Understanding the Urban Poor's Vulnerabilities in Sanitation and Water Supply

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Abstract

Many millions of urban dwellers are excluded from formal systems of water and sanitation service delivery. Without access to piped water and acceptable sanitation services, households and individuals are forced to use limited supplies of water, often of poor quality, from unreliable sources and usually at a high cost. Safe sanitation and the means to practice hygienic behaviours are often entirely absent. This paper argues that one of the root causes of this exclusion has been the long-standing inability of utility and city managers and their advisers to plan and implement water and sanitation systems which respond to the reality of the lives of the urban poor. Rigid approaches, based on inappropriate norms and standards, leave little room for regulated vending, licensed onselling, small scale network operation, and community-managed systems which could extend utilities' reach into previously unserved urban spaces. Such an extension could enable utilities and cities to 'recapture' the systems of delivery which are now largely unregulated, often illegal and almost always substandard. The physical location, lack of voice, and day-to-day reality of many poor urban people form their greatest vulnerability in accessing services which are currently often captured by an urban elite.

Executive Summary

Many millions of urban dwellers are excluded from formal systems of water and sanitation service delivery. Without access to piped water and acceptable sanitation services, households and individuals are forced to use limited supplies of water, often of poor quality, from unreliable sources and usually at a high cost. Safe sanitation and the means to practice hygienic behaviours are often entirely absent. This paper argues that one of the root causes of this exclusion has been the long-standing inability of utility and city managers and their advisers to plan and implement water and sanitation systems which respond to the reality of the lives of the urban poor.

Wholesale and Retail Services

The delivery of essentially 'networked' services such as water and sanitation depends both on the delivery of trunk or wholesale services (bulk water, water treatment services, secondary distribution pipes, secondary collection and/or transportation systems, wastewater or sludge treatment services and disposal options) and retail services (taps and toilets) (**Figure S1**).

This is the fundamental nub of the challenge in water and sanitation service delivery to the urban poor; solutions which address what we might term the wholesale end of the business and pay no attention to retail issues (wastewater treatment plants for example) are as unlikely to result in sustained citywide improvements as those which address retail issues alone. The 2006 Human Development Report notes for example the need for both 'action from below' and 'government leadership' (UNDP 2006).

Identifying the Excluded Population

In general those excluded from accessing formal services are the households or individuals located in areas of the city that are characterized by poor or absent planning, density, poor quality housing, lack of or ambiguous tenure and low access to basic urban services. Most households and individuals in this group are income poor. However, while some are slum dwellers or live in peripheral growth areas (often termed peri-urban), many live in pockets of poverty within better-off districts. Further, generalized terms such as 'slum dweller' themselves mask a wide range of urban realities. The challenge of defining such populations plays out in the lack of reliable aggregate data on their access to services. This unreliability is exacerbated because international benchmarks for access tend to ignore the reality of accessing basic services which they face.

