. multiple behaviors:** The integrated multi-behavior change approaches of PHAST, Community Health Clubs, and health education contrast with single focus behavior change approaches of CLTS, social and sanitation marketing, and PPPHWS. Limited evidence suggests targeting a single behavior change may be more efficient and easier to accomplish than targeting multiple behaviors at the same time for a given population group. However, this debate has not been resolved.
- **Linkages to water supply:** SDC and HBC programs have increasingly been implemented as stand alone projects with independent funding, in contrast to earlier times when they were integrated or directly linked with water supply projects. This has been generally a positive change, given the very different activities, methods, skill sets, time frames and challenges faced in implementing SDC and HBC relative to water supply projects. However, the recommended sequencing of water supply, sanitation demand creation and hygiene behavior change activities for communities to maximize sustained hygiene behavior change and health impacts remains unclear. Benin's rural sanitation and hygiene promotion program prioritizes villages that have improved water supplies. This appears to make good sense from household and community perspective where water supply is typically a higher priority than sanitation, and from a behavioral perspective where access to sufficient water supplies facilitate sanitation and hygiene behaviors and has been associated with increasing demand for sanitation³⁴. Setting sanitation improvements as a pre-condition for water supply has frequently led to perverse and ineffective behavioral responses.
- **Champions:** Cases of success at scale demonstrate over and over the importance of political will and leadership with an individual champion at state or local government level, driving and creating the framework for success. How are champions created and found?
- **Common elements for success:** Highly dedicated and trained outreach staff and an extensive network of trained community volunteers, with close monitoring and supervision, appear to be essential requirements for successful implementation of most SDC and HBC approaches. A well-structured implementation strategy and program of awareness-creation, face-to-face communications and mobilization activities based on well-designed and tested materials, processes and tools also appears necessary for effective SDC and HBC. Last, SDC approaches typically need to be accompanied by an appropriate consumer-preferred range of technology options, and facilitation, information, and support to households, especially poor and vulnerable groups must be available, to help them choose the technology and features that best meet their needs, preferences, and ability to pay.

ROLE FOR DEVELOPMENT BANKS

This review has identified a number of effective approaches for sanitation demand creation and hygiene behavior change that exist and should be supported by increased funding. Several proposals for consideration are made:

- 1) Finance the development and implementation of extended large-scale national social marketing and mobilization campaigns to change social norms around open defecation, similar in scope to what was undertaken in Bangladesh during the 1990s but adapting community-led total sanitation messages and methods.
- 2) Develop programs with micro-credit finance institutions and partners to provide credit for household sanitation that include integrated sanitation demand creation and outreach components.
- 3) Develop and finance incentive and award programs for local government and communities to achieve open-defecation free and sanitized conditions as part of larger government sanitation promotion initiatives, and assure that sufficient funding for capacity building of independent verification mechanisms and technical and managerial services and capacity building are included for local government.

³⁴ Curtis et al. (1995) and Jenkins & Cairncross (forthcoming).

- 4) Fund the expansion and renewed of campaigns under the Public Private Partnership for Handwashing with Soap program, and explore opportunities to enhance these programs through investment in development and promotion of complementary handwashing devices to support behavior change among low-income populations lacking in-house piped water.
- 5) Assure that complementary but independently managed hygiene behavior change and sanitation demand creation programs are funded at sufficient levels within all water and sanitation hardware investment projects, and re-program allocations for household sanitation construction hardware subsidies to instead be used to fund and scale-up sanitation marketing programs.
- 6) Match school construction hardware programs with appropriate funding for improved school sanitation and water supply and behavior change programs.
- 7) Include adequate funding for and attention to monitoring, evaluation and cost-effectiveness analysis in the inception and preparation of programs so that financing for behavior change can be made increasingly more effective.

Annexes

ANNEX 1: TABLES

Table 1. Expected reduction in diarrhoeal disease morbidity from improvements of one or more components of water and sanitation (Esrey *et al.* 1991)

	All Studies		Rigorous Studies	
	N° Studies	Reduction	N° Studies	Reduction
Water and Sanitation	7	20%	2	30%
Sanitation	11	22%	5	36%
Water Quality and Quantity	22	16%	2	17%
Water Quality	7	17%	4	15%
Water Quantity	7	27%	5	20%
Hygiene	6	33%	6	33%

Table 2. Cost per adopter of different hygiene and sanitation campaigns

Project / duration	Target group	Activities	Main indicator for behavior change % Adoption	Cost of campaign / "Adopter" in EUR (in % per capita GDP)
KfW Rajasthan 10 years	1.05 Million	Sensitisation of decision makers; awareness raising combined with curative health offers for women in form of health camps; health competitions at schools; health and sexual education for girls	Latrine construction Project \uparrow 18% other \uparrow 28% (total \uparrow 46%) baby faeces to latrine \uparrow 10%	Project 3.34 EUR p.p. (0.7%) all adopters 1.27 EUR p.p. (0.3%)
UNICEF Bobo Dioulassou 3 years	37,319 Mothers	Neighbourhood hygiene commissions with home visits; discussion groups in health centres and neighbourhoods; street theatre, local radio; primary school curricula	Hand washing after contact with baby faeces \uparrow 18.5%	48 EUR/mother 6.55 EUR/family member (2.3%); (5.03 EUR/member without start phase (1.7%))
KfW Malawi 3–5 Jahre	308,000	Videos, street theatre, flipcharts and brochures on hand washing, coverage of water and cleanliness of latrines	Safe latrines Project \uparrow 49% Hand washing Project \uparrow 14% Cover water Project \uparrow 19%	7 EUR p.p. (4.4%)
ONEA, Burkina Faso	1.1 Million	Training (NGOs, masons), Promotion (NGOs), Subsidies (slabs and vent bricks), works (masons)	Latrine construction	Social intermediation costs relative to average cost of the facilities: 34%

ANNEX 2: SANITATION DEMAND CREATION AND BEHAVIOR CHANGE APPROACHES

Community-led total sanitation

Initiated and tested in Bangladesh from about 2000, this innovative approach adapts PHAST-like tools and group processes to focus on stopping open defecation at the community level, using the power of shame, fecal disgust, and social and peer-pressure to achieve open-defecation free villages without any hardware subsidy for latrine construction. The awareness-raising and motivational strategies are coupled with strong elements of informed choice, community empowerment, and encouragement of extreme low cost latrine technology innovation (Kar 2003; Kar et al. 2006). Its subsequent rapid spread in and outside Bangladesh, it has been modified in numerous ways and frequently blended with other approaches, including use of hardware subsidies, as it is adapted to new contexts, situations, and existing sanitation policies across a range of countries. The most notable cases of uptake and adaptation of the CLTS approach, thus far, in terms of scale and impacts are Ethiopia (Southern Nations) and India (Total Sanitation Campaign) (see Section 2.6).

Sanitation marketing

This approach recognizes that most household sanitation across the developing world has and continues to be provided by the private sector via the market place, with household investments driven mostly by the non-health benefits. It applies social and commercial marketing strategies and principles to create demand while simultaneously catalyzing, developing and expanding the market-based supply of sanitation products and services to focus on serving the sanitation needs of underserved poor population segments, using a coordinated at-scale approach to stimulate and link demand and supply. Thus, it builds on social marketing by adding strategies to improve availability and access to affordable and attractive sanitation products and services for the poor, by building the capacity and supporting the development of private sector supply chains (Cairncross 2004). Sanitation marketing has been successfully tested in several countries, most notably in Vietnam in 2003–2005 (Frias & Mukerjee 2005) and Benin (on-going since 1996) (Reif & Clebeza 1999; Jenkins & Kpinsoton 2008). Earlier variants and examples of projects and programs which invested in developing and expanding private sector market-based provision of appropriate sanitation products and services to low income rural and urban populations include the urban sanitation program in Lesotho (Cairncross 1992), ONEA's urban program in Ouagadougou, Burkina Faso (on-going) (WSP-Africa 2002), Bangladesh's rural sanitation provision program in the 1990's (Heierli & Frias 2007; Luong 1994), and Mozambique's dome slab program (1982 through 1990's) (Tremolet et al. forthcoming).

PPPHWS

This is an at-scale national approach which recognizes the value of partnering with the soap industry to develop coordinated social behavior change and commercial soap marketing aimed at increasing soap use for the purpose of handwashing at key times. Evolving out of the success of the Saniya Project's application of social marketing to increase hand washing with soap, the PPP approach was developed and tested for the first time in Ghana with Unilever Corporation as the main private sector partner and World Bank public financing, from 2002–2004 (check dates). An implementation handbook on the approach is available, based on the Ghana experience (World Bank 2005). Considerable impact and success was achieved in Ghana (Scott et al. 2008), laying the foundation for the PPP hand washing with soap approach to spread. It is currently underway in over 8 countries in Africa, Asia and Latin America. Private sector soap partners have included a local soap company in Uganda, and the multinational soap companies Unilever and Procter & Gamble, among others. With the successful in Ghana, Unilever and its Indian subsidiary Hindustan Liver, have launched their own hand washing with soap behavior change program and begun to market their bar soap, Lifebuoy, specifically as a hand wash soap to low-income populations in several target markets in India and elsewhere.

Community Health Clubs

The Community Health Club approach is a broad-based health education and behavior change approach that addresses a range of relevant disease prevention and health topics, including sanitation and hygiene behaviors. Like PHAST, it draws on participatory and adult group learning theory and methods, but adds the additional structure and cohesion of club formation and membership which provides greater discipline, mutual support, social interaction, and motivation

for achieving results. Like PHAST, it also requires skilled trained facilitators, but in addition, session facilitators must also have sufficient health knowledge depth to lead on a range of health topics, while course materials and methods must be developed locally and the intervention usually spans a much longer time commitment per community of 1–2 years, and ideally longer. The Community Health Club approach was developed, expanded and tested in Zimbabwe in the early 2000's and found to be successful in achieving increases in both sanitation and a wide range of hygiene behaviors among club members (Waterkyn & Cairncross 2005). It has since been taken up by several projects, albeit at relatively small scales, in several African countries.

Mass social mobilisation

Social mobilization is an action-oriented at-scale communications approach which mobilizes leaders from all sectors and all levels of society, starting at the highest levels, to focus attention and priority on solving a shared social problem using multiple channels and types of communication and social engagement. First implemented in Bangladesh in the 1990s at national scale (Heierli & Frias 2007), it mobilized national attention on the very low and poor levels of sanitation across the country and motivated action by all levels of society to improve it. Mass institutional and community mobilisation has been a major and essential component of Ethiopia's Southern Nation rural sanitation promotion program (WSP-Africa 2007).

Participatory Hygiene and Sanitation Transformation (PHAST)

PHAST is a flexible set of tools for use in a group-based structured process based on participatory rural appraisal and participatory learning theory and methods. PHAST was developed to help rural communities change any number of inadequate sanitation conditions and hygiene behaviors within their community. Rigorous testing of the PHAST approach was undertaken in the late 1990's (UNDP/World Bank and WHO 1997), leading to up-take and widespread application in many countries by numerous actors.

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SESSION 2

Targeting the Poor – Facilities and Improved Services

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ABSTRACT

This paper looks at the interventions that can help poor people to access sanitation goods and services. It focuses on three types of interventions; the use of low-cost technologies, the use of micro-credit and the use of targeted public finance (or subsidies) to reduce the funding gap that poor people face to meet the capital and recurrent costs of sustainable sanitation. The paper then focuses on the use of targeted public finance and lays out five parameters against which performance can be assessed. These are: targeting (the ability to steer money to the poorest families), effectiveness (the tendency to construct toilets that are wanted and used properly in conjunction with necessary hygienic behaviors); leveraging (the potential to leverage additional (household/local government) investment including not crowding out other sources of funding), sustainability (the ability to deliver along the 'whole' sanitation service value chain to ensure both household access and long term effective management) and the scale of impact. The paper develops a typology of targeted public funding strategies and gives examples of their performance against these parameters. The paper concludes with some general lessons for development banks for the design of interventions designed to increase access to sanitation for poor people.

DEFINING GOOD SANITATION FOR THE POOR

What is sanitation for?

Sanitation potentially delivers benefits at three levels; to the user, to society and to the wider community through the environment. To be deemed successful a sanitation system needs to perform well at least at one of these levels, and preferably at them all.

At the user level, sanitation potentially delivers health improvements, but often user expectations focus more on the utility of the service provided – measured in terms of comfort, privacy and convenience¹. At the level of society we expect sanitation to deliver public health improvements – but the available evidence suggest that for this, the service may have to include both safe collection of faeces as well as hand washing and disposal of sullage (grey) water and solid waste. To deliver wider environmental benefits, the service has to deal with the life-cycle management of wastes – including collection, appropriate treatment and safe re-use or disposal.

Thus sanitation has a number of purposes including delivering improvements in quality of life to households, improving community or public health and enhancing (or minimizing damage to) the environment.

Investments in sanitation may also be needed to offset potential negative impacts of other development investments. For example, investments in water supply, particularly in dense areas, may have adverse health impacts unless adequate provision is made for management of wastewater and excreta.

¹ Jenkins & Sugden (2006).

Why specifically target the poor?

The effective delivery of the wider environmental and public health benefits of sanitation require that services reach the majority of the population including the poor². The poor however face a number of barriers to access. Evans categorises the barriers faced by poor people in urban areas as³:

- distance and hence cost of connecting to formal services;
- high costs of developing independent shared sanitation services;
- legal barriers to accessing formal and informal services;
- residence in areas that are technically difficult to serve (low lying, steep or otherwise challenging);
- high costs of accessing services coupled with low incomes resulting in poor people being 'priced out' of available services.

Poor rural households may not face all of these barriers but are likely to face a disproportionate challenge in accessing technical support, goods and services at an affordable price.

SERVING THE POOR – MEASURING SUCCESS

Special efforts are needed to ensure that sanitation goods and services reach poor people as well as less-poor people. This can be seen in terms of removing the barriers that the poor face and altering the incentive structure to:

- change household behavior (usually to encourage investment);
- change household preferences (to make one option more appealing than another);
- pay for part of the system that cannot be financed by households (which may include household infrastructure such as a toilet, if costs are relatively high, but which also includes facilities and services to ensure the long term operation of the system and the downstream management of the waste stream).

Interventions which seek to change household behaviors and preferences are dealt with in the background paper to Topic 1⁴. Here we are concerned largely with interventions that change the incentives around payment for infrastructure and its management. These interventions generally work either by lowering costs (through technical interventions or subsidies) or by making payment easier (through credit).

The key interest is in changing the incentives for poor people. But using public-sector interventions to specifically target poor people attracts certain risks. In general for sanitation these can be summarized as⁵:

- elite capture (wealthier households benefit);
- provision of inappropriate or 'unwanted' toilets;
- provision of only one part of the service or sanitation value chain (i.e. toilets but no downstream management or a wastewater treatment plant but no toilets);
- crowding out of household/other investment; and
- insufficient funding to make a difference.

The success of any approach can thus be measured in terms of how well it addresses the objectives listed above and minimizes the risk. In summary success can broadly be measured against the following parameters:

- ability to steer money to the poorest families (targeting);
- tendency to construct toilets that are wanted and used properly in conjunction with necessary hygienic behaviors (effectiveness);
- potential to leverage additional (household/local government) investment including not crowding out other sources of funding (leveraging);

² See for example Bareto et al. (2007) and a discussion in Hall & Lobina (2008), although the conclusion that the only suitable system is sewerage is by no means proven.

³ Evans (2006).

⁴ Jenkins et al. (2009).

⁵ See for example Evans et al. (2009a).

- ability to deliver along the ‘whole’ sanitation service value chain to ensure both household access and long term effective management (sustainability); and
- scale of impact (scale).

Cost effectiveness of the investment or ‘efficiency’ is also important. Efficiency, measured in terms of the ability to deliver services to the largest possible number of people within defined budgetary constraints can impact the overall scale of an intervention. While evidence on efficiency is limited⁶ Trémolet et al.,⁷ have developed a framework for comparing alternative financing approaches based on criteria such as costs, effectiveness of public spending (including leveraging), financial sustainability and scalability.

HOW CAN THE POOR BE SERVED?

Introduction

Sanitation systems are commonly divided into two types; on-site systems where excreta are collected, stored and sometimes treated close to the toilet and off-site systems, where excreta are removed from the plot, most commonly via waterborne sewerage. Typically on-site systems are regarded as pro-poor while networked systems are not.

Additionally in the literature there is often a suggestion that on-site systems have no or negligible operational costs as compared to off-site systems with high operational costs. The reality is more complex. While this issue is dealt with in more detail in the background paper for Topic 3⁸ two key points are important here.

Firstly that on-site systems can be equally, if not more, costly than off-site systems depending on local conditions, and housing density. Research in Northeast Brazil in the late 1980s suggested that the annualized cost of on-site systems exceeded that for sewerage at densities of around 160 persons per hectare.

Secondly that in anything more than highly dispersed rural densities, on-site systems do require active ongoing management in order to deliver health benefits. This is due to the fact that, unless there is space to move the latrine and cover over abandoned pits, pit contents must be emptied and disposed of. In the best-case, waste in a pit will have been treated and can be safely reused locally, but in the majority of cases, further transport and treatment is required and this is often expensive.

Thus the simplistic distinction between on-site systems for the poor and off-site for the rich is rather unhelpful and it may be more useful to focus on the fact that all sanitation systems attract both capital and recurrent costs and that these vary with both the type of sanitation used and the nature of the area in which they are deployed.

Having established this, it is now possible to generalize to say that all sanitation systems have both capital costs and operational costs, which include maintenance. The main problem is that the money available to poor households for sanitation is often insufficient to cover these costs, which leaves a funding gap as shown on Figure 1 below.

The scope of costs to be included in any analysis of the funding gap would be determined by the institutional context and the objectives of any given policy intervention. In a utility/urban situation where new connections will result in a marginal increase in the cost downstream collection, treatment and re-use or disposal, and where this treatment is valued highly, these costs would need to be included. By contrast where the marginal costs of downstream management are very small, the focus will be on the costs of increased access and better management at the household level only.

Three broad types of interventions can help address this gap, as shown on Figure 2.

Firstly, total costs can be reduced through the use of more appropriate lower-cost technologies. Both capital and operational costs may be reduced through better design – although the focus often falls disproportionately on lowering capital costs.

Secondly the capacity to pay can be increased through micro-credit, which spreads the financial burden over time. Micro credit can enable households to pay more by reducing the impact of large one-off payments.

Finally public funding (or subsidies) can be used to fill the remaining funding gap. The way in which subsidies can be delivered is determined by the sanitation system in use. In urban/utility situations where downstream management is critical to the operation of the system (for example through operation of sewerage or faecal sludge management) public funding may be needed to fill gaps in both capital and recurrent expenditures. In non-networked systems, funding may be needed more to reduce initial capital investment costs for households.

In the following three sections we look at each of these interventions in more detail. Mechanisms for improving the targeting and the efficient delivery of public funding are examined further in Section 4.

⁶ Evans et al. (2009a).

⁷ 2009.

⁸ Mara (2009).

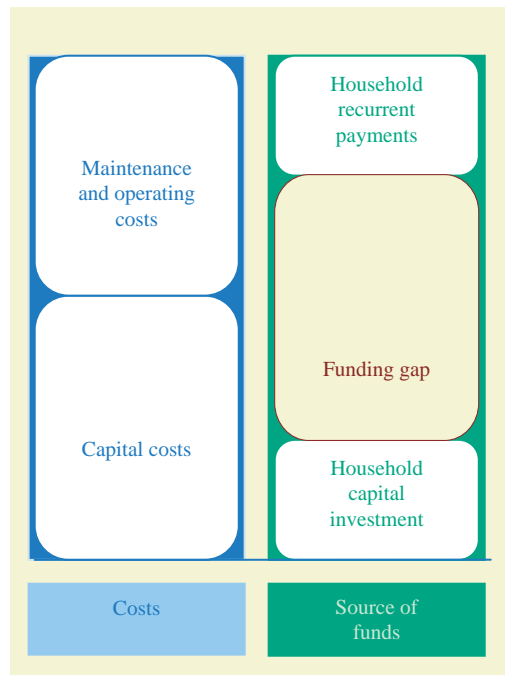


Figure 1. The Funding Gap for Household Sanitation Provision

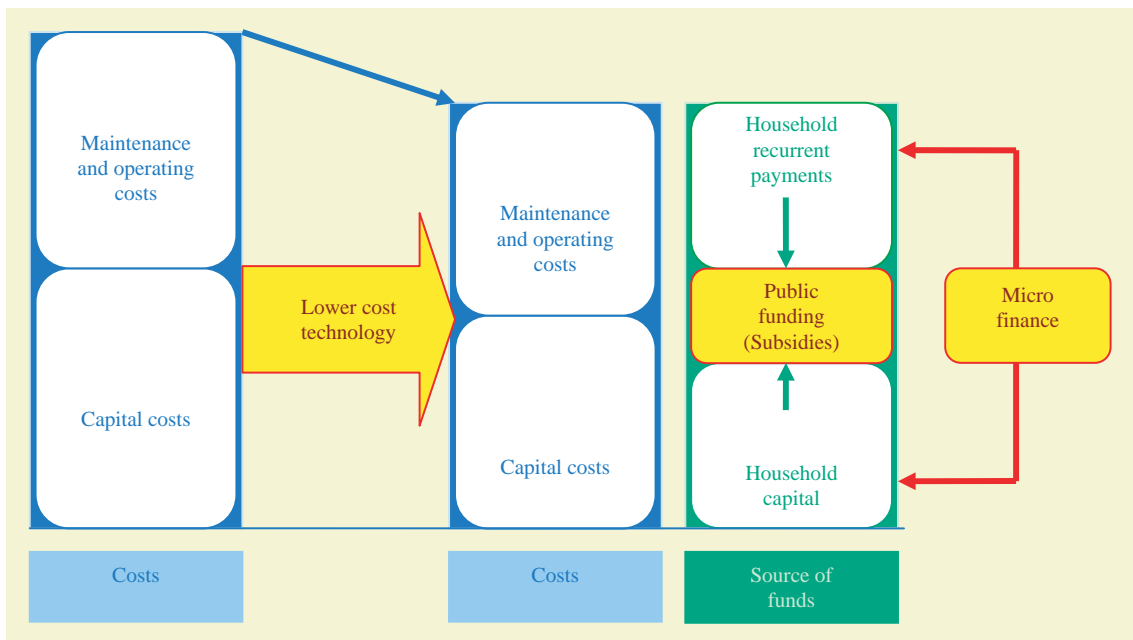


Figure 2. Possible Interventions to Reduce the Funding Gap

Lower cost technology

The identification and/or design of appropriate (often but not always low cost) sanitation technologies has been a major part of the effort to increase access to sanitation services to poor communities for the past 30 years. The Blair Latrine (later known as the Ventilated Improved Pit latrine or VIP) made possible a huge acceleration of latrine construction in rural parts of East Africa in the 1970s⁹. Similarly, efforts to develop a low cost latrine slab were an integral part of the

⁹ Robinson (2002).

successful low cost sanitation programme in Mozambique from the 1980s onwards¹⁰. In urban areas of Brazil the development of simplified sewerage enabled a huge acceleration of service delivery to poor sections of urban communities¹¹. The later widespread use of this technology for both poor and non-poor households also illustrates that while ‘appropriate’ sanitation may be developed for poor people, it can and should deliver the same level of service (particularly in terms of comfort, convenience and privacy) expected by the non-poor.

The availability of low-cost options removes or reduces the financial barriers faced by poor people and may also mean that local government/service providers are more willing to invest in systems which reach them. It may also mean that, where major investments are made in trunk services (sewers, wastewater treatment plants etc.) in urban areas, there is more chance that connections will be provided for households, including the poor. The corollary is that an unwillingness of service providers to make use of alternative appropriate technologies can lead to the exclusion of poor people from sanitation even where major investments are being made.

Micro-finance

Another mechanism for targeting the poor is through the provision of micro finance. The major advantage of intervening through micro finance is that it “leaves households in control of decisions about the type and cost of services to be paid for” and minimizes interference in the supply-side market for goods and services¹².

During the 1980s and 1990s, micro-finance was sometimes incorporated in water supply and sanitation projects through a revolving fund component managed by the project directly, which usually provided seed funding for households to invest in toilets. Repayment of this money was then supposed to enable the funds to be ‘revolved’ to further households. However, the general low level of performance of many of these schemes has resulted in a shift towards the delivery of “subsidies and guarantees to micro-finance institutions (MFIs) who can then lend money for sanitation investments to households. . .”¹³. This option has the additional advantage that MFIs may also provide other important services, such as micro-savings and micro-insurance. As a result, such interventions have the useful secondary benefit of stimulating the development of micro-finance institutions in general and encouraging them to get involved in the (water and) sanitation sector.

A revolving fund that has proved particularly effective is the Sanitation Revolving Fund in Vietnam, as described in Box 1 below¹⁴.

Box 1. Sanitation Revolving Fund in Vietnam

In 2001, a Sanitation Revolving Fund (SRF) component was incorporated in the World Bank-financed Three Cities Sanitation Project in Vietnam to provide loans to low-income households for building on-site sanitation facilities. The SRF provided small loans (USD 145) at partially subsidized rates to low-income and poor households to build a septic tank, a urine diverting/composting latrine or a sewer connection. To access the loans, households needed to join a Savings and Credit group, which bring together 12 to 20 people who must live close to each other to ensure community control. The loans covered approximately 65% of the average costs of a septic tank and enabled the household to spread these costs over two years. The loans acted as a catalyst for household investment although households needed to find other sources of finance to cover total investment costs, such as borrowing from friends and family.

The initial working capital for the revolving fund (USD 3 million) was provided as a grant by the World Bank, Denmark and Finland. The SRF was managed by the Women Union’s, a countrywide organisation representing the rights and interests of women that has a long experience with running micro-finance schemes. The initial working capital was revolved more than twice during the first phase of the project (2001 to 2004) and was then transferred for subsequent phases to be revolved further. Combined with demand generation and hygiene promotion activities, the SRF helped around 200 000 households build sanitation facilities over the course of seven years. The revolving fund mechanism allowed leveraging household investment by a factor of up to 25 times the amount of public funds spent. Repayment rates are extremely high (almost 100%).

This pilot approach has since been scaled up, via other World Bank-funded projects (with an outstanding working capital of about USD 25 million as of March 2009) or through the Vietnam Bank for Social Policy (VSBP). The latter offers separate products for water and sanitation, through the Safe Water and Rural Environmental Sanitation Program (SWRESP). In 2007, the amount of loans for SWRESP was USD 20 million.

¹⁰ Colin (2002) and Trémolet et al. (2009).

¹¹ Melo (2005) and Mara (2003).

¹² Evans et al. (2009a).

¹³ Evans et al. (2009a).

¹⁴ Sources: Trémolet et al. (forthcoming) and Mehta (2008) in Trémolet and Scatista (2009).

Targeted public funding

By far the most commonly-discussed mechanism for improving access for the poor is through the use of public funding to pay for selected sanitation goods and services and to remove financial barriers for poor people. The source of funds is usually direct government revenue or overseas development assistance (ODA) but occasionally specific cross-subsidies may be designed to channel funding from one set of users to another (for example from industrial to domestic consumers in urban utility situations, or from less poor to poorer households in a rural area).

The sustainability of this type of financing mechanism is almost entirely determined by the source of funding. Schemes that can generate the necessary finance 'internally' (through cross subsidies and revolving funds) are obviously more sustainable than those which rely on recurrent allocations of funding from the general budget, particularly in poor countries where the public budget is severely constrained.

Financing mechanisms (including subsidies) can be broadly defined by what is financed, who receives the funds and the timing. These aspects are discussed in more detail in the next section.

IMPROVING SUBSIDY TARGETING TO REACH THE POOR

Introduction

In this section we look at some of the options for public funding of sanitation. The various dimensions of financing mechanisms are briefly outlined below and summarized in Table 1.

Table 1. Some Typical Types of Subsidy

Recipient What Financed?	Household	Community	Local Government and/or Service provider
Hardware costs (private)	H1. Ex ante – direct or infrastructure subsidies for household facilities (either as cash or direct provision) H2. Ex-post – infrastructure subsidies – usually in cash to reimburse part- or full-cost of household facilities H3. Connection subsidies for networked systems.	C1. Ex-ante payment of part- or full- cost of community infrastructure C2. Ex-post performance awards for achieving sanitation targets (such as ODF).	L1. Ex-ante inter-governmental transfers to finance provision of household facilities and/or networked services (i.e. trunk sewers/ WWTPs) or community services (i.e. public toilets). L2. Ex-post output-based subsidies for services delivered to poor households. L3. Ex-post performance awards for achieving sanitation targets (such as ODF).
Hardware costs (public and shared)			
Software costs		C3. Ongoing financing made available to communities or via NGOs etc. to support management of community facilities including Business Development Services	L4. Ex-ante inter-governmental transfers for on-budget funding of software activities by government staff. L5. Ex-post output-based subsidies for services delivered to poor households. L6. Ex-post performance awards for achieving sanitation targets (such as ODF).
Operational costs	H4. Consumption subsidies (reduced user fees) – usually in urban areas.		L7. Operational subsidies to service providers to fill the gap between operational costs and revenue where consumption subsidies exist.

Public financing can be used to finance a range of elements of the sanitation value chain. Thus the first defining dimension of a financial mechanism is what will be subsidized? Put another way this question can be rephrased to ask how far along the value chain is support needed?

For example public money may be used to pay for upfront costs such as the costs of policy development and support, training, social mobilisation, sanitation marketing, hygiene promotion, and all other support for behavior change. Many of these costs (which are referred to as “software costs”) continue beyond the initial intervention period and, along with the costs of monitoring and evaluation, they must be financed on a recurrent basis, usually through public sector institutions.

Public money can also be used to fund the capital costs of private/household hardware (infrastructure) such as toilets, or public or shared hardware (infrastructure) including public elements of urban systems, and public or community latrines and institutional facilities in schools and other public buildings. These costs are often one-off costs and support for these may be delivered through a range of institutions (local government, utilities, non-governmental organizations) depending on the nature of the sanitation system being delivered.

Finally there are the ongoing recurrent costs of operating and maintaining the system. These are usually handled through utilities or local government departments in the case of urban systems, but in rural areas responsibility may fall to community groups (sometimes comprising small commercial enterprises), local government, or non-governmental organizations.

The second defining dimension of a financing mechanism is who receives the support? The recipient may be an individual or household (receiving support either in the form of cash or delivery of reduced-price goods and services), the community or local government/the service provider.

The final defining dimension is timing. When is the support delivered? Broadly financing mechanisms fall into two groupings; those where payment is made ex-ante (prior to service delivery) and those where payment is made ex-post (on or after acceptable delivery of a service). This latter group includes performance-based incentive payments and output-based aid.

Using these dimensions Table 1 shows a summary of twelve broad groupings of financing mechanisms. Several of these are discussed in more detail below and analysed on the basis of the indicators laid out in Section 2: targeting, effectiveness, leveraging, sustainability and scale.

Direct and infrastructure subsidies for private hardware

(Table 1: H1, H2, C1). Perhaps the most familiar and commonly-cited form of sanitation subsidy is the use of public money to construct new infrastructure at the household level.

In rural areas and some urban contexts the most common form is payment of part or all of the cost of household toilets either in the form of cash or through direct provision, with labour and materials provided by government.

Targeting: may be done through means-testing, geographical targeting, or by subsidising only certain levels of services (a basic single-pit latrine for example).

In very few cases, subsidies may be delivered in the form of a direct cash or voucher payment or tax rebate (direct subsidy) against sanitation expenses along with a basket of other social services. This system exists in Chile for example and as Tax Credits in the UK and some other European countries. For these multi-sector financial tools, more sophisticated forms of targeting (means-testing for example) may become more cost-effective.

Effectiveness: Infrastructure subsidies for household sanitation have been widely deployed and are popular in public policy as they are a visible and ostensibly pro-poor instrument. However they can be problematic, particularly when coupled, as they often are, with target-driven supply-dominated programmes. In the worst cases, publicly-financed latrines may be built but never used. Some success has been anecdotally reported in schemes where payments are made ex-post (i.e. once a latrine is completed). Certainly ex-post payment ensures that a latrine is constructed although the challenge may remain to ensure that it is wanted and used.

Leveraging: Where households are expected to contribute part of the cost – often in the form of unskilled labour for excavating a pit – these types of subsidy may be seen as quite effective at leveraging household contributions. Unfortunately though they are often associated with direct public-sector provision and rigid standards, thus they may have the tendency to suppress local innovation and stifle private sector provision. The availability of free money from the government may also deter households from saving or borrowing money to invest in their own sanitation facilities.

Sustainability: Most direct and infrastructure subsidies focus exclusively on the provision of hardware rather than on its long term management. Rigidity in the provision of standard design toilets may even make it harder for these to be managed in the long term. Certainly evidence from South Africa is now coming to light to suggest that the widespread provision of subsidized single-pit latrines is now leading to a backlog of maintenance¹⁵.

Scale: Ultimately subsidizing household facilities can be costly and these programmes are often not financially sustainable at scale. An exception is the sanitation surcharge in Burkina Faso which uses a levy on the water bill of utility customers to pay for new on-site sanitation in informal urban settlements¹⁶. Failures in the former subsidy-driven Rural Sanitation Programme in India have led to the redesign of the Indian programme with a shift away from hardware subsidies (Tremolet et al. forthcoming; Peal et al. forthcoming). On the other hand the Government of Thailand sanitation programme, which includes hardware subsidies, has resulted in almost universal access to sanitation although the role of the subsidy specifically has not been analysed. Noticeably, countries with long standing subsidy-programmes tend to be middle-income countries with relatively strong utility service providers, such as Tunisia, for example.

Ex-post performance awards to communities and local government

(Table 1: C2, L3) In recent years there has been a significant increase in the use of ex-post performance awards to communities and local governments against pre-agreed sanitation targets. Particularly in South Asia this has been seen as a key part of national or regional programmes using the Community-led Total Sanitation Approach. Both India and Bangladesh for example offer financial rewards to local and district governments who achieve open-defecation free status (that is the elimination of open defecation).

Targeting: These schemes can be geographically targeted (made available to poorer regions) but it is generally difficult to steer funding to the poorest families within a community or district. In general funds are made available for any type of follow up investment following the meeting of the original target. Thus targeting depends on the ability and willingness of the local community or government to prioritise services that are valued by the poorest people. To date there has been little or no analysis of the equity impacts of these types of schemes although evidence from a recent WaterAid study did suggest that Community-led Total Sanitation (CLTS) projects as a whole have the potential to benefit all sections of society¹⁷.

Effectiveness: Again the effectiveness of incentive payments in achieving improved services for the poor is a function of both the underlying sanitation programme and the effectiveness of the monitoring and evaluation systems in place to determine when payments should be made. In India, assessments of open-defecation free (ODF) villages under the Total Sanitation Campaign (TSC) programme are carried out by independent consultants, hired by the Government of India on behalf of the State governments. A significant amount of work has been done to establish a rigorous framework for monitoring but there is little independent evidence as yet of the effectiveness of this system¹⁸.

Incentive payments have the potential to create incentives for sustainable sanitation systems, but again this depends on how the monitoring framework is designed; there is little evidence yet from India or Bangladesh for example, that targets have focused on anything beyond the elimination of open defecation, but the system has the potential to be redesigned as the objectives of the programme change. Similarly the scale of the program is determined by the number of communities and the size of the awards. So far the government of India reports that in the region of 17,000 communities (gram Panchayats) have received cash prizes under its Nirmal Gram Puraskar award scheme – suggesting that the scheme has potential to operate at a significant scale¹⁹.

Ex-ante intergovernmental transfers – hardware and software

(Table 1: L1, L4, C3) Perhaps the most significant cash flow into the sanitation sector comes in the form of on-budget intergovernmental transfers to local government and public-sector service providers to fund investments in hardware and software activities. More rarely such support is also provided to communities who take on the responsibility of managing community services. These on-budget recurrent payments often account for a significant percentage of

¹⁵ Eales & Potter (2008).

¹⁶ Savina & Kolsky (2004).

¹⁷ Evans et al. (2009b).

¹⁸ Bongartz & Monik (2008).

¹⁹ GOI (2009).

sector financing. A recent study by WaterAid suggested that, for water supply, reliable recurrent budgeting is more likely to be found in countries with a high degree of decentralisation, reflecting the fact that local governments can and do prioritise long term investment in water services²⁰. The study suggested that up to 80% of capital investments may be sourced from the local government's own budgets (revenue and intergovernmental transfers). Where decentralisation is weak, this share falls to around 20% and the available data suggests that the overall funding envelope is far from adequate. For sanitation the situation is likely to be similar although it is commonly suggested that the overall budget envelope for sanitation is much smaller (in terms of the needs) than that for water²¹.

The performance of this funding mechanism against the criteria laid out in Section 2 is difficult to assess, but in general observers note that funds tend to be taken up with paying salaries and establishment costs and that accountability tends to be weak particularly where political decentralisation is out of step with fiscal decentralisation (ibid.). Thus targeting and effectiveness may be relatively low. Proper attention to the delivery of sustainable sanitation may be hampered by the political necessity of distributing funding equally across regions and areas and by the limited flexibility in investment patterns. The proper financing of the recurrent costs of sanitation service delivery is however essential if programmes are to go to scale. It is clear that well-structured and properly-financed programmes will have recurrent funding needs and that if these are well financed there will be the potential to operate at scale (when compared for example to the potential of pilot or stand-alone investment projects). As has been noted in the background paper for Topic 2²², funding for hygiene behavior change and sanitation demand creation activities is a pre-requisite in most sanitation programmes. Creating incentives within these financial systems for better targeting, greater effectiveness and more sustainable investment may be an important strategy for improving the delivery of sanitation to the poorest.