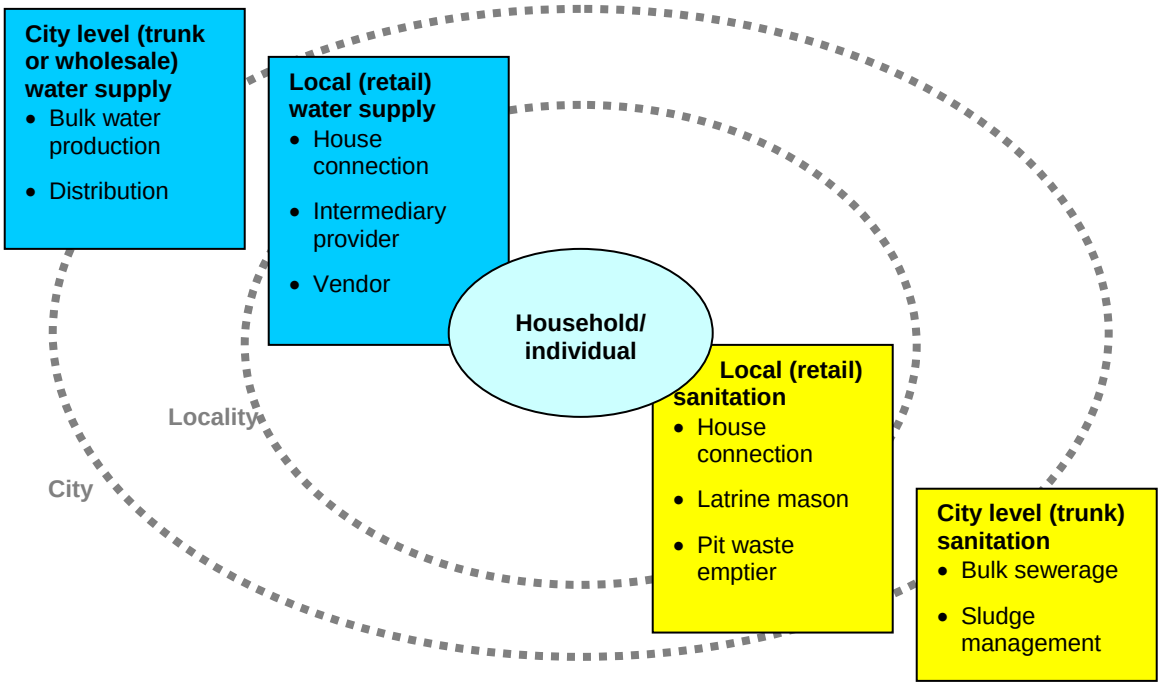

Figure S1: The relationship between wholesale and retail services

Summary of Vulnerabilities

In addition to weak data on access to and quality of services, these populations are vulnerable to exclusion for a number of key reasons:

- They may live far from trunk infrastructure, making the unit costs of both wholesale and retail services unattractive to the utility/city service provider.
- They face constraints on self-provisioning (stand-alone retail services) in the absence of trunk infrastructure. Usually such constraints are related to the high cost of developing alternative bulk sources of water or disposing of effluents appropriately; economies of scale limit the potential for stand-alone initiatives from within the urban community except in some exceptional circumstances.
- They face legal barriers to access including lack of tenure, failure or inability to meet building regulation requirements, and residence in areas which are 'zoned' for alternative land uses. Many of these constraints are not as severe as they often appear to be – but can nevertheless be used by authorities who are unwilling or unable to provide services as a justification for inaction.
- They live in areas which are technically difficult to serve – often prone to flooding or on steep hillsides. Naturally there are some areas which are fundamentally 'untenable' and as such should not be part of the long-term structural plan of a city. However, the reality is that many such areas have been settled for many years – structural constraints often hamper utility/city service providers from delivering appropriate short to medium-term solutions such as regulated vending, community-managed shared infrastructure and small-scale network operation.
- They may be priced out of accessing formal services, usually due to high and unclear connection fees and excessively bureaucratic processes for gaining an official connection.

These primary vulnerabilities arise largely because of structural constraints in the city as a whole. These include:

- weak utility capacity and perceptions;

- challenges to communities organizing around water and sanitation;
- legal structures which mitigate against alternative service providers who could reach the community better;
- adverse incentives in urban planning;
- lack of access to credit; and
- weak revenue base and poor access to debt markets for failing utilities.

These structural constraints in turn may be the product of underlying political economy issues in city governance including:

- certain communities not being the priority for decision makers; and
- existing policies favouring influential populations.

These constraints are reinforced by:

- a lack of knowledge and awareness of approaches which work; and
- a lack of well-targeted international support promoting the interests of the unserved populations.

The play of these vulnerabilities and their causes is not uniform across urban spaces in all regions of the world. This typology is not a blueprint, but merely an indicative framework which suggests how it may be possible to identify the level at which financial instruments could be employed to change incentives and remove the fundamental vulnerabilities of certain urban populations.

Future Dynamics – Population Growth

Population growth has three important impacts on the city that have relevance to water and sanitation services:

- It results in the development of new informal areas, often on the periphery of the city or on land which is 'zoned' for other purposes – such communities are often located far from existing trunk infrastructure (although sometimes they may be close to transmission mains or water treatment plants). They grow rapidly with little overall control or vision, leaving little space for rational planning of street layouts or development of core services.
- It results in 'densification' of existing communities – placing additional demands on existing services and rendering retailing in previously unserved areas increasingly challenging technically.
- It results in an overall increase in demand, which can steer investment away from the retail end of the business into development of additional bulk water production and wastewater treatment capacity.

Fundamentally population growth in unplanned areas also increases the impression of *difficulty* for city planners who may have some commitment to reaching unserved communities. 'If only these people would stop coming or stop multiplying we could do something to help', e.g.

Given that urban population growth is not going to stop it is necessary for the policy response to reflect it. Several key elements would therefore need to be built into urban water and sanitation planning:

- a realistic assessment of future population size and subsequent demands.
- a realistic assessment of likely patterns of settlement – and an acceptance that at least in the short term this is unlikely to change (the Victorian sewerage of London was built to serve the slums that existed then; it still works in today's less densely settled city areas).
- a dynamic approach to planning that can adapt plans to reflect urban settlement patterns as they arise. The use of more 'modular' systems carries huge benefits for rational systems operation anyway – zoning the city's water supply to respond to growth as it happens also enables better

management and can result in significant reductions in physical losses from the system. Similarly wastewater treatment systems can be decentralised, and the use of horizontally disaggregated sanitation systems (with a mix of service arrangements for different areas of the city) allows a more nuanced response as settlement patterns develop.
- the use of more vertically disaggregated service delivery mechanisms that enable more rapid and responsive investments in trunk services and enable progressive development of services in growth areas. A city which is committed to delivering some services through a well-regulated vending system can more rapidly respond to growth than one for which reticulated systems are the only option, for example.