Output-based subsidies to service providers or local government

(Table 1: L2, L5) In recent years there has been growing interest in the idea that public finance for infrastructure (generally hardware subsidies) would be more effective if they could be paid on delivery of outputs rather than for the purchase of inputs. This idea was generated largely within the donor community, seeking to make aid more effective, and in particular by the World Bank and several bilateral European donors. The formation of the Global Partnership for Output-based Aid recognized that the idea would be relatively new and that both southern governments and their development partners would need assistance to design projects that used output-based financing. However the idea is equally applicable to intergovernmental transfers and payments of subsidies to poor households. Indeed, the incentive payments associated with CLTS in South Asia are just one example of such output-based payments managed within the government budget.

Experience to date in the use of output-based financing for sanitation has been somewhat limited (with the exception noted above). The Global Partnership for Output Based Aid (GPOBA) has designed a number of schemes with incentives to increase coverage of sanitation in urban areas. In Morocco, a GPOBA-funded scheme has provided output-based financing to a number of service providers, both public and private, to extend water and sewerage to poor customers. The scheme is coupled to a grant-financed programme of urban upgrading and resettlement²³. Interestingly it is administered directly by GPOBA which is unusual. This may be due to the relative complexity of the programme and the need to monitor a range of different approaches used by the various recipients of the subsidy.

GPOBA place a lot of importance on the financial viability of the recipient agency, arguing convincingly that using concessionary funds to connect poor people to a service which cannot be financially sustained in the long term is a waste of scarce development funding. This can mean that many seemingly progressive projects do not ultimately get funded. In Gharbeya directorate in Egypt, for example, a proposed OBA scheme focused on creating incentives for private operators of wastewater treatment plants to increase the collection and proper treatment of septage from poor households. The financial viability of the scheme depended on the implementation of a previously-agreed tariff increase in order to ensure that the operators would be paid and would be able to continue to run the plants, but this has not yet been agreed. In Colombo, GPOBA are currently working with the National Water Supply and Drainage Board to design an incentive based subsidy programme to increase both connections to the sewer network and proper management of on-site sanitation which would extend the experience of OBA still further in the area of sanitation.

²⁰ Mehta & Mehta (2008).

²¹ Ibid. and see for example WHO (2008).

²² Jenkins et al. (2009).

²³ Chauvot de Beauchêne (2009).

Depending on the definition of the outputs, output-based financing can be well targeted, effective and sustainable. It also has the potential to leverage additional funding, if well designed. By paying only for delivery of working services, it can potentially go to scale more quickly than other arrangements because money is not wasted paying for inputs which do not achieve the expected output. However, output-based payment does attract a relatively high administrative cost – particularly at the current time when governments and development partners are unfamiliar with the concept. The need for rigorous monitoring and evaluation means that the ongoing costs can be higher than for more conventional financial arrangements although it can also be argued that a similar level of monitoring should be applied to all development projects.

Consumption and operational subsidies

(Table 1: H4, L7 and Connection subsidies, H3). Many urban sanitation customers connected to networked sewerage enjoy consumption subsidies since they do not pay the full operational costs of the sanitation service through the tariff. Where tariffs are artificially suppressed the service provider must either offset the consequent losses by reducing expenditure on maintenance (thus running down the value of the assets) or will require an operational subsidy.

Consumption/operational subsidies tend to be a rather 'blunt instrument' with poor targeting, since the majority of those connected to sewers are likely to be the non-poor²⁴. Operational subsidies could be better targeted if they were associated with management of on-site or networked services for the poorest households. For example this could include operational subsidies to pay for the proper disposal and management of pit wastes, where households are willing to pay the direct costs of pit emptying. Several cities, notably Freetown in Sierra Leone and Colombo in Sri Lanka are working to develop financial incentive schemes to encourage sludge tanker operators to empty pits in targeted poor areas and to dump the waste in approved locations.

Operational subsidies can be made more effective if coupled with connection subsidies since the available evidence suggests that it is generally the one-off cost of a connection, rather than the monthly tariff that is regarded as a financial barrier by the poor²⁵. Again the introduction of an output-based element to operational subsidies could also introduce greater effectiveness and sustainability – if for example it encouraged utilities to increase the rate of connection for poor customers or improve the management of wastewater treatment plants and faecal sludge management. Consumption subsidies are unlikely to have a leverage effect – connection subsidies are more likely to encourage greater investment in household plumbing and in payment of monthly operational charges. Finally, operational subsidies are unlikely to be viable at scale, without serious attention to improvements in overall financial sustainability of the service providers, since every new connection will simply increase the levels of losses sustained and the amount of the operational subsidy. In countries where only a minority of people are served by utility service providers of networked services, the potential impact of operational subsidies in terms of people benefiting is likely to be low.

Summary

A summary of the various options described above is shown in Table 2.

WHAT CAN DEVELOPMENT BANKS DO?

Better targeting of support to poor households to gain access to sanitation services requires attention to the specific elements of the entire sanitation value chain. This means that funding from development banks (including international and bilateral financial institutions) should:

- reach poor people;
- provide services that people want and can use; and
- fund the whole value chain of sanitation to ensure that potential health and environmental benefits are realised.

This requires that development banks reconsider the way in which they provide financing to the sector. Below are recommendations for development banks to enhance the pro-poor impact of their interventions in the sanitation sector:

Development banks should seek to develop a much more comprehensive view of the sanitation sector during the project design process. A proper understanding of the opportunities and constraints to access faced by poor people

²⁴ Morella et al. (2008).

²⁵ Brocklehurst & Janssens (2004).

Table 2. Summary of Potential of Various Financing Mechanisms

Financial mechanisms	Potential				
	Targeting	Effectiveness	Leveraging	Sustainability	Scale
Direct and infrastructure subsidies for private facilities	Potentially very good although evidence for good targeting is weak	Potentially very good but requires extremely good performance monitoring and pro-active management	Poor – can tend to crowd out household investment and private sector innovation	Poor – usually focuses on delivery of infrastructure rather than ongoing service provision	Poor – medium – depending on level of subsidy and cost of selected interventions
Ex post performance rewards	Poor within communities	Moderate – high depending on definition of outputs	Moderate – high when coupled with demand-responsive and CLTS-type interventions	Unclear – little evidence as yet of long term use of incentive payments	High, where interventions are relatively low-cost so incentives can be spread widely
Ex ante inter-governmental transfers	Generally poor although can be targeted to poorer regions or for software activities	Generally poor where incentives for staff are not oriented correctly	Moderate – good if coupled with demand-responsive and CLTS-type interventions	Good – sustainable financing of recurrent programme costs is an essential element of a sustainable programme	Good – high if service delivery is efficient
Output-based subsidies	Good – if outputs are well defined. M&E can be based on user feedback	Good – if outputs are well defined	Moderate	Very good – if full value chain of sanitation is defined as the output	Moderate
Consumption and operational subsidies	Usually poor – particularly in urban utility situations. Connection subsidies can perform better	Poor – can be enhanced if coupled with connection subsidies	Poor – connection subsidies have a higher potential	Potentially good, if coupled with connection subsidies and focused on delivering the whole sanitation value chain	Moderate to poor, unless coupled with incentives to improve financial efficiency and raise tariffs

would enable the design of more nuanced and better targeted financial interventions. As part of this, development banks should ensure that investments in water supply are coupled with appropriate interventions in sanitation, in cases where an increase in the water supply would otherwise result in adverse health and environmental impacts.

Development banks should seek to better understand the existing financial landscape in countries and sectors where they intervene and analyse how best to make use of all available funding sources, before designing new financial interventions. A more careful evaluation of supposedly pro-poor financial arrangements is required to ensure that these truly deliver sustainable benefits to household, community and society as a whole. This could help minimise distortions in the existing financial system. One area which requires further work is to better understand the extent to which general- and sectoral-budget support can be harnessed to improve access to sanitation for the poor. In general Banks have a responsibility to evaluate the financing regimes of their borrowers and grantees and to encourage well targeted, effective and sustainable financing regimes that can go to scale.

Adopting such an approach would require that banks work more in partnership with other agencies (taking care to ensure that partnerships are well designed and well managed) so as to attract and blend different types of finance for an entire program, ranging from commercial financing to grant financing and to ensure that the entire value-chain of sanitation is adequately financed before sinking funds into one particular aspect. This would help ensure that the right types of funding are directed to the appropriate financing gaps in the sanitation value chain. For example, where commercial financing might be appropriate to the development of public sanitation facilities or a wastewater treatment plant, this could be coupled with an effective grant-financed program to allow poor people to connect to the network

which serves the plant. Similarly, grant money can be used in a targeted manner to support demand creation and hygiene promotion to maximize the potential of households own investment in sanitation goods and services. Since development banks are not always experienced in working directly with poor communities, other organisations could step in to manage these elements of the programme, thus enhancing the impact of both the commercial and grant funding.

Development banks are also in a good position to deliver support to micro-finance institutions including financing for initial start-up costs or seed financing for MFIs willing to get involved in the water and sanitation sector and for increasing awareness of the potential of microfinance in the sector.

They could also pay greater attention to performance- and output-based regimes where these have been shown to have potential (for example, by using ex-post performance rewards and output-based subsidies as illustrated on Table 2).

Finally banks could work to improve the design and effectiveness of their monitoring and evaluation frameworks, to ensure that the funds disbursed have effectively contributed to improving access. Measuring financial interventions against the five parameters laid out in Section 2 (page 3) would provide banks with a much better view of the impact of their money.

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SESSION 3

Sanitation Options for Low Income Urban Areas: Technical Options and Financial Arrangements

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ABSTRACT

Two trends characterise the current world population development: absolute population growth and rapid urbanization. Rapid urbanization, taking place in Asia, Latin America and Africa, puts major pressure on the affected regions. While most of this growth is expected to occur in low-income areas, today's development of e.g. Asian countries is stamped by a combination of urbanization with high rates of economic growth. A conventional centralised infrastructure of supply, treatment and disposal of water cannot cope with the new challenges arising from these incomparably high growth rates. New approaches are therefore required for ecological, socio-cultural and economical reasons, and – at least partially – they do exist.

In the main paper Professor Duncan Mara makes a distinction between on-site and off-site sanitation and high density and lower density population areas. In high-density areas (4 160–200 inhabitants/ha), he sees three viable options: simplified sewerage, low-cost combined sewerage and community-managed sanitation blocks. In lower density areas, pit latrines, vault latrines, biogas latrines and pour-flush toilets are technically well established solutions. Emptying the pits when they are full often turns out to be highly problematic in practice and it needs to be addressed specifically. Community participation is crucial for the viability of any options. Cooperative approaches can reduce costs and increase the utility's financial viability. Access to well embedded micro-finance is important to facilitate household-level investment. Similarly, if service providers have access to long term funding, and if the purchasing power is on a certain level, central systems become affordable for low income areas.

In the co-paper Professor Peter Cornel presents the vision of a semicentralised approach focusing on integrated water supply and treatment structures for wastewater and waste at neighbourhood level. He argues that a shift from centralised to semicentralised supply and treatment systems will minimise the severe discrepancy between rapid urban growth and the provision of supply and treatment infrastructure. The semi-centralised approach offers great flexibility in implementation, energy self-sufficient operation, as well as enormous saving potentials in water demands through intra-urban water reuse. Even for higher income areas, the approach has advantages when compared to centralised sectorised solutions.

In the annex Alain Mathys deals with affordable access to improved sanitation services for households located in low-income peri-urban areas and slums. In 1998, the water operator in charge of the water and sanitation services of the municipalities of La Paz and El Alto (Bolivia) started the construction of condominial sewerage systems in low-income areas of the city of El Alto. Prior to the project, 70% of the inhabitants relied on outdoor faeces disposal. With 60% of the population below the poverty line, most houses were not equipped with toilets and other sanitary facilities. The overall result of the project was definitely positive and it demonstrated that reaching universal coverage in water and sanitation even in very poor communities is possible. A sustainable approach has to combine appropriate engineering design, community participation, promotion of sanitation and hygiene education and micro-credit.

INTRODUCTION

The world's population is increasing almost exponentially at present, but almost all population growth over the next 40 years is expected to occur in urban areas in developing countries, as shown in Figure 1. We can expect most of this growth to be in low-income areas, and therefore sanitation solutions have to be appropriate for these areas, whether they are slum areas or not – with “appropriate” here meaning socioculturally acceptable, financially affordable and institutionally feasible.

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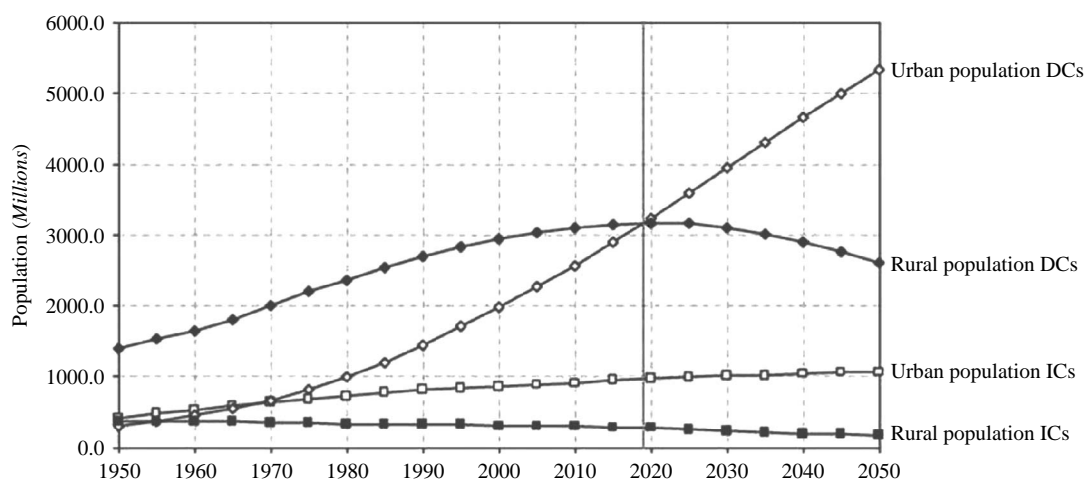


Figure 1. World population 1950–2050. DCs: developing countries; ICs: industrialised countries
 Source: United Nations Department of Economic and Social Affairs, Population Division (2008)

A highly practical approach to sanitation technology selection has to be taken. It is therefore useful to consider two broad types of sanitation system and two broad population-density classifications. These are:

- on-site sanitation, and
 - off-site sanitation
- and:
- high-density areas, and
 - lower-density areas

On-site and off-site sanitation systems

On-site sanitation systems are those in which the excreta, toilet-flush water (if any), and greywater are disposed of into the ground within the plot area if individual household-level sanitation is provided, or within or adjacent to the area in which the community lives if communal facilities are provided. Off-site systems are those in which the excreta, toilet-flush water and greywater are piped away from the households, ideally to a wastewater treatment works and subsequent use of the treated wastewater in aquaculture and/or agriculture.

On-site systems include the following:

- ventilated improved pit (VIP) latrines, which may have single pits or alternating twin pits,
- urine-diverting alternating twin-vault ventilated improved vault latrines (also called eThekwini latrines),
- pour-flush (PF) toilets, which may also have single pits or alternating twin pits,
- biogas toilets, and possibly also
- ecological sanitation systems.

Off-site systems include:

- simplified sewerage (also called condominal sewerage), and
- low-cost combined sewerage.

Further distinction may be made between individual-household sanitation systems and communal (but, as detailed in section 2 below, preferably community-managed) sanitation facilities; the latter may be on-site or off-site systems. Commonly there is also an institutional distinction: the local water and sewerage agency is generally responsible for simplified and low-cost combined sewerage but not for on-site systems, which are normally the responsibility of the users under the oversight of the environmental health department (or equivalent) of the local council – see the Background Paper for Session 4 of this Symposium.

For descriptions of all these systems see 'Further Reading' below.

High-density and lower-density areas

This distinction is useful because it was found in northeast Brazil in the early 1980s that simplified sewerage became cheaper than on-site sanitation above a population density of ~ 160 persons per ha.¹ In South Africa the corresponding figure is ~ 200 persons per ha.² The term “lower-density areas” is therefore used here to refer to urban areas where at least one on-site sanitation system is cheaper than simplified sewerage.

SANITATION OPTIONS IN HIGH DENSITY AREAS

In high-density areas there are three options: simplified sewerage, low-cost combined sewerage and community-managed sanitation blocks.

Simplified sewerage

Simplified or ‘condominial’ sewerage was developed in northeast Brazil in the early 1980s to serve high-density periurban areas. Essentially the very conservative design codes for conventional sewerage were relaxed in order to reduce the sewer diameter, minimum gradient and depth, while maintaining rigorous hydraulic design principles – in fact simplified sewerage is more rigorously designed than conventional sewerage.³

The minimum sewer diameter used in simplified sewerage is 100 mm and, for a minimum tractive tension of 1 kN/m^2 (which ensures self-cleansing of the sewer), the minimum sewer gradient is 1 in 200 (i.e., 5‰), and the sewer is commonly laid in-block to reduce the length of house connections. A 100-mm diameter sewer laid at this gradient can serve ~ 200 households of five persons with a water consumption of 100 litres per person per day. Cost comparisons between conventional and simplified sewerage in Brazil, India and South Africa have shown that the cost of simplified sewerage is $\sim 35\text{--}50\%$ of that of conventional sewerage.

Community participation in the design of simplified sewerage schemes is essential for success.⁴ Sewerage agencies that fail to engage effectively with their low-income customers simply ensure the failure of their schemes.⁵

Low-cost combined sewerage

In low-income areas subject to regular flooding low-cost combined sewerage is often less expensive than simplified sewerage and separate stormwater drainage.⁶ The design basis adopted in the state of Rio de Janeiro in Brazil is as follows: (a) the drainage area should not exceed 12 km^2 (see also the co-paper on semi-centralised solutions); (b) the design stormwater flow is that resulting from the local 10-year flood; and (c) the minimum sewer diameter is 400 mm. The sewer gradient is determined for the peak daily wastewater flow in the dry season and the sewer diameter selected to carry the 10-year storm flow.

Community-managed sanitation blocks

In high-density low-income urban areas, including slum areas, often the only viable sanitation system is community-managed sanitation blocks of the type promoted by SPARC, the Society for the Promotion of Area Resource Centres, an Indian NGO (www.sparcindia.org). These sanitation blocks are designed, built, owned and managed by the communities they serve: they are for the use of the community members, who pay for its upkeep⁷ – they are in no sense public facilities, although a community may allow casual use on payment of a per-use fee. These sanitation blocks, which commonly have a piped water supply, are better designed and managed than conventional government-funded and contractor-built communal toilet blocks without community participation and they cost less. In Bangladesh, there is positive experience with community-managed sanitation blocks comprising a loan component.⁸ This model of community-designed, built and managed sanitation blocks is easily adaptable to other sociocultural settings – for

¹ Sinnatamby, 1986

² J. Bhagwan, Water Research Commission, Pretoria, personal communication, 2007

³ Mara et al., 2001; Melo, 2005

⁴ de Andrade Neto, 1999; see also the El Alto example in the annex

⁵ Watson, 1995

⁶ Guimarães and de Souza, 2004

⁷ Burra et al., 2003

⁸ Khandaker, 2004

example, it has been successfully applied in Kibera slum in Nairobi. Generally help from a local NGO is required initially to catalyze community activity and to interact, on behalf of the community, with and seek financial support from the local city or town council.

SANITATION OPTIONS IN LOWER DENSITY AREAS

Pit latrines, vault latrines, biogas latrines and pour-flush toilets

These options are technically well established (see 'Further Reading' below). Which one is the most appropriate in any given situation is best determined with the beneficiary community. Emptying the pits when they are full is often in practice highly problematic and pit emptying needs to be addressed fully at the sanitation option selection stage. Generally it requires regulatory and institutional arrangements including payment procedures. One important factor is to reduce the cost for proper sludge removal and disposal and treatment (e.g. a sufficient number of acceptance points reducing transport costs).

Ecological sanitation

While it is true that 'EcoSan' solutions offer in principle sound advantages from the reuse of the nutrients (principally nitrogen and phosphorus) in human excreta, costs are currently very high and, to quote Otterpohl,⁹ ecological solutions "are not really ready for large-scale application, except in rural areas." In urban settings, the cost for organising transport and reuse generally exceed the value of nutrients – the recent abandonment of the EcoSan systems in the 'EcoTown' of Erdos in China provides good evidence for this view.

Keys to successful programmes and projects

The Lesotho Low-cost Urban Sanitation Programme, which started in 1980 and was based on VIP latrines, serves as a very good example of a successful project. Its keys to success were as follows:¹⁰

- an affordable and acceptable latrine design;
- minimal direct grants or subsidies to householders;
- all latrine construction done by the private sector;
- a comprehensive programme of latrine promotion and hygiene education;
- integration of the project into existing government structures; and
- strong coordination in policy and planning between different departments promoting improved sanitation.

PROVEN SOLUTIONS

Water and sanitation cooperatives

Supplying water supply and sanitation services to groups of households is simpler and much cheaper than to individual households.¹¹ Groups of households form cooperatives, and the local utility bills the cooperative, rather than individual member-households. The cooperatives may be:

- community-managed water-and-sanitation block cooperatives;
- standpipe cooperatives with either individual simplified-sewerage connections or individual on-site sanitation systems;
- yard-tap cooperatives with either individual simplified-sewerage connections or individual on-site sanitation systems; or
- multiple-tap in-house cooperatives with individual simplified-sewerage connections (this option is for non-poor households).

⁹ 2008

¹⁰ Blackett, 1994

¹¹ Melo, 2005; Mara and Alabaster, 2008

The type of cooperative is chosen by the community in conjunction with the local utility. The sewerage service would be a simple surcharge on the water fee.

Microcredit: VIP latrines in Maseru, Lesotho

Householders in Maseru receiving VIP latrines as part of the Lesotho Low-cost Urban Sanitation Programme obtained a loan from the parastatal Lesotho Bank which was repaid in 20 instalments over 24 months at the bank's normal rate of interest – no payments were to be made in December and January as householders had Christmas expenses and school fees to pay. The loan was obtained from a bank rather than from the government as people knew that the government was relatively inefficient at collecting loan repayments. In the event loan repayments were high and defaulting households were mostly the non-poor who thought they could reasonably escape payments. The whole process was very well organised (see Box 1 below) and it clearly lends itself to replication elsewhere. The proportion of poorest urban population that did not benefit from the loan programme and could not afford the VIP construction was limited to roughly 10%.¹²

Box 1. Sanitation Financing – The Lesotho VIP Latrine Loan Scheme

HOW TO GET CREDIT FOR YOUR VIP

“If you do not have the funds to build a VIP now, then you can apply to USIT^[1] for a loan from Lesotho Bank. This is what you have to do:

1. Go to your nearest USIT office and ask for a full explanation of the Loan Scheme and the various options available.
2. With USIT assistance, complete the Loan Application Form. You can choose to repay your loan over any period of up to 20 months. Interest will be charged at the normal Lesotho Bank rates on the loan. In exceptional circumstances, repayment of the loan could be negotiated for a longer period.
3. You will then be called for an interview by the Loan Approval Committee (LAC). They need to check that you are over 18, that you can produce a site ownership certificate and that you are likely to meet your monthly repayments. Before you can receive for the loan you will have to collect 120 blocks and sand for the substructure. You must also dig your own pit.
4. When you have collected the materials, you will have to sign an “Acknowledgement of Debt” agreement and commit your collateral against the loan amount. You should then pay the M 10.00 registration fee.^[2] This fee covers the cost of paperwork, flyscreen, roof screws and a few small items. You will then be given a “loan number”.
5. USIT will help you find a trained builder and give you a purchase order for the remaining materials and the builder's fee.
6. After you collect the materials yourself from the suppliers, the builder can start building. A USIT Technical Officer will check that it is built correctly. When it is finished, you will have to sign a completion certificate, stating that you are satisfied with the VIP – before the builder is paid.
7. When the invoices have all been paid, USIT will set up the loan with Lesotho Bank. You will be given a Loan Repayment Card to take with you to the Bank. The repayment should be made on or before the first day of every month.
8. If you have any financial problems and cannot make a repayment, talk to USIT community staff about it and USIT will try to help you. Remember, if you repay in less than 20 months, you will pay less money in interest.”

Notes: [1] Urban Sanitation Improvement Team; [2] M10 ¼ approx. US\$3.50.

Long term loans: Simplified sewerage in northeast Brazil

In the early 1980s the cost of simplified sewerage in low-income areas of Natal in the northeastern Brazilian state of Rio Grande do Norte was US\$ 350 per household.¹³ CAERN, the state water and sewerage company, borrowed money

¹² Wsp, 2002

¹³ Sinnatamby, 1986

for a simplified-sewerage project from the then Banco Nacional de Habitação (now the Caixa Econômica Federal) and determined it could repay the loan over 30 years by surcharging the monthly water bill by only 40% (rather than the 100% surcharge used for conventional sewerage) thus no subsidies were required and the schemes were self-financing. In January 2008 the surcharge was 35% and the monthly payment equivalent to ~1.7% of the local minimum monthly wage,¹⁴ thus clearly demonstrating the affordability of the system.

This is a very pertinent example as it can be straightforwardly applied to any local sewerage agency and any local or non-local development bank in areas where the general purchasing power is sufficient to pay for such cost-efficient services.

CONCLUSIONS AND RECOMMENDATIONS

- Well-tested, socioculturally acceptable, financially affordable and institutionally feasible sanitation options for low-income urban areas are currently available for use at scale (e.g. Lesotho, India, Bangladesh, Brazil).
- Financing institutions should ensure that during programme design, all relevant sanitation options have been considered. This requires that in the selection process of consultants the experience with relevant sanitation options and with participatory planning processes is one of the selection criteria.
- In very low income high density areas the affordable service level might be limited to community managed sanitation blocks. Financing mechanisms can facilitate the access of communities to better facilities through the provision of medium term loans.
- Water supply and sanitation cooperatives can achieve substantial cost reductions.
- Successful micro-financing models are available and replicable for on-site sanitation. They are most effective in combination with a well organised private sector offering good low cost technical options. Programme support should look at both loan facilities offered by micro-finance institutions and qualification of private sector artisans.
- Simplified sewerage becomes affordable for poorer households, if the implementing institution can rely on long term loans (e.g. 30 years). Financing institutions should contribute to overcome the lack of long term credit facilities in countries with poor overall economic performance (e.g. Sub-Saharan Africa).

¹⁴ Mara, 2008

Co-Paper: Semicentralised Supply and Treatment Systems – Integrated Infrastructure Solutions for Fast Growing Urban Areas

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CHALLENGES OF FAST GROWING URBAN REGIONS

Worldwide, rapid urban growth has tremendous effects on the infrastructure of supply, disposal and treatment of water, wastewater and solid waste. The environment is put under serious strain by deficient or missing wastewater and waste treatment plants. Not only does this situation cause worldwide environmental damage, it also causes inadequate access to water and sanitation for the growing urban population and, in connection, results in aggravating health problems. As stated by WHO/UNICEF in 2000, “one-sixth (1.1 billion people) of the world’s population is without access to improved water supply and two-fifths (2.4 billion people) lack access to improved sanitation. The majority of those affected live in Asia and Africa. Fewer than one-half of all Asians have access to improved sanitation.” As regards sanitation in China, for instance, it can be predicted that problems related to an insufficient water supply and treatment will increase in the next couple of years.¹⁵ At the global level, the situation regarding water supply has especially worsened in urban areas: “Unlike urban and rural sanitation and rural water supply, for which the percentage coverage has increased, the percentage coverage for urban water supply appears to have decreased over the 1990s.”¹⁶ It has been widely acknowledged that there is a close link between water supply and sanitation, human health and development in general. This puts the improvement of access to water and sanitation high on the global development agenda.¹⁷

New infrastructure solutions needed to cope with urban growth

To improve the access to water and sanitation, two main objectives are to be pursued. First the environment must be protected from pollution, secondly the wastage and overexploitation of resources have to be reduced to a minimum. Today this has been recognised worldwide. In particular the formulation of the Millennium Development Goals (MDG) reflects the increased awareness of this necessity. In the context of Goal 7 (“Ensure environmental sustainability”), of specific relevance are Target 9, to “reverse the loss of environmental resources”, and Target 10, to “halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation”. Among the recommendations formulated to achieve these targets the identification of new water sources, such as rainwater and reclaimed wastewater¹⁸ is vital. With regards to densely populated and fast growing urban areas, this inevitably requires intra-urban water reuse. The applicability of specific technologies to this end has to be assessed context-related manner. In addition to the ecological aspects of water reuse there are strong economical arguments for reclaiming water. The increasing water demand while natural resources (groundwater, surface water) remain fixed inevitably leads to scarcity in highly condensed urban regions. Rising prices for the purification of tap water from alternative resources (like seawater by desalination) are the direct outcome. They can only be prevented through a massive reduction of the amount of water needed by reusing main fractions. This will additionally save energy for transport and conditioning.

However, it is obvious that this objective is barely realisable with the conventional centralised supply and disposal systems, as they were implemented in industrialised countries in the 20th century. Centralised treatment units can treat the sewage of millions of urban residents – but only if the grid system necessary is comprehensive and regularly maintained and the population to be supplied with infrastructure is more or less steady. Yet the urban reality

¹⁵ Wilderer et al., 2003

¹⁶ WHO/ UNICEF, 2000

¹⁷ Lenton et al., 2005

¹⁸ UN, 2008; Lenton et al., 2005

of developing countries is characterised by a population increasing by some dozen up to several hundred people a day.¹⁹ Shanghai for example grows by 32 people per hour,²⁰ resulting in an additional 280,000 inhabitants per year, or more than 2 Million more people. This occurs within a typical time frame of 7 to 10 years from the planning, financing and building of sanitation infrastructure like sewers and centralised treatment plants. One of the main features of centralised supply and disposal systems is the poor flexibility in associated facilities, which makes an appropriate standard of supply and disposal economically almost impossible in growth-periods. The treatment capacity of technical units has to be much higher than the actual individual demand. Furthermore centralised systems have a high and long-term capital commitment, because of their vast grid network. Because of the obvious shortcomings of centralised pipe and sewerage systems, alternative solutions have been discussed worldwide. One of them involves decentralised sanitation systems treating waste waters on-site at the household level. These might be appropriate within areas characterised by low population densities but not within densely populated urban areas because of the limited availability of space for on-site treatment facilities. On the other hand, household-based solutions such as compost toilets, household-based urine-separation and rainwater collection treatment have already been proposed as possible solutions. These systems give valuable information. In urban areas with high population densities, however, problematic aspects such as (monitoring) quality standards and surveillance, hygiene, maintenance and performance put in doubt a widespread use of household-based solutions as stand-alone solutions.

Another challenge predominantly surfacing in fast growing developing countries is the rising amount of sewage sludge, a result of increasing treatment capacities. At the same time, fast growing urban areas have to focus on increasing amounts of residual waste. For both challenges there suitable and reliable solutions are missing, especially in urban regions with high population densities and therefore lacking space.

To overcome the shortcomings of centralised systems on the one hand, and of household-based decentralised systems on the other, a semicentralised approach will be developed. But semicentralised doesn't only indicate the size of a system. A simple shift from sectorised centralised to semicentralised supply and treatment systems, from industrialised countries to fast growing urban regions in newly industrialised and developing countries, does not appear to be appropriate. Intra-urban water reuse fosters relatively compact structures, avoiding substantial transports of wastewater out of the city borders for treatment and of the service water back into the city for reuse. For this reason, the shift from traditional centralised systems towards semicentralised solutions is a decision in favour of integrative planning and proceeding of technical infrastructure as well as material and energy flows.

The Semicentralised approach—supply and treatment on district level

The implementation of innovative semicentralised supply and treatment systems will minimise the grave discrepancy between the rapid urban growth and the provision of reliable and sustainable supply and treatment infrastructure systems. Intra-urban recycling, especially the reuse of water and the recovery of energy from waste and sludge are an advantage of compact systems, which avoid long-distance transports of wastewater, waste and sludge and foster a close-by treatment of domestic material flows.

Semicentralised systems—integrated treatment technologies

In contrast to conventional city-wide systems, semicentralised supply and disposal systems do not comprise entire cities, but work in smaller district units (cp. Figure 1).

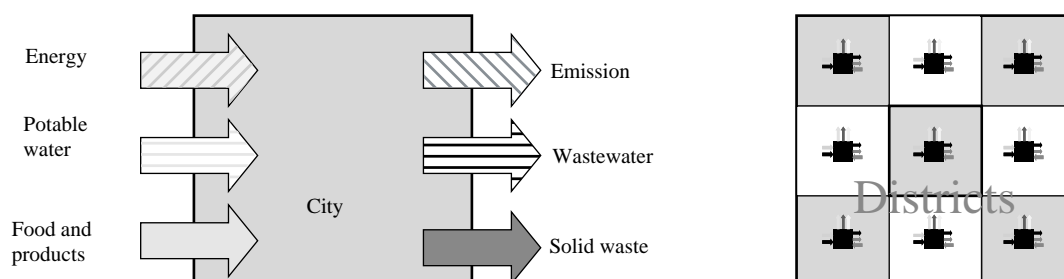


Figure 1. Centralised (left) vs. semicentralised (right) supply and treatment systems (Weber *et al.*, 2007)

¹⁹ Shanghai Statistical Bureau, 2007

²⁰ Burdett & Rohde, 2007

Semicentralised supply and treatment systems therefore offer the opportunity of integrated treatment facilities for water, wastewater and residual waste. They provide service water for intra-urban use, e.g. for toilet flushing or irrigation of public greens, for the entire district of a city.²¹ As Figure 2 shows, each district operates its own Semicentralised Supply and Treatment Centre (STC). The combined treatment in STC includes the implementation of new technical solutions and treatment methods to optimise mass and energy flows for instance by the co-fermentation of organic waste and wastewater sludge.

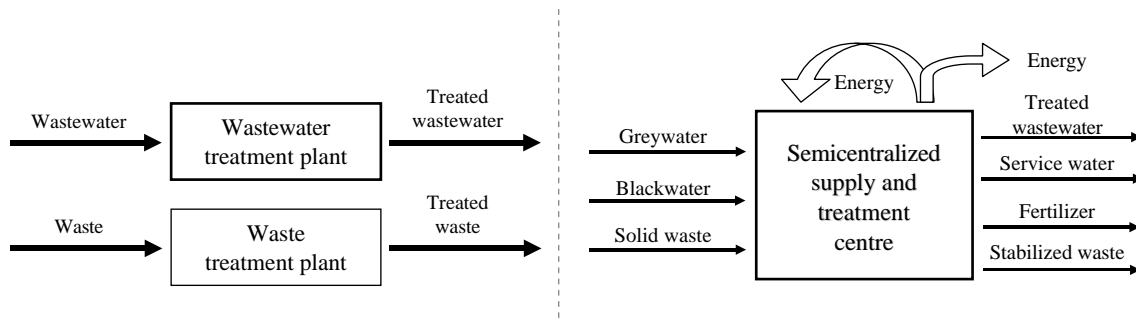


Figure 2. Comparison of sectored centralised (left) and integrated semicentralised (right) material flows in supply and treatment systems

To minimise the distance between the households (source of greywater and blackwater as well as consumer of service water) and the treatment location of the water flows, the STC has to be located close to urban housing areas. The contiguity of housing and treatment units requires a compact STC design due to high land costs and development pressure. Therefore compact treatment methods are of particular interest. In addition, emissions (such as odour and noise or air pollution) need to be reduced to a minimum. These requirements are best met by enclosed solutions.

The residential reuse of water and the integrated treatment of solid waste and sewage sludge are key elements of the integrated semicentralised concept and consequently of enclosed solutions. A determination of specific treatment technologies is not intended – the choice has to take the specific circumstances into consideration.

The treatment of tap water for producing high quality potable water is an option which is not included in the subsequent energy balance.

Scale and flexibility

As indicated above, the overall aim of semicentralised supply and treatment systems is to contribute to improve techniques. At the same time it guarantees flexibility. This is based on the assumption that the conflicting pillars of sustainability, economic, social and ecologic interests can only be balanced in an integrated and condition-adapted system. Integration concerns the utilization and optimization of interfaces between different supply and disposal sectors, such as solid waste, water and wastewater, through the recycling of materials. Therefore the system has to be adaptable to the specific situation of a given context. This in turn can only be achieved by a flexible supply and treatment system. Hence, semicentralised supply and treatment systems must be flexible in implementation.

A further central issue concerning the design of a semicentralised supply and disposal systems is the scaling. In accordance with the concept of adaptation to specific contexts, the actual size of the population supplied by one unit has to be assessed from case to case, but is to be guided by the principle “as small as possible as big as necessary”, coping with the ambivalence of sustainability with regards to economic as well as social and ecologic interests. The comparison of different scales, starting from about 10,000 up to more than 200,000 capita suggested the recommendation of a best suitable scale (according to ecological, sociocultural and economical reasons) of 50,000 up to 200,000 capita in a fully integrated semicentralised supply and disposal system.²² Latest research provides the evidence that this scale is also recommendable if the system is not fully integrated, i.e. not comprising all four material flows (water purification, greywater treatment, blackwater treatment, integrated sludge and waste treatment), but any case-adapted integrated solution.²³

²¹ Böhm et al., 2006

²² BMBF, 2006

²³ Bieker 2009, to be published

Furthermore, supply and treatment are carried out by qualified personnel, thus assuring maximum reliability in achieving high quality standards, the control of material flows, and above all hygiene in water distribution and water reuse. In addition to these advantages, planning and design are much more reliable as it comprises smaller and manageable frames in time and space as well as economical advantages.²⁴

ADVANTAGES OF THE SEMICENTRALISED APPROACH

In comparison to conventional (sectored) centralised supply and treatment systems integrated semicentralised solutions offer a range of advantages, like:

- Water savings – e.g. 30–40% by non-potable intra-urban reuse for toilet flushing;
- Energy self-sufficiency – to operate independently and reducing operational costs;
- Minimised carbon footprint – by using resources from wastewater and solid waste;
- Decreased capital commitment – by adjusted, modular and flexible growth;
- Reduced operation costs – by minimising the energy bill;
- Higher flexibility and therefore higher planning certainty.

These will be outlined below.

Water savings and energy self-sufficiency

To illustrate the saving potentials in energy matters, the sectored centralised approach needs to be analyzed in more detail. Figure 3 shows a scheme of conventional treatment in fast growing urban regions in China, using the example of the city of Qingdao. The fresh water demand ranges at about 109 L/(C · d) and the needed waste treatment amount is of about 1 kg/(C · d).²⁵

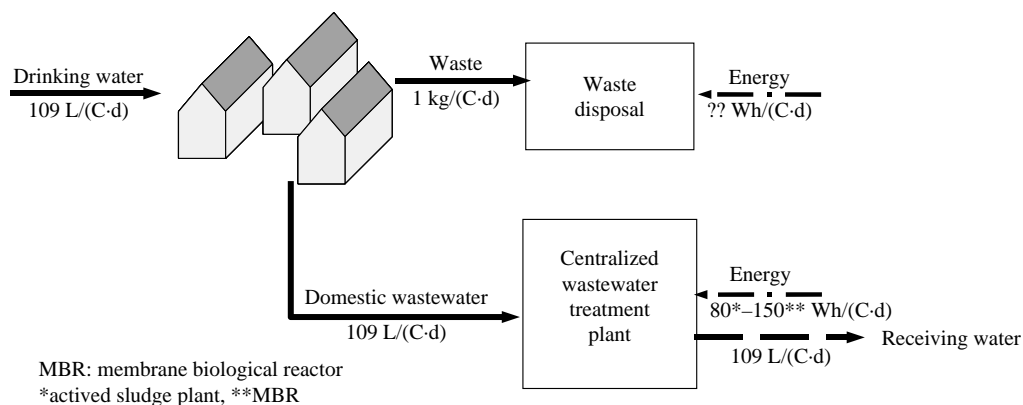


Figure 3. Material and energy flow in a conventional centralised system—the case of Qingdao, P.R. China [Cornel *et al.*, 2007]

In comparison, the integrated semicentralised approach, visualizing the example of the city of Qingdao (cp. Figure 4), can achieve large reduction rates: In a first step toilet flushing is operated with service water gained from greywater (in this case: greywater 'light' – gained from washing machines and bathing), which can save more than 40% of the needed tap water. Higher water reduction rates can be achieved by treating the whole amount of the arising greywater (greywater 'light' plus hand wash basins and kitchens). The flexibility of the semicentralised approach allows an application-optimised operation, also in terms of service water.

²⁴ cp. Paragraph Capital commitment and planning certainty

²⁵ Bi, 2004

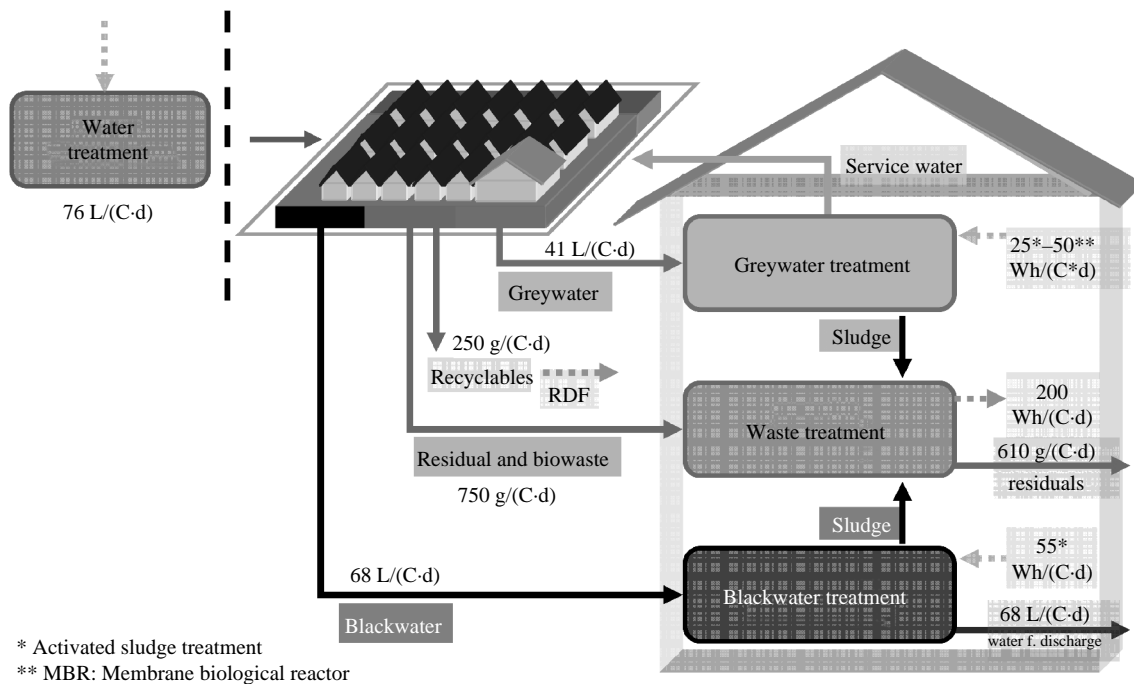


Figure 4. Material and energy flows in an integrated semicentralised supply and treatment system (scenario greywater 'light' reuse) – the case of Qingdao, P.R. China

The treated greywater for non-potable use in private households has to meet high quality standards. The example of China shows the quality level required: according to GB/T 18920-2002, water quality standard for urban miscellaneous water consumption, water for toilet flushing has to fulfil the following requirements as for example (extract):

- TDS \leq 1,500 mg/L
- BOD₅ \leq 10 mg/L
- NH₄-N \leq 10 mg/L
- anionic surfactants \leq 1 mg/L
- coli form \leq 3/L²⁶

The integration of sludge and waste treatment leads to an increase of the overall system efficiency and a decrease of the amount of residues to be disposed. At the same time the sludge gets stabilised and a solution is provided for the currently severely deficient situation of the treatment of wastewater sludge.²⁷ The biogas obtained from the integrated anaerobic treatment of sludge and waste is (under biogas-optimised treatment conditions) energetically sufficient to provide for the STC's electric energy demand and even to produce a surplus for additional purposes. An energy self-sufficient operation of the integrated semicentralised supply and disposal systems is therefore possible.

Some figures as they result from a feasibility study: There's a system demand of 25 up to 50 Wh/(C·d) for the greywater treatment, according to the chosen treatment method. Additionally around 55 Wh/(C·d) are needed for blackwater treatment. The example of Qingdao excludes potable water purification on a semicentralised scale for statutory reasons; therefore the potable water purification is not part of the energy balance. The conversion of biogas into electricity generates about 300 Wh/(C·d). Approximately 100 Wh/(C·d) are needed for solid waste treatment, so there is a surplus of 200 Wh/(C·d). Deducing the system needs for greywater and blackwater treatment, an energy surplus of 95 to 120 Wh/(C·d) is to be reflected in the energy budget. Although the surplus might be further reduced in practice it seems at least to be sufficient for pumping waste water and distributing service water.

Concurrently, the energy production from waste and sludge improves the carbon footprint of the STC. The energy is (nearly exclusively) gained from organic material, the wastewater treatment sludge as well as bio waste and residuals.

²⁶ GB/T 18920-2002

²⁷ cp. openPR, 2008; Bfai, 2008

By using the biogas out of this sludge and waste, not only is the energy bill reduced to a minimum, also the CO₂-balance of the whole system is significantly improved. Ongoing research will clarify the greenhouse gas balance further.

Another advantage of the integrated semicentralised approach is the proximity between consumers and treatment facilities. This allows for short sewer and pipe systems and can reduce water losses to a minimum. It also permits to separate municipal wastewater from industrial wastewater, resulting in a convenient water reuse. Treated wastewater can be profitably launched for domestic use as toilet flushing or intra-urban irrigation, because long transport distances between use and treatment are avoided. At the same time, close-by waste treatment facilities minimise transport routes and optimise the recycling of resources according to energy recovery.

Furthermore, the temperature of the separated greywater provides potentials in heat-recovery, which can be easily employed in nearby settlement structures, e.g. for heating processes. If appropriate applications for thermal use exist, additional heat can be received from the conversion of biogas into electricity. Depending on the system configuration, up to 1.5 times as much of the amount of the gained electricity can be achieved.

Capital commitment and planning certainty

Semicentralised systems focus on small and compact units, avoiding large distances between housing and treatment plants – with economic saving potentials and without any lack of comfort. In earlier times, odour, noise and hygienic aspects have been sound reasons to locate waste and wastewater treatment units far away from housing and other sensitive uses. Modern treatment techniques and methods, on the other hand, enable close-by treatment with the opportunity to save massive resources even without any changes in the habits of water use.

One essential consequence of the proximity between the accruing and the treatment location is the massive reduction in grid scale. Considering that 70%–80% of the capital costs of a wastewater system result from the sewer lines,²⁸ any reduction in grid distances and diameters leads to enormous saving potentials. Moreover, shorter distances induce lower investment needs and operation costs for water transport and pumping.

In addition, planning and operation are much more reliable than in conventional centralised systems, as the integrated semicentralised system consists of smaller and better manageable frames in time and space. One line of argument regarding the reliability of planning is as follows. Realizing a centralised system for several 100,000 or even million people is a planning risk. What happens, if the development scenarios fail because of unforeseen circumstances such as worldwide economic turbulences or simply false forecasts as those put forward in East Germany in the last decade of the past century? Investments in far too large sewer system and treatment facilities are not only an economical disaster but also pose technical challenges. These are corrosion in the sewers induced by anaerobic degradation due to low flow velocities and the operation of the treatment facilities far below the designed capacity. As far as semicentralised systems of some 10,000 properties are concerned, the planning scenarios offer a very different reliability, even in new development areas. Within three to five years the planned scales of integrated semicentralised supply and disposal systems can operate fully loaded.²⁹ And even if those development scenarios failed, the economic casualties would be incomparably lower than for centralised systems. This additional flexibility offers a huge advantage in spatial planning and spatial development in general. Further potential may lie in the standardisation of planning and construction processes of integrated semicentralised systems. Ascertained reductions in planning and realisation through off-the-peg solutions are conceivable, but are still under advanced investigation.

Finally, semicentralised scales are much less vulnerable in terms of external influences. Even in case of complete system failures as a result of natural disasters like floods or earthquakes, the impacts to civil life are not comparable in terms of affected properties. For the same reason semicentralised supply and disposal systems would be of no interest as potential targets for terrorism, because the effects would be strictly limited as contrasted with centralised systems of several 100,000 connected residents.

Implementation strategies for semicentralised systems

Although the overall recommendation of the scale of integrated semicentralised supply and treatment systems focuses on 50,000 up to 100,000 inhabitants served, smaller units can also be realistic. Current research and data from a feasibility study in a coastal city of China gives reasons to believe that the higher investment costs of semicentralised systems are going to pay off after a period of 15 to 20 years, because of the substantially lower operation costs of semicentralised solutions resulting from closed water and energy loops within the system. If these prospects will be

²⁸ cp. Günthert, 2001

²⁹ cp. Bieker, 2009, to be published

confirmed, the above mentioned argumentation in terms of flexibility and planning certainty of integrated semicentralised supply and treatment systems will be corroborated even further.

Further studies are focusing on the partial integration of some material flows to enhance the adaptability of the semicentralised supply and treatment system even more.³⁰ As considered in a first step at the case of Qingdao, a fully-integrated approach (potable water, greywater, blackwater, sludge and solid waste) need not be the best adapted one – and therefore different grades of integration will be considered. First results suggest that economic advantages can be achieved in less integrated solutions, too.

Obstacles and further challenges

- **Governance** Since the administration for water supply, sanitation, wastewater treatment and solid waste disposal is quite often separated, the integrated approach is likely to encounter resistance. Furthermore, innovative new approaches necessarily have fewer references. Administrations are not known for being innovative and open to new ideas.
- **Cost and fees** Reuse water has to be cheaper than fresh water for the customer. As long as drinking water is subsidised, the user will prefer freshwater. Thus the fees have to reflect the true costs for both freshwater and reuse water. Energy intensities might serve as an indicator. As an example the desalination of seawater might require around 3,5 to 4 kWh/m³, and long distance transport might need an even higher energy input, the energy intensity of high quality non-potable reuse water is below 1 kWh/m³.
- **Funding and Financing** Financing institutions rather like to finance few large projects compared to a large number of small units. Furthermore they tend to be conservative in requiring large numbers of references.
- **Public Acceptance** All users and stakeholders have to be educated and convinced, especially to reusing water. Reliable technical design and professional operation are basic elements for convincing consumers, but public awareness and participation might be as important as technical issues. Singapore's Newater provides an example of perfect public relations in the context of water reuse.

CONCLUSIONS

New development areas in fast growing urban areas are facing new challenges in infrastructure and resource matters. The employed case study is based on the city of Qingdao, China. But the mentioned challenges are not only Chinese. They occur in fast growing urban regions worldwide. The integrated semicentralised approach offers flexible solutions to cope with the new needs and to develop case-adapted solutions, wherever certain thresholds of population density are topped. In this range, semicentralised supply and disposal systems open a wide scope of possibilities in resource management, especially reducing the fresh water demand of new urban areas – besides any changes in behavior (there lie further potentials, which are not part of this study). Furthermore, semicentralised supply and disposal systems offer energy self-sufficient operation and even delivery of surplus energy while integrating solid waste and sewage sludge treatment.

³⁰ cp. Bieker, 2009

Annex: From No Basic Sanitation to Condominial Sewerage – The Example of El Alto (Bolivia)

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THE SANITATION CHALLENGE IN DEVELOPING COUNTRIES

Affordable access to improved sanitation services in developing countries is an issue for many households located in low-income peri-urban areas and slums. Sustainable sanitation is a concept that has been discussed by many experts and institutions. There is a common agreement that a sustainable sanitation system should be economically viable, socially acceptable, and technically and institutionally appropriate, and should also protect the environment and the natural resources.³¹

Infrastructure development and its effective operation and maintenance are key elements to allow urban population to have a permanent access to sanitation services. The responsibilities to make this happen are shared by several institutions: national and local governments, financing institutions, research centres, the civil society and the water and sanitation services providers. Among these stakeholders, water utilities have a pivotal role to play in ensuring the development of sanitation infrastructure to the underserved areas. They have the responsibility and the ability to develop and implement large-scale sanitation projects and to ensure sustainable operation and maintenance of infrastructure and reliable customer services. Their role is not only technical and operational but they also have to understand community demand and its ability to pay in order to ensure the economic viability and the social acceptability of the systems to be built and operated.

In developing countries, local conditions (less developed economies, strong urban growth and irregular settlements) require the development of cost-effective sanitation solutions significantly different to the ones implemented in industrialised countries and adapted to local demand. Access to sewerage and on-site sanitation remains a big issue in the majority of large cities. Pilot projects have tested various technical options but few cities have been able to implement such projects at large scale. The development of sanitation services is complex and, as for water supply, involves technology innovation and differentiation, education and marketing, investment and subsidies.

CONDOMINIAL SEWERAGE APPROACH

In Latin America and particularly in Brazil, service providers have been involved for more than 20 years in the development and management of condominial water and sanitation networks, in response to the rapid development of peri-urban neighbourhoods. The term condominial refers to a group of housing that is considered as a housing unit, similar to an apartment building except that a condominium is physically horizontal and institutionally informal (see Figure 1).

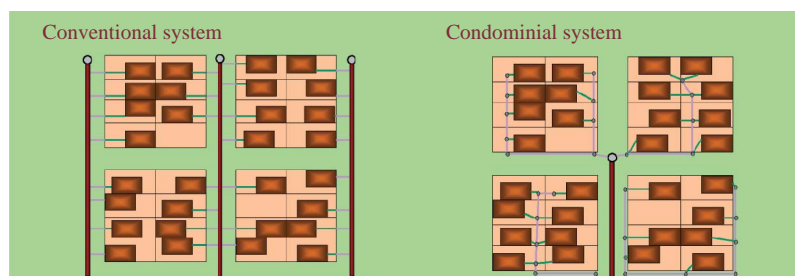


Figure 1. Conventional and condominial networks

Condominial networks are based on two fundamental principles:

- technical optimisation of the collection system in order to reduce investment costs
- participation of the population in the construction and maintenance of the system.

³¹ Sustainable Sanitation Alliance at www.susana.org

URBAN DEVELOPMENT CHALLENGES IN EL ALTO

In 1997, the city of El Alto had a population of 600,000 inhabitants, the majority belonging to the Aymara ethnic group. This city faced many challenges: considered as the highest city in the world (elevation between 4,000 and 4,150 meters above sea level), it has a cold climate (ranging between 15° C and 5° C). It suffered an accelerated growth process generated in the 80's by internal migration. El Alto had an annual growth rate of 9.2%, one of the highest ratios in America. Initially a small suburb of La Paz, the city increased in size very rapidly and encountered the usual challenges of rapid urbanization in a low income country. As far as basic services are concerned, the rapid growth has generated an important coverage deficit, particularly for sanitation (30% sewerage coverage, 52% water coverage). The vast majority of houses in El Alto are quite simple, even precarious made of adobe (sun-dried mud brick) and are not equipped with toilets and other sanitary facilities.

El Alto is dominated by the informal economy. Seventy percent of the employed population works in family-run businesses – they are street vendors or artisans. Moreover, about 60% of the population lives under the poverty line. The average monthly household income is US\$120, while the cost for a conventional sewerage connection is US\$276.

Cultural characteristics also contributed to the project being critical. The religious beliefs of the Aymara people preclude certain forms of modern hygiene. For example, latrines and septic tanks would be regarded as unacceptable to many because they involve the burial of faeces in the ground, something that is considered sacrilegious to their deity Mother Earth, the Pachamama goddess.

Water consumption is low; on average just under six cubic meters per household per month (or about 40 litres per capita per day). The largely rural origins of the population and the cold temperature make many people reluctant to adapt to modern urban lifestyle in particular regarding personal hygiene. People are accustomed to obtaining their water directly from nature, and disposing their faeces outdoors.

All of these characteristics combined to make El Alto a unique location and raised a number of technical and social issues for the expansion of water and sanitation services. This prompted the water utility to conduct in-depth socio-economic and anthropological studies and to develop partnership with local associations and authorities in order to better understand the specific characteristics of community demand for water and wastewater services. As far as sanitation was concerned, on-site sanitation such as latrines and septic tanks was not a solution, since the religious beliefs of the Aymara people regarded them as unacceptable.

The high fee to be paid for a connection to sewer network would prohibit many household to connect to modern sanitation system and the low water consumption would create concerns for the efficient functioning of the sewers. This prompted a search for ways of reducing the cost of providing sewerage to low income households, and led the Bolivian authorities and the water utility to consider the potential use of the condominial sewerage approach.

THE CONCESSION CONTRACT FOR WATER AND SANITATION SERVICES OF LA PAZ AND EL ALTO (BOLIVIA)

In 1997, a private consortium led by Suez Environment under the name Aguas del Illimani (AISA) took over a 30-year-concession contract to provide water and sewerage services to La Paz and El Alto cities in Bolivia (altogether 1.6 million inhabitants). Contract was awarded to AISA through an international tender led by the Bolivian Government. The tender was structured through a precise definition of objectives to be reached, both in terms of levels of service as well as in terms of service expansion, which was the major goal sought by the Bolivian Government.

For this reason, the award criterion selected for the tender was the number of new water and sewerage connections that the bidders would offer for the first five years of the contract. After it took over in August 1997, AISA focused on delivering the objectives and results agreed upon through the contract for the first 5-year plan, i.e.:

- improving water supply service coverage to reach 100 % in La Paz and 82 % in El Alto (within the service area).
- improving sanitation service coverage to reach 83 % in La Paz and 41 % in El Alto (within the service area). For El Alto, this would mean achieving 38,000 new sewerage connections in five years.

THE EL ALTO PILOT PROJECT

In 1998, Aguas del Illimani, in charge of the water and sanitation services of the municipalities of La Paz and El Alto (Bolivia) started the construction of condominial sewerage systems in low-income areas of the city of El Alto (average income per household: 120 US\$/month) in response to the low sanitation coverage (around 30%). Between 1998 and 2002,

close to 5,000 households or 25,000 inhabitants were connected to condominial sewers. The innovative characteristics of the El Alto Pilot Project were based in the engineering design, the community participation, the promotion of sanitation and hygiene education, and a micro-credit facility offered to household to finance their in-house sanitation facilities.

Engineering design: the wastewater collection network is divided into two parts (see Figure 2): the main collector (public) that corresponds to the secondary network in a conventional sewerage network and the condominial branches running within housing units in the most convenient locations (in the front yards, back yards or under the sidewalks). Pipes diameters, length, and excavation depth of the network are reduced. This innovative design allows savings in equipment and construction costs that can go over 50% compared to conventional sewers.

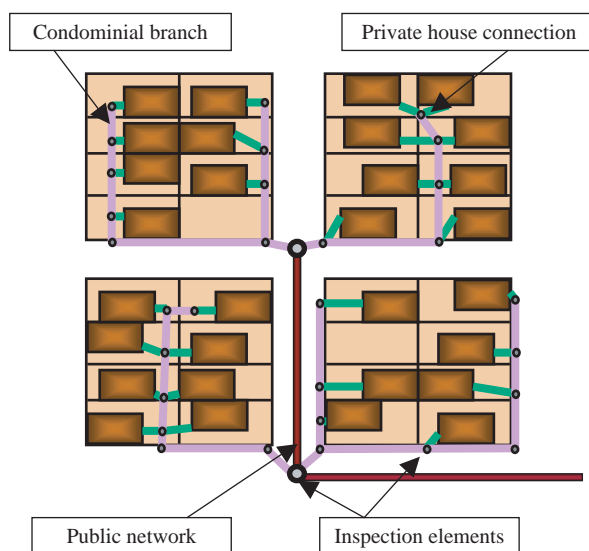


Figure 2. Schematic diagram of a condominial system. Housing units are connected to the public network by a single connection point

Community participation: the second innovative element of the condominial system is the participation of the community in the design, construction and maintenance of the system. This implies to develop a narrower relationship between the service provider and the customers than with conventional approach. Community participation allows further reduction costs of construction and maintenance.

Promotion of sanitation and hygiene education: At the start of the project in El Alto, very few families had got any form of sanitation equipment in the project areas. Hygiene education and technical support were provided by the water company's team specially trained in community participation techniques to the communities and help them constructing their own bathrooms.

Micro-credit: A micro-credit facility was included in the project to help poor families pay for the material required to construct a bathroom. Overall, 25% of households applied for credit. However most of the inhabitants chose to rely on their own savings or to borrow money from close relatives to finance these equipments.

The El Alto Pilot Project was conceived as a joint venture between the Government of Bolivia (GoB), the private concessionaire Aguas del Illimani (AISA), the World Bank Water and Sanitation Program of Latin American Countries (WB-WSP-LAC), and the Swedish International Development Agency.

- The GoB agreed to relax its technical standard which would legally preclude the use of the condominial approach.
- With the endorsement of the regulatory agency, AISA agreed to use the condominial approach to meet a proportion of its expansion targets in El Alto.
- The role of WB-WSP-LAC was to facilitate the transfer of this alternative technology for low cost water and sewerage system from Brazil to Bolivia. WB-WSP-LAC has supported the institutionalisation process towards the modification of the technical standards for replicating the model at a large scale.
- The Swedish International Development Cooperation Agency financed the research and training activities required to transfer and adapt the condominial system to Bolivia.

During the El Alto Pilot Project implementation, 2,500 households were connected to condominial sewers distributed in 7 neighbourhoods. Some of them were not connected to the water network and AISA initiated the implementation of water networks and household connections in parallel to the development of the El Alto Pilot Project.

Different methodological approaches demonstrated that the Pilot Project's impact was as significant as expected. A census data survey (1,700 lots), and two random sample surveys were performed: one of the surveys to compare a conventional system neighbourhood with one simultaneous condominial system neighbourhood (76 lots versus 87 lots); and, the other to compare the situation before and after the condominial system (134 lots). The results were as shown in Table 1.

Table 1. Results of the evaluation and impact survey of the El Alto Pilot Project

Parameters	Condominial system (census survey)	Conventional system (random sample survey)	Pre-condominial system (random sample survey)
Connections	98%	66%	0 %
Bathroom equipment	74%	30%	35% (with water network) 8% (without water network)
Water consumption	7.4 m ³	5–6 m ³	5.0–6.3 m ³
Hygiene habits	% of households with outdoor faeces disposal decreased from 70% to 20%		
Satisfaction with condominial sewerage	83% of households were satisfied with the system		

As to connections, there was a higher level of households' sewerage connections in the condominial system than in the conventional one. In relation to bathroom installation, there was a higher proportion of bathrooms built in the condominial system. It is worth mentioning that before the implementation of the condominial system, among those that had water network, 35% had their bathrooms installed, while among those neighbourhoods that did not have water networks, only an 8% had bathrooms installed.

As regards water consumption, it was possible to verify a greater water use compared to the conventional system and also to the situation before the condominial sewerage (a statistically significant difference). As to hygiene habits, there was a substantial improvement, such as the elimination of water consumption from dangerous sources, and the reduction of households that practiced outdoors excreta disposal.

Through a financial study it was possible to demonstrate that there was a 20 to 30% saving when using contractors, and a 40 to 50% saving when using community labour. Savings in the cost of materials arose as a result of the shorter length and narrower diameter of the pipes; savings in labour effort resulted from the shorter and shallower trenches that can be used in the condominial case while savings in labour costs arose from community participation.

Today there are about 5,000 connections of condominial sewerage in El Alto and La Paz. The project also had a significant positive impact on urbanization, such as an increased population density, street lightning and road pavement.

Thanks to the El Alto Pilot Project validation in November 2001, the governing board of the Bolivian Institute for Technical Norms and Standards, IBNORCA, approved new technical standards for the design and construction of sewerage systems and wastewater treatment plants. This new set of standards will support condominial system replication on a large scale in Bolivia.

The success of the El Alto Pilot Project has encouraged other countries like Peru, Ecuador and Paraguay to initiate projects to test this alternative in their own contexts. The peculiar cultural, geographical and social circumstances of El Alto make it an extreme test for the condominial approach in the sense that the factors which limited the benefits of the condominial system in Bolivia might not necessarily be present to the same degree in other contexts.

The Pilot Project's results have demonstrated that it is possible to reach universal coverage in water and sanitation, whatever the developing community level is, provided that there is: common vision of the actors involved, community participation, efficiency of the operator, and availability of financial mechanisms.

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Sanitation practice: Short notes on good and poor practice

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SESSION 4

The Potential Role of Utilities in Sanitation Provision for Peri-Urban Areas and Poor Target Groups

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ABSTRACT

Tony Richards' paper examines why sanitation service provision by local government authorities is poor, which makes it difficult to achieve the Millennium Development Goals (MDGs). Based on his experience of water sector reforms in Eastern and Southern Africa, he provides examples of how water supply and sanitation utilities are being encouraged to support peri-urban areas and poor target groups with the provision of sanitation services. The paper highlights necessary framework conditions for extending utility services beyond sewerage provision and supporting households and communities with on-site sanitation in order to increase the sustainability of financing sanitation.

Bertrand Dardenne emphasises in the co-paper that the purpose of utilities is to provide commercial services in a field of specific public interest where economies of scale justify publicly regulated services. He reminds the difficulties of utilities to provide piped water and sewers in a commercially viable manner and argues not to disturb utilities by adding commitments on top of the core business. He doubts that there are sufficient economies of scale for on-site sanitation services, while he sees strong arguments for utilities engaging in condominal technologies and education efforts.

Regarding the recommendations, Tony Richards emphasizes the importance of utilities providing a more comprehensive and professional approach to basic sanitation provision, while the role of local government authorities could change to that of by-law enforcement of building regulations, education and public awareness. He argues that this requires financing mechanisms for the provision of basic sanitation that do not impose an unacceptable burden on a utility's water and sewerage customers. Bertrand Dardenne recommends that utilities should embrace a more holistic approach in informal settlement areas, where the separation of tasks between regulatory authority and utility is difficult. Both agree on the need for intensive public advocacy and involving beneficiaries.

INTRODUCTION

The Millennium Development Goals (MDGs) monitoring efforts show that two regions in the world have particularly low access to improved sanitation and high rates of waterborne diseases. One region comprises India and neighbouring countries, the other region is Sub-Saharan Africa. This paper has a strong focus on the emerging experiences in Sub-Saharan Africa.

Box 1. Statement Prince William of Orange

"Clean water and sanitation are not only about hygiene and disease, they are about dignity too. . .[E]veryone, and that means ALL the people in the world, has the right to a healthy life and a life with dignity. In other words: everyone has the right to sanitation." Prince William of Orange, Chair of the UN Secretary Advisory Board on Water and Sanitation. Speech by His Royal Highness Prince Willem-Alexander of the Netherlands, Chairman of the United Nations Secretary-General's Advisory Board on Water and Sanitation (UNSGAB), held at the launch of the International Year of Sanitation (IYS), New York, 21 November 2007.

Definitions of sanitation and sewerage

Before looking at the roles of utilities and other service providers in providing sanitation, we should consider the definition of the terms “sanitation” and “sewerage” and, within the context of this paper, the same definitions are used as those adopted in Tanzania^{1,2} namely:

Sanitation: The provision of appropriate facilities and services for the collection and disposal of human excreta and waste waters.

Sanitation works: Sewers, drains, pipes, ducts or channels, whether open or closed, used for the drainage of human excreta or waste waters from buildings or land and on-site systems for the reception of human excreta and waste waters which do not connect to a sewer.

Sewerage: Human excreta disposal systems relying on water as the waste transporting medium.

Who provides water supply and sanitation services?

Providers of water and sanitation services generally fall into one or a combination of three types of organisation:

1. Utilities legally established specifically to own the assets and provide the services. These are usually statutory or para-statal bodies, but exceptionally can be established under companies' legislation (e.g., Zambia).
2. Local government authorities accorded responsibility for the services under local government legislation.
3. Service Providers established under companies' legislation to provide the services under contract to either utilities or local government authorities through various arrangements such as management, lease or concession contracts. These are the normal vehicle for private sector involvement in the sector.

However, this categorisation masks some critical features:

- in some countries, utilities have been created to address the historical inadequacies of local government authorities in delivering services, and to introduce a commercial ethos;
- utilities tend to provide only water supply and sewerage services leaving other sanitation provision to local government authorities;
- utilities in developing countries may be relatively new and not yet fulfilling their mandate for providing water supply and sanitation services;
- separation of service provision responsibility in utilities from the urban planning responsibilities of local government authorities can exacerbate the service access problems in peri-urban and other low income areas;
- local government authorities tend to see water supply and sewerage revenues as a means of financing other responsibilities and it is difficult to generate revenue from sanitation; and
- service providers tend to operate on a strictly commercial basis, particularly where the private sector is involved.

The fundamental question

Access to safe drinking water and adequate sanitation is a human right. The question is “how can this right be satisfied in a sustainable manner and what is the potential role of water and sanitation utilities in achieving this?”

WHY HAS SANITATION BEEN ACCORDED LOW PRIORITY?

Linking water supply and sewerage service provision is both logical and provides a means of cost recovery of sewerage services through the water tariff and revenue collection process. However, the provision of basic sanitation and hygiene education to peri-urban and other low income areas has received little attention historically for a number of reasons, including:

- separation of policy direction, strategies, and legislative provisions at the central government level;
- separation of responsibility for sewerage and sanitation in institutional and organisational terms;

¹ United Republic of Tanzania, The Water Supply and Sanitation Act, 2009, No. 12 of 2009.

² The United Republic of Tanzania, Ministry of Water and Irrigation, National Water Sector Development Strategy, 2006 to 2015.

- pressure, principally from development partners, to focus on water supply and on utilities achieving cost recovery targets as a condition of investment grants and loans;
- pressure, particularly from private sector partners, not to get involved in non-commercial activities;
- difficulties in recovering costs associated with the maintenance of basic sanitation facilities;
- inadequate enforcement of by-laws and regulations by the responsible organisations, including water sector regulators; and
- insufficient public education on the links between health, hygiene and sanitation.

Separate responsibilities in Central Government

In many countries the central government responsibility for sanitation rests with the Ministry responsible for health rather than the Ministry responsible for water, thus creating a bureaucratic separation which perpetuates itself down through the administrative structures. It also creates a need for a high degree of inter-ministerial cooperation, which is often lacking.

As a consequence, water sector policies developed by the Ministry responsible for water fail to adequately address basic sanitation issues. For example, the National Water Policy published by the Government of Tanzania³ contains no reference to the provision of basic or on-site sanitation facilities, but, while recognising the problems of low income groups in urban and peri-urban areas, refers only to the provision of small bore and shallow sewers in these areas by utilities.

The subsequent Tanzanian National Water Sector Development Strategy does, however, give consideration to the improved provision of services to low income groups and the integration of water supply, sanitation and hygiene education. The prioritised activity schedule assigns responsibility for improving services to the utilities and local government authorities, while responsibility for these services is assigned jointly to the ministries responsible for water, health and local government, although there is currently little coordination between them.

It has been left to the Ministry of Health and Social Welfare to develop policies and a strategy for sanitation and hygiene promotion^{4,5}. This strategy is still in the drafting stage and focuses on strengthening the provision of environmental health services generally within the local and regional government administrative structure. Cooperation with water sector institutions is not mentioned.

Utilities and local Government

The link between basic sanitation and the water sector is obvious. Sewage and leakage from pit latrines and soakaways can pollute both surface and ground water, thereby reducing the availability of safe water for domestic use, or it can be reused to irrigate agricultural land after adequate pre-treatment, thereby increasing food production.

However, sanitation tends to be handled separately both in organisational and financing terms. In many countries sanitation is considered to be the responsibility of local government authorities through its association with public health. Meanwhile, water supply and sewerage is often seen to be the responsibility of utilities established under the auspices of the Ministry responsible for water. This seems to be the case particularly where local government authorities have been weak historically and, as a result of the importance accorded to water supply service delivery, water and sewerage has come under the Ministry responsible for water.

This separation results in far less attention being paid to the provision of sanitation as the financing of sanitation has to compete with other local government services. Also, the loss of revenues by local government authorities arising from the transfer of water supply and sewerage responsibilities to utilities further reduces the scope for financing sanitation.

But, in Zambia, where water supply and sanitation is a local government responsibility, the water supply and sanitation law⁶ provides for local authorities to establish commercial utilities to provide these services in their areas. The definition of sanitation includes "the disposal, on-site or off-site, of human excreta". Thus these utilities are wholly responsible for sanitation.

³ The United Republic of Tanzania, Ministry of Water and Livestock Development, National Water Policy, July 2002.

⁴ The United Republic of Tanzania, Ministry of Health and Social Welfare, National Environmental Health and Sanitation Policy Guidelines, 2004.

⁵ The United Republic of Tanzania, Ministry of Health and Social Welfare, The National Environmental Health, Hygiene and Sanitation Strategy, October 2008.

⁶ Government of Zambia, Water Supply and Sanitation Act, No. 28 of 1997.

The role of development partners

Sanitation has not received the same amount of attention as water in the agendas of development partners. If sanitation is to improve, there is a need to move away from projects that view basic sanitation as a by-product of water projects.

Until fairly recently the focus of development partners, multi-lateral and bi-lateral, has tended to be on water, or water and sewerage, projects with little attention being paid to meeting the requirements of the urban poor, particularly in terms of sanitation. Where such efforts have been supported by development partners, this has either been as an add-on to water based project activities or through separate initiatives in support of public health activities.

Under pressure from development partners, tariff levels for water utilities in developing countries have been aimed at the achievement of full cost recovery, including depreciation on fixed assets. In turn this has fed the move to commercialising the provision of water and sewerage services through the establishment of utilities. Targets related to cost recovery and tariffs are often set as conditionalities for the release of investment funds, thus utilities have been reluctant to expand service provision into sanitation in peri-urban and other low income areas, where cost recovery is difficult.

Also, achievement of full cost recovery is still more of a dream than a reality in many countries and the inclusion of basic sanitation in the mandate of water utilities will appear to make attainment of this target even harder unless innovative financing mechanisms are put in place.

The involvement of the private sector

Involvement of the private sector in the provision of water and sanitation services in developing countries has been promoted over the last twenty years, with varying degrees of success. However, the motivation for the private sector to become involved is the opportunity to get a positive return on the investments made. Thus expansion of the provision of services into areas that are seen as financially unattractive, such as sanitation in peri-urban or low income areas, is likely to meet with resistance.

Recovering costs of sanitation services

Since sewerage systems, when available, rely on water as the transporting medium, they have been designed generally to serve higher income areas of urban conurbations where adequate levels of water supply are available directly into properties.

The provision of sewerage services, including conventional and small bore sewers, is closely linked to the availability of water supply with cost recovery through tariffs and billing and collection mechanisms. Therefore, at least in principle, cost recovery is easier to achieve as long as tariff levels are adequate and commensurate with efficient billing and collection mechanisms.

On the other hand, peri-urban and other areas that tend to be the main residential locations of the poor are unlikely to have adequate levels of water supply to sustain the operation of sewerage systems, as this often through off-site facilities such as standpipes or kiosks. Consequently the poor tend to be reliant on various forms of on-site sanitation, such as pit latrines, septic tanks or communal facilities. Added to this lack of a linkage is the fact that, apart from the capital cost of installing on-site sanitation systems, on-going maintenance costs are primarily related to emptying the facility either manually in the case of latrines or through the use of vacuum tankers in the case of septic tanks.

With the cost of emptying being perceived generally as the direct responsibility of the individual householder, maintenance of on-site sanitation has to compete directly with other family expenditure. Consequently, in low income households the tendency will always be to put off the emptying of sanitation facilities with the consequent risks to public and environmental health.

It may be argued that the costs of maintaining on-site sanitation facilities could be recovered through a local authority's rates or building tax system. However, in many developing countries these systems are ineffective or inefficient and peri-urban and low income areas lack adequate records, or are informal and outside the system.

Box 2. Services for on-site sanitation – Zanzibar

In Zanzibar, where water supply and sanitation services are handled separately by the Ministry of Water and the Municipal Council respectively, most households in Stone Town and adjacent areas have septic tanks connected to the sewerage system. Formerly, the Council used to empty septic tanks according to a programme for which householders would pay a fee at the time of emptying. In order to try and overcome the intermittent but high once off cost of emptying to householders, the Council introduced a by-law setting the emptying frequency and requiring householders to make a monthly payment together with their solid waste collection charge to cover this service by the Council. This places full responsibility for septic tank emptying with the Council.

Enforcement of by-laws and regulations

Provision of sewerage or on-site sanitation facilities by households is usually covered under local authority by-laws or regulations, often within the provisions of public health legislation. However, even though this may be effective on paper, enforcement of legislation in developing countries is commonly very weak and the informal nature of peri-urban and low income areas exacerbates this lack of enforcement.

INSTITUTIONS AND REGULATIONS FOR SERVICING THE POOR

The reasons for giving priority to rapidly expanding peri-urban and poor areas are as valid for sanitation as they are for water. Nowhere else are living conditions caused by deplorable sanitation as devastating as in settlements of the urban poor (see also Session 3), or people as affected by waterborne diseases with cholera outbreaks a frequent risk. The breakdown in basic sanitation systems in Zimbabwe, and the consequent cholera outbreaks, is a recent demonstration of this.

However, sanitation is usually regarded as a private household matter and strategies to improve access concentrate on influencing decision-making at the household level, thereby focussing on issues such as social marketing, hygiene awareness campaigns, and sanitation education. These measures, as important as they are, should not be used as an excuse for avoiding large-scale sanitation projects implemented by utilities that include the construction of sanitation facilities, or for setting and demanding minimum sanitation standards through a range of technologies.

Achievement of the Millennium Development Goals (MDGs) and other national level poverty reduction targets will not be possible unless support is provided for constructing sanitation facilities for poor households (for a more detailed discussion see Session 2). A more comprehensive approach is needed. Focussing on creating demand and awareness is by all means important – but not enough. Providing financial assistance for construction in the form of subsidies to poor households is essential. So is building capacities for sustainably planning, constructing and operating on-site sanitation facilities that comprise toilet facilities, and the collection, treatment and safe disposal of human excreta, faecal sludge and domestic waste water.

Potential role of utilities

Water sector reforms in many countries, particularly in Africa, have created new and more effective structures within the framework of commercialisation, private sector participation and regulation. This has increased professionalism in the sector and it is important that basic sanitation also benefits from this and the improved performance of commercialised utilities, which should be given some of the responsibility for improving the sanitation situation.

In a number of cases, commercialised providers show interest in participating in basic sanitation in order to boost their image and have a stronger negotiating position when tariffs are adjusted. Utilities can use their institutional structure for basic sanitation without substantially increasing their staff numbers, for example, by involving the local private sector in construction and including non-governmental organisations (NGOs) in soft components.

Thus, utilities have a potential role to play in improving sanitation facilities in peri-urban and other poor areas but this must be encouraged and backed by clear institutional and legal provisions, especially in respect of the potential overlapping responsibilities of utilities and local government authorities.

Box 3. Mix of Technologies in Mwanza – Tanzania

In Tanzania, the Mwanza Urban Water and Sewerage Authority is to implement a sanitation project, financed by KfW, using a combination of technologies appropriate to the topographical circumstances and the distance from the existing sewerage system.

The project has been developed jointly by the utility and the local government authority, and implementation will be the responsibility of the utility with extensive beneficiary consultation.

- Pour-flush toilets will be provided in hilly and rocky areas of the town with collector lines leading to a communal septic tank into which householders can empty the sludge from their pits at “Sludge Insertion Points”, on the line. The communities will be responsible for the maintenance of the collector lines and communal septic tanks, while the utility will be responsible for emptying the septic tanks and assisting the community to maintain the system, if required and for a fee.
- Condominial or small-bore sewerage systems will be provided in the flatter areas of the town that are not covered by the existing conventional sewerage system.
- On-site sanitation systems will be provided at schools, markets and public health centres.

A new concept for utility involvement in the provision of sanitation in peri-urban areas is being developed in Tanzania where, as a component of a KfW/EU co-financed urban water supply and sanitation project, the Mbeya Urban Water and Sewerage Authority will implement water supply and sanitation facilities at schools in the utilities operational area. While the construction costs will be covered under the project financing arrangement through the utility, on-going operation and maintenance costs will be met by the schools and the local communities. The utility is to overcome the potential inertia arising from cross-sectoral responsibilities for school sanitation involving three different government ministries and linking sanitation provision to water supply service delivery. The utility sees long term benefits from providing and educating school children in water use, sanitation and hygiene as they are the future customers of the utility and will demonstrate a greater understanding of the work being carried out to provide the services.

Potential role of local Government authorities

In other countries, local government authorities have retained their responsibilities for water supply and sanitation provision as part of the traditional local government role. While this has significant advantages in maintaining a close link between water supply and sanitation services, public health and urban planning, it places a greater requirement on good governance in the authorities to ensure that revenue generated from the provision of the services is channelled back into operation and maintenance of the facilities.

Failure to “ring fence” these revenues has frequently led to the revenues being used for other local government priorities and a consequent deterioration in water and sanitation infrastructure.

Also, local government authorities appear to be more susceptible than utilities to political pressures to keep tariffs to a minimum, often below cost coverage requirements. In the absence of any regulatory or performance monitoring framework, such local political pressure can seriously undermine the sustainability of water and sanitation investment.

The role of regulation

The advent of commercialisation of water and sanitation services over the past twenty years, combined with attempts to involve the private sector, has led to an increasing trend for the introduction of regulation of utilities and other service providers to protect consumers’ interests. This has followed two basic approaches:

- the English model whereby an “independent” regulator balances the levels of service provided with the operational and fiscal efficiencies to assess and approve tariffs; and
- the French model whereby the provision of services is managed under a contract between the asset holder, e.g. a ministry, utility or local government authority, and the service provider.

Irrespective of the regulatory approach adopted, utilities and other service providers, including the private sector, could be required to meet service targets for peri-urban and other poor areas as part of their overall performance obligations. The costs of providing these services could then either be built in to negotiations for tariff increases to provide internal cross-subsidisation, or could be subsidised transparently from external sources such as government or development partner grants, or a combination of both.

Other regulatory instruments such as guidelines on sanitation, standards, and comparative reporting could also be enforced or used to provide incentives for utilities to include the provision of basic sanitation services.

“Although core regulatory tools and functions lie in the economic domain, most decisions relating to water and sanitation services also have social implications and regulation must therefore achieve a balance between competing commercial and social objectives⁷.”

The sector regulator in Zambia, the National Water Supply and Sanitation Council, has issued a guideline for water supply in peri-urban areas⁸ within which it refers to the use of a “Devolution Trust Fund” to promote inter alia the extension of public water distribution systems and on-site sanitation in peri-urban areas by the commercial utilities. Unfortunately the envisaged guidelines for promoting a sanitary clean environment have not yet been published.

THE ROLE OF UTILITIES IN FINANCING SANITATION

Utilities and other service providers have an interest in selling water, even to the urban poor, therefore they should also have a responsibility for ensuring that the water provided is also removed – the “producer pays principle”. In Uganda, where this principle was enforced with penalties for non-compliance, both utilities and local government authorities reported an increase in their revenues⁹.

Provision of low cost sanitation is primarily a capital cost as the on-going operation and maintenance costs are usually very small, mainly the cost of emptying. Therefore, even if some kind of user fee is involved, the initial capital cost must still be sourced. Therefore the finance must either come from equity such as grants, debt in the form of loans, or cash flow from other operations, such as the water services of a utility.

Voluntary funds are only likely to play a role in financing sanitation where there is an established community and a culture that rewards giving, although the “low value” of sanitation may not encourage this. Also, peri-urban areas usually lack the social cohesion of a community as the population tends to come together through “urban drift” rather than developing internally as is the case in rural villages.

Charging a user fee basis to cover the costs of providing the service, including depreciation, has worked in the provision of shared communal sanitation facilities, such as the Sulabh Foundation in India. But, given the difficulties of collecting user charges for low-cost sanitation it is unlikely that this approach can be applied at the individual household level.

If there is inadequate willingness to pay by the poor to use sanitation services or make investments, the only way to increase use of sanitation facilities is to reduce the price by subsidies or increase demand. Aggressive public health advocacy and promotion of community enforcement of good sanitation behavior increases demand.

User initiated sanitation is more likely to be sustainable when it is combined with other community development activities. The public health arguments are rarely strong enough to attract the necessary engagement, time and money that have to be provided by households, and consideration should be given to promotion not only on public health grounds but also for human dignity and the social norm.

The role of utilities in cross-subsidisation of basic sanitation

Using income from water and sewerage services to cross-subsidise basic sanitation is an example of how the water and sanitation sector can successfully be linked to each other.

⁷ Deutsche Gesellschaft fuer Technische Zusammenarbeit (GTZ) GmbH, Regulation Brief No. 1, “All Inclusive? How Regulation in Water and Sanitation can be Pro-poor”, 08/2009.

⁸ National Water Supply and Sanitation Council, Guidelines on Water Supply for Peri-Urban Areas, NWS/G008/7-2002.

⁹ SOWAS Sanitation Working Group, Nairobi, May 2009.

Box 4. ONEA – Burkina Faso

The National Water and Sanitation Office (ONEA) in Burkina Faso is a good example of how a commercialised water company can play a significant role in improving access to basic sanitation. After carrying out a pilot project (financed by the World Bank and later supported by GTZ), ONEA moved to the large-scale implementation of basic sanitation in the capital Ouagadougou.

Since 1999, the 45,000 rehabilitated or newly constructed sanitation facilities have been entirely financed by the sector through subsidies generated by a sanitation surcharge and contributions by users. This has increased coverage from 7% to 45% in line with the Millennium Declaration. It has also contributed to improving sanitation in many public places, such as schools, thus reducing the risk of epidemics, for example, cholera.

The role of ONEA is limited but crucial. Income from the *taxe d'assainissement* is used to contract NGOs for social marketing/hygiene awareness campaigns and monitor and enforce standards for subsidised sanitation facilities. Consumers can apply at ONEA pay stations for subsidies to construct basic sanitation facilities on their premises. ONEA helps to train local masons, which are then licensed to construct basic sanitation facilities within a certain area. The utility also maintains an information system for basic sanitation, to target subsidies and monitor progress to achieving the MDGs.

The experience of Burkina Faso may have applications in other countries although a number of lessons learned in applying this approach have been reported¹⁰ in that the organisation responsible for providing basic sanitation services must be capable of managing:

- revenues;
- ensuring autonomous and transparent management of the sanitation surcharge;
- defining performance indicators and monitoring achievement of objectives;
- establishing partnerships with local authorities;
- minimising the costs of providing sanitation;
- ensuring maintenance of sanitation facilities; and
- recognising the real cost of promoting sanitation.

Trust funds financing utilities' sanitation services

The concept of a utility involvement in providing basic sanitation as used in Burkina Faso are now being developed into the establishment of basket funds to provide water and sanitation services in peri-urban and other low income areas. Examples are the Devolution Trust Fund (DTF) in Zambia, the Water Services Trust Fund (WSTF) in Kenya, and the proposed National Investment Fund in Tanzania. These could play a vital role in supporting sanitation initiatives through the implementation support of utilities.

By collaborating with utilities and municipalities, funds can be channelled from governments and development partners into the large-scale implementation of basic sanitation – no longer as by-product of water projects.

Devolution trust fund – Zambia

The DTF in Zambia¹¹ was established to provide a basket fund for water supply and sanitation in low income urban areas with the objective of assisting commercial water utilities to extend water supply and sanitation provision to the urban poor.

The Fund was created in 2001 through a Statutory Instrument under the Water Supply and Sanitation Act, 1997 under the administration of the regulatory authority, NWASCO, as provided for in the Act. Management of the Fund is separated from the regulatory functions of NWASCO through a separate decision making process.

¹⁰ UN Commission on Sustainable Development, Water Action Network Database – Local Actions at 4th World Water Forum (2006).

¹¹ dtf.nwasco.org.zm

Box 5. Devolution Trust Fund – Zambia

The purpose of the Devolution Trust Fund is to:

- facilitate funding for investment in appropriate low-cost technologies in water supply and sanitation for low-income urban areas, and
- assist with establishing sustainable management systems for these installations/facilities.

The General Fund is disbursed as a grant to a commercial utility without any obligation to reimburse the DTF in whole or in part. While only a commercial utility registered and licensed in accordance with the water legislation is eligible to apply for funding, non-licence holders such as NGOs may access the funds through a partnership with a licensed utility.

The criteria for the eligibility of projects are aimed at ensuring that the projects have a direct positive impact on the water supply and sanitation needs of the urban poor. Compliance with the objectives of the Fund is given as:

- the project area must be classified as either peri-urban or low cost and must be on traditional land or on land legalised by the local authority; and
- promoting the extension of public water distribution systems with kiosks (or a hybrid system – kiosks and individual connections) and sanitation in peri-urban and low-cost areas, including measures to upgrade a system, if it can be demonstrated that these measures are a necessary precondition to be able to improve the water supply or sanitation service provision for the urban poor.

The Fund also provides for capacity building activities aimed at strengthening the utilities in planning, implementation and management of water supply and sanitation services for the urban poor, for which technical assistance is to be made available.

To date the fund has been used primarily for improving water supplies to the urban poor but expansion into sanitation provision is being encouraged.

Water Sector Trust Fund – Kenya

The WSTF in Kenya¹² is a State Corporation established under the Water Act, 2002, with the mandate of assist in financing the provision of water services to areas of Kenya which are without adequate water services. The Corporation is guided by a Trusts Deed to act as a basket fund for mobilizing resources and providing financial assistance towards capital investment costs of providing water service and sanitation.

The role of the Water Services Boards (WSBs) was perceived originally as being in the appraisal of the project and approval of associated engineering designs prior to submission to the WSTF, and in supervision of the project during implementation.

Box 6. Water Sector Trust Fund – Kenya

WSTF's mandate includes supporting capacity building activities and initiatives that aim at enabling communities to plan, implement, manage, operate and sustain water services by creating awareness and disseminating information regarding community management of water services, and encouraging their active participation in implementation and management.

Applications for projects must be initiated by communities or NGOs working closely with them, and must be managed by the communities.

Currently, according to the Implementation Plan for Sanitation under preparation by the Ministry of Water and Irrigation¹³, the WSTF will channel funds for household, public institutions, and public places through the WSBs and their registered Water Service Providers (WSPs). This is to ensure that sanitation services are carried out to specific

¹² www.wstfkenya.org

¹³ Republic of Kenya, Ministry of Water and Irrigation, Implementation Plan for Sanitation (IPS) 2009 (The Water Sector Sanitation Concept – WSSC).

standards and technologies used are sustainable. Public sanitation facilities will become assets of the WSBs but their construction and maintenance will form part of the Performance Agreements with the WSPs, who will be encouraged to use local private operators for this.

Self-financing of operation and maintenance for public facilities will be from within the funds of the WSBs and WSPs, while householders and public institutions will be required to guarantee payment for the maintenance of their facilities.

National investment fund – Tanzania

The establishment of this Fund is included in the newly approved Water Supply and Sanitation Act¹⁴ but its *modus operandi* has yet to be established.

CONCLUSIONS: HOW TO BETTER USE THE POTENTIAL OF UTILITIES

Historically, a number of models for improving sanitation in peri-urban and other low income areas have been developed; these have tended to focus on specific solutions to specific targets. They have also been implemented within a country's institutional structures for health and local government administration.

As a result of institutional frameworks and pressures for commercialisation, water utilities have usually provided waterborne sewerage systems within their areas of responsibility and other forms of sanitation has been the responsibility of local authorities. This separation has severely constrained the much needed provision of basic sanitation to the poor and makes the Millennium Development Goals and specific national targets very difficult to achieve.

While local government authorities may continue to have a responsibility for the provision of sanitation, where utilities provide water and sanitation services, the role of local government authorities could change to that of by-law enforcement of building regulations, education and public awareness.

Utilities have the potential role of providing a more comprehensive and professional approach to basic sanitation provision. However, development banks and similar financial institutions supporting such concepts should pay attention that they are supported by:

- an institutional framework that integrates sanitation with water supply and sewerage;
- a regulatory regime that recognises sanitation priorities and encourages and compels utilities to include sanitation provision within their scope of services;
- the availability of finance targeted at the provision of basic sanitation that does not impose an unacceptable burden on a utility's water and sewerage customers;
- a mechanism for professional implementation of basic sanitation provision and ensuring that maintenance requirements are met;
- intensive public advocacy on health, hygiene and sanitation issues;
- involving the beneficiaries in a way that instils a sense of ownership and responsibility.

The establishment of the trust funds in Zambia and Kenya as part of the overall sector reform framework, and recent initiatives directly with water utilities in Tanzania, appear to meet these requirements and may provide the framework within which utilities can potentially take a leading role in improving sanitation for the poor in order to satisfy their basic human rights.

¹⁴ United Republic of Tanzania, Water Supply and Sanitation Act, 2009.

Co-Paper: Utilities and Low Income Areas – What Service is Realistic?

Bertrand Dardenne

ASPA Utilities

BACKGROUND: WHAT IS A UTILITY?

In the Key Note Paper, Tony Richards starts with an appropriate definition of sanitation (on-site facilities) and sewerage (off-site disposal). Accordingly, I initiate my argumentation of this co-paper with an attempt to define the rather confusing term of utility.

Within the context of this note, a public utility (or just a utility) is a “corporatized” organization that maintains the infrastructure for a public service and also provides a service using that equipment.

The existence of a specific word, “utility”, reflects the intuitive idea that the kind of organization or company supposed to be in charge of essential tradable goods or services, such as water, electricity, or sewerage, needs to be shaped in a somehow peculiar manner, due to a series of specificities:

- The service provided is considered essential or basic. Consequently, the public authority or government ensures that the population will benefit from a minimum standard of delivery. Whoever owns the utility, the public authority that has this political commitment (national or municipal, depending on the constitution) must regulate (control, organize) the public service.
- It is a tradable good and/or service. The population is not only a beneficiary of the public service but also a customer/purchaser/client, who pays for a “private” service as well.
- A collective infrastructure is required. The equipment is collective because a strong economy of scale is expected. Owing to the effects of monopoly, the state may also regulate the “private service”.

In other words, a utility is a type of organization tailored to address issues in two dimensions: the typical universe of the private economy (to sell a good to customers) and the typical universe of the public economy (to manage collective assets and to meet a basic need of the population).

This is not an easy task. We all know that. There is an unavoidable contradiction between both target types that needs to be managed. A large range of institutional solutions has been experimented. These solutions can be divided into four main categories:

- The rather pure public administration. In this case, the public “authority” manages the service itself. There is no “utility”. Economic efficiency and customer-oriented service provision usually remain the weak points.
- State-owned capitalist company. The entity in charge of the service is “corporatized”, while the government retains ownership. The implicit contradiction between public service and business objectives is kept internally. The same structure is both “authority” and “utility”.
- Systems based on a separation of the role of “public authority” from a separate operator, to which the day-to-day provision of the service is delegated. The contradiction is formalized through a contract and/or a “regulatory” device. The utility in charge of the operation can be owned by public, private or mixed capital.
- Pure private organizations, which are only supervised through a regulatory scheme. Such a framework barely exists at large scale, except in the United Kingdom (England and Wales), in Chile and in some parts of the United States (New Jersey, for example).

The third category most appropriately illustrates what a “utility” is: the basic roles of the “utility” and the “authority” are formally separated. However, the border between the two spheres can vary a lot. Depending on the institutional framework, the main assets can belong to the “authority” which leases the use, or to the “utility” in a concession type model.

Every solution has its strengths and weaknesses. Because water is a local topic, and the cultural and administrative backgrounds are very diverse, every case is different. The point we would like to stress here is that every a water utility is a thoughtful construction, tailored to accomplish a very specific task.

Compared with water supply, sanitation is a rather new concern. Sanitation was progressively integrated into the water problematic, at least through its sewerage component. In the more advanced countries, where sewage collection and wastewater treatment, alongside water supply, are supposed to be universal, the sewerage activity can amount to half the operational costs of a water supply and sanitation utility. Having been set up later, the investment effort is even higher for the time being. It is not uncommon to see places where more than 80% of the global water supply and sanitation investment programs are dedicated to sewerage and wastewater treatment.

In less advanced countries, sewerage and wastewater treatment have to be developed while water supply coverage is still not fully achieved. Financial resources being limited, a highly political decision has to be taken to determine which target has priority, namely to extend water supply coverage to the poor suburbs or to improve the environmental situation of the city centres.

Three issues will be discussed in the following pages:

- How to manage water and sewerage together? What is a “sewerage utility”?
- What responsibility should water supply and sanitation utilities have regarding on-site sanitation?
- Why is the case of low-income areas more complicated?

IS SEWERAGE A STANDALONE SERVICE?

At the international level, water and sewerage are generally managed together through the same utility, although both activities remain identified as distinct.

We argue that, in a modern – that is to say both environmentally responsible and customer oriented – conception, the sewerage service should not even be identified separately. It is simply part of the water supply commitment.

The water service business is responsible for taking the water resource from some adequate point, treating it, delivering it to the customer, collecting the residual wastewater, cleaning it and appropriately returning it to nature. Moreover, a customer-oriented conception of the service also leads to the conclusion that there is only one service. The population is not interested in paying two separate bills, in having two distinct interlocutors. A typical customer will prefer a one-stop-shopping access to a global service.

Following on from this point of view, neither should sewerage appear as a standalone service, nor should a specific sewerage tariff exist. Nevertheless, different types of reasons explain why sewerage is (still) often considered as a separate service:

- Weight of history. Concerns about sewerage arose later than those about water supply. Furthermore, sewage collection started long before any attempt at wastewater treatment. In fact, sewage collection was initially linked more closely to rainwater drainage and waste management than to water. Many organizations are still the consequence of this historical background.
- Institutional framework. One same entity may not be responsible for both public services. In some countries, there is a Ministry of Water and Energy that manages water, whereas a Ministry of the Environment or of Urban Development manages sanitation. In other places, water is managed at a regional or national level, while sewerage is managed at the municipal level.

Table 1. Pros and Cons of separating the services

Pro	Con
Can fit in with specific local conditions. In dry areas, for example, water needs to be managed at a regional level, while sanitation remains a municipal issue	Loss of scale effect, especially when the sewerage business is still very small
Helps the leverage of financing for water, avoiding cross subsidies to face the burden of unprofitable sewerage service	Highly detrimental to sewerage, whose separate operator will have more difficulties in closing its balance sheet and promoting investment
Can be convenient in the context of IDA proceedings: grants are expected for sewerage, while only loans are accessible for water	Need for a complex interface to share a common billing scheme and a customer front desk
In a Public Private Partnership strategy, water operation is ready to be delegated, but sewerage is still insufficiently developed	Duplication of some costs and need for more experienced human resources to manage the two entities

Financial concerns. Financial agreements are established with institutional donors or private financing for large investment programs. Where the water activity is financially sound, whereas the sewerage services are deeply in the red, the government can prefer to maintain two distinct entities, for the water authority’s financial statements to remain satisfactory enough for loan leverage or to give guarantees of payback.

Separate operations are rather common in developed countries (Belgium, France, Germany, The Netherlands, Portugal, Spain, Hungary) and more rare in developing ones (see annex). Except some major cases, sewerage is practically everywhere else managed together with the water supply.

Box 1. The Brazilian concept of “Saneamento Básico”

In Brazil, “saneamento básico” (literal translation of basic sanitation) means “water and sewerage”. Somehow, water supply is semantically embedded within the sanitation concept¹⁵. Moreover, there is usually no specific “sewerage” tariff in Brazil. In most places, the sewerage fee is simply a percentage surcharge on the billed water fee.

WATER SUPPLY AND SANITATION UTILITIES AND ON-SITE SANITATION

Another important issue is, whether it is appropriate to attribute the utility in charge of sewerage with responsibilities regarding in-house or on-site sanitation.

As said before, a utility is a specific organization tailored to manage basic tradable services with a collective infrastructure. These companies are usually not shaped to do anything else efficiently. By itself, in-house sanitation neither is a tradable service, nor requires collective infrastructure. Although it uses purely private devices, it impacts a lot relevant collective issues such as public wealth and local environment. A strong regulation is therefore expected from the public “authority”. But it is not a service to be ruled by “utilities”.

Nevertheless, some collective services related to on-site sanitation have to be performed. That is for instance the case of sludge removal from septic tanks.

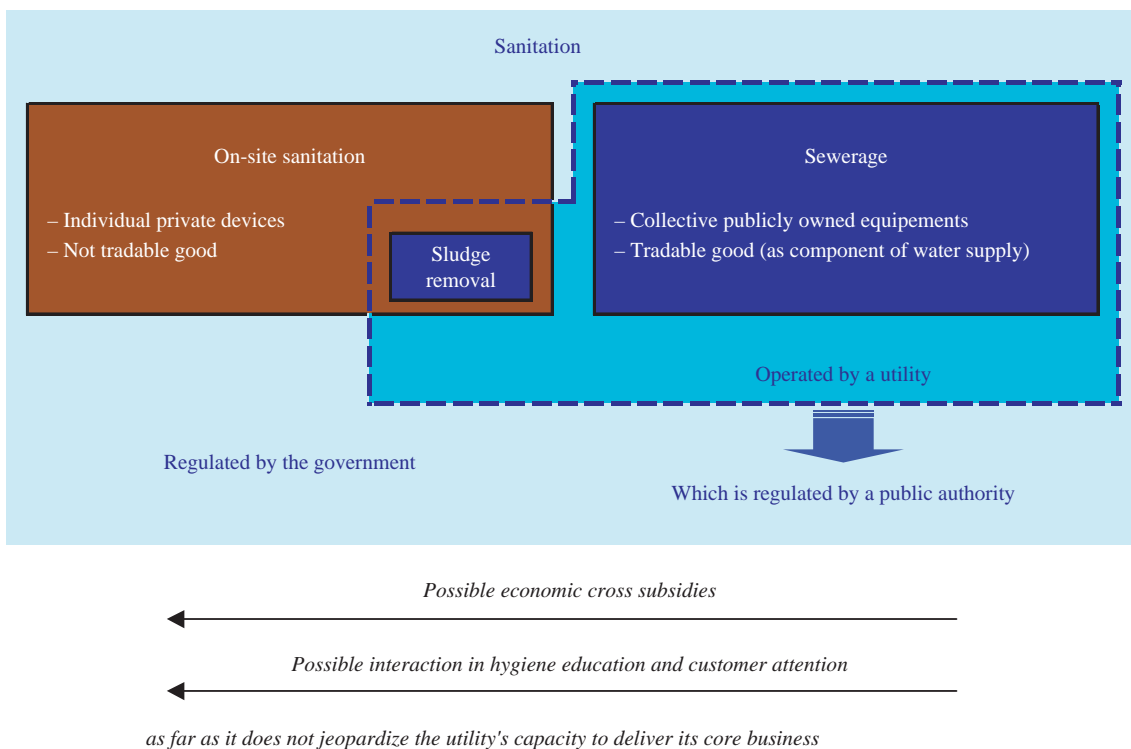


Figure 1. Sanitation services and role of utilities

¹⁵ It is different in Portuguese of Portugal, where “saneamento” remains restricted to sewerage and sanitation issues.

In many places, the local free market is not sufficient to set up a satisfactory solution. State regulation is not sufficient, state involvement in service operation is required; this mainly results from the fact that vacuum sludge removal carried out through modern and hygienic technologies costs too much for the low-income population.

If the water supply and sanitation utility is however committed to meet the sludge disposal need of the poorer population, a department has to be created within the company; this department will inevitably record recurrent losses. It is doubtful that the poor technical economy of scale between business units with scarce technical and commercial interfaces should compensate for the negative scattering effect of the company's organization.

Furthermore, adding non-profitable activities to a utility results in a loss of visibility of its core business' real accountability, hence opening up a range of possible excuses to justify insufficient operational results. Only well-organized and wealthy companies are able to diversify their businesses without damaging their organization. This is not the case of many utilities.

Box 2. Water and Sanitation in Addis Ababa

AAWSA (Addis Ababa Water and Sewerage Authority) is a publicly owned utility in charge of the services in the Ethiopian capital. To keep AAWSA the way it is or to spin off the sanitation issues into a separate entity is today an institutional debate in Addis.

The water distribution network has an estimated length of 3,000 km, with approximately 250,000 connections. The sewerage network is only a few km long. It is estimated that the number of customers effectively connected to the sewerage network is only around 2,500. However, sewerage fees are charged in all the zones, regardless of whether or not water customers are effectively connected to a sewer. As well as the small line sewer business, AAWSA manages a sewage fleet service (sludge removal through vacuum trucks), with a fleet of 69 trucks.

In 2008, sewerage activities, mainly related to the line service (90%), represented 14.6% of AAWSA's total income. The income share due to the fleet service was therefore less than 1.5% of AAWSA's total income. According to a 2005 tariff study, sludge disposal by vacuum trucks is charged between 15% (for domestic households) and 40% (for commercial or administrative customers) of the real cost.

Sewage fleet service therefore constitutes a heavy financial burden for the utility. Moreover, the activity directly mobilizes over 300 people (approximately 15% of AAWSA's total staff). Sewage strongly contributes to the complexity of the company's organization, which the managerial authorities need to face.

CORE RECOMMENDATIONS: UTILITY SERVICES FOR LOW INCOME AREAS

- Sewerage should not be managed as a business separate to water supply. Separating water supply from sewerage through distinct bodies may be justified by tactical reasons on a short-term basis, but the long-term trend should be to definitely aggregate into a single issue what today are known distinctly as water supply and sewerage.
- A "utility" is a complex organization, tailored to perform a specific kind of service. It is not recommended to disturb this organization by adding commitments on top of the core business, especially when such peripheral activities are not profitable, the utility is still weak and yields unsatisfactory results regarding its main challenging objective.
- There is usually no sufficient technical economy of scale to justify the aggregation of services related to in-house sanitation together with water and sewerage operation. On the contrary, any business diversification that might damage the organizational capacity and the financial wealth of a W&S utility should be avoided, at least as long as the utility is not completely successful in the performance of its core business.

Nevertheless, this is theory. In practical terms, the distinction between solutions for sewerage and in-house sanitation is not so clear in low-income peri-urban areas.

- Out-of-the-box approaches, like condominal technologies, are successfully based on a rejection of the simple distinction between "public" sewerage and "private" sanitation devices.
- A strong education effort is called for, with respect to any sewerage project and to basic sanitation, as well as to water supply through standpipes. There is at least a certain level of economy of scale in the necessary field of social work.

· As a matter of fact, sanitation is widely unregulated in informal settlement areas. In the conventional scheme, the authority defines the rules and the objectives of the public service; the utility applies these rules. The utility is not supposed to go beyond its contractual scope. Nevertheless, in low-income areas, these rules cannot be put into practice. The normal separation of tasks between the authority and the utility is not applicable. Rules have to be drafted in the field, in accordance with the hands-on service operation. The utility needs more freedom to go out of the box, to adapt its general commitment to the real local situation, and to embrace the sanitation issue as a whole, if it is to help develop water and sewerage programs.

Box 3. Social Workers for Condominial Sewerage Implementation in Natal – Brazil

In the mid 80s, I managed the implementation program of condominial sewerage in a large part of the city of Natal (Northeast Brazil) for the state-owned regional utility. Our project-working team consisted of 36 people: only 6 of these were related to hydraulics engineering (engineers, draftsmen, topographers), while 30 were social workers (including a street theatre company). Although very far from a conventional sewerage project team, our work has been very successful.

Annex: Main cases of sewerage services split from water utilities in developing countries

In Latin America and the Caribbean, the main example is Montevideo.

- The state-owned national utility, OSE, provides water and sewer services to all of Uruguay, with the exception of the capital (one third of the Uruguayan population), in which the municipality provides sewerage services and OSE only provides water services¹⁶.
- There is no institutional responsibility for sanitation in Haiti, since the mandates of CAMEP (Water for Port au Prince) and SNEP (water for the rest of the country) currently do not include sanitation.

In Asia, China is a specific case.

- In China, water and wastewater services are usually provided by two distinct municipally-owned companies. In fact, the services are often more deeply separated. For example in Shanghai, the Water Division of the Shanghai Urban Construction Investment Development Corporation manages a raw water company, five water distribution companies, one sewage management company, three engineering companies and two construction companies. It serves 12 million people¹⁷.
- Sewerage is not managed by water in Hanoi either.
- In Indonesia, a few utilities, called PD-PAL or Local Government Owned Wastewater Utilities, are exclusively dedicated to sanitation. However, in the main cities, the services are jointly provided.
- In the Philippines, most of the 5000 water service providers only deliver water. However, in the main cities, the services are jointly provided.

In the Middle East and North Africa region, Tunisia represents the most explicit example of a separate operation scheme with two state-owned utilities.

- Since 1974 in Tunisia, water and sewerage services are managed at the national level through two different state-owned companies: SONEDE (Water) and ONAS (Sewerage). Urban coverage is today 94% and 75%, respectively for domestic water and sewerage connections.
- The Egyptian Holding Company for Water and Wastewater, which was created in 2004, holds 14 companies that operate water and sewer systems. The two largest cities, Cairo and Alexandria, each have separate companies in charge of water supply on the one hand and sanitary drainage on the other. Ten other cities or governorates have a joint water and sewer company as a service provider.
- A similar case occurs in Iran. Only Teheran has a separate sewerage company. In all the other provinces, water and sanitation services are provided together.

In Sub-Saharan Africa, Senegal is the main example.

- Responsibility for urban water supply is shared between the Senegalese national water company SONES, a holding company, and SDE, a private operating company contracted by the former, through a rather prosperous

¹⁶ OSE serves 330 localities with 2.8 million inhabitants with water services and 152 localities with 0.5 million inhabitants with sewer services. The department of Montevideo manages sewerage for approximately 1 million inhabitants in the capital.

¹⁷ In larger Chinese cities, a separate raw water company may transport water from far-away sources and sell it to the municipal water company for distribution. Likewise on the wastewater side, larger cities may have several district drainage companies in charge of different parts of the city, a wastewater company in charge of the main collectors, and yet another company in charge of wastewater treatment. In some cities the various companies are under the same "parent bureau", which may be the construction bureau or a water bureau, while in other cities the water company and the wastewater company report to different bureaux. Over the past 20 years China has engaged in what is possibly the largest program to build wastewater treatment plants in history. In 2006 there was sufficient capacity to treat 52% of municipal residential wastewater. Between 2001 and 2004, the number of cities that charged wastewater tariffs increased from 300 to 475 out of 661 cities. However, the construction of sewerage has lagged behind the construction of treatment plants. As a result, many plants are underutilized or poorly-functioning.

PPP scheme. The “Office National de l’Assainissement du Sénégal” (ONAS) is in charge of sanitation. Both sub-sectors are involved in different kinds of funding.

- In some other African countries, sewerage concerns are not dealt with by water, essentially because it is still not a sizeable activity. In such cases, it can be said that sewerage is not considered a priority: it is preferable to concentrate the efforts (and the scarce financial resources) on the extension of water supply coverage. The water utility cannot afford to take on the heavy burden of sewerage, at least for the time being.
- In Ghana, for example, urban sanitation is a local government responsibility (let’s translate: no means, no priority). On the other hand, GWCL manages the water supply of the 82 main urban centres, with strong financial (loans) and operational (private management contract) support.
- The same scheme occurs in Mozambique, where the national water authority FIPAG is forbidden by the World Bank to integrate sewerage: the multilateral organization fears that the FIPAG’s fragile financial balance might be jeopardized before the payback of the loans. Sewerage consequently falls into empty municipal hands.