Future Dynamics – Climate Change

In addition to these observations (particularly the need for systems to be dynamic and responsive to change), the risk of climate change has three additional implications for planning urban water and sanitation systems:

- The proportion of the urban population for which high-cost reticulated systems are the most appropriate level of service will fall. There will be increasing areas of many cities which cannot be regarded as suitable for long-term development but which are likely to be inhabited in the short to medium term because, between extreme events, they are (if barely) habitable and respond to the needs of workers to be located close to the workplace. These spaces will merit investments in services which are easily 'portable' (the use of regulated vendors or community-managed water points and toilets) or low cost.
- Linked to this the system may have to include elements which are appropriate to areas which face specific risks. One example is to reduce reliance on shallow ground water in areas which will increasingly be subject to seawater inundation. Latrines suitable for high-water-table areas may increasingly be appropriate in areas where groundwater levels are rising, and so on.
- Finally, the system will increasingly need to include capacity to rapidly respond to natural disasters and provide appropriate water and sanitation services to internally displaced populations.

A Final Word about Sanitation

The analysis in this paper focuses on the difficulties for some communities of accessing *both water and sanitation systems which provide basic reliable service*. However, sanitation is and remains a 'poor cousin' in the water and sanitation field. While delinking it institutionally from water supply has some merit in rural areas, in urban areas these two essential urban services remain strongly interdependent. Sanitation is harder than water supply in urban areas for a range of reasons but its proper delivery and management alongside appropriate hygiene programs have the potential to massively increase the quality of life of poor people and improve the status and potential of the city as a whole. Poor people are particularly vulnerable to the ill effects of lack of adequate sanitation. It can no longer be neglected

1. Introduction

Many millions of poor people living in the world's cities lack access to basic levels of safe water and the means of safely disposing of their excreta. The magnitude of the problem is hard to assess with any degree of accuracy – the Joint Monitoring Program of UNICEF and World Health Organisation (JMP) estimates that the percentage of the urban population with access to safe water supply globally remained stable from 1990 to 2004 at 95% (WHO/ UNICEF 2006). However, due to urban growth the *absolute number of urban people without access to safe*

drinking water rose from 107 million to 170 million and is projected to reach 240 million in 2015. Furthermore, this global figure masks some disturbing anomalies; in some countries the percentage of the urban population with access to safe water is actually declining (about 10% of countries saw urban drinking water coverage decline by two percentage points or more). The problem seems to be most acute in parts of sub-Saharan Africa and East Asia (**Table 1**). Access to basic sanitation for the urban population 'crept up' from 79 to 80% between 1990 and 2004 but the absolute numbers of unserved urban people rose from 475 million to 611 million over the same period. Some countries, notably Mexico, Vietnam, Myanmar, Egypt and Pakistan, have made progress however, achieving a decrease in the absolute numbers of unserved urban people despite a more than 20% increase in the urban population (**Table 2**). The picture then is patchy, but overall there seems to be a long way to go to reach the urban portion of the MDG target on water supply and sanitation.

One of the main challenges for urban water and sanitation services as compared to rural water and sanitation or some other urban services is that services to the household have to be embedded within a workable (sustainable and effective) urban system. Self-help only works for long periods if it can engage with arrangements for the city as a whole.

Over time the approach to planning and implementing urban water and sanitation has evolved, or more correctly, has revolved. Before the International Decade for Drinking Water Supply and Sanitation (IDDWSS, 1980-89), there was a widespread assumption that conventional networked systems would be appropriate everywhere, and that urban systems were therefore amenable to relatively static master planning. Later, during the 1990s, two important strands of thinking became prominent; firstly a focus on demand-driven, community-based approaches, which theoretically at least allowed local demand to drive decision making; and secondly, the concept of strategic planning – a more versatile and adaptable approach to the urban system, which was first documented in Kumasi and Ougadougou in Ghana but was in fact evolving in several locations, prevalent in the 1990s. The former has tended to be linked to a more 'market-based' way of thinking, and also has been used in some cases as a justification for a more laissez-faire approach – often in response to the inability or unwillingness to raise public funds for needed investments. The latter strand – that of strategically planning urban systems – heralded a general move towards a more mature analysis today, which seeks to embed community and household decision making and management into a workable urban system.

Country	Urban Population 2004 (thousands)	Urban drinking water coverage 1990(%)	Urban drinking water coverage 2004(%)
China	123,195	99	93
Indonesia	103,436	92	87
Nigeria	61,780	80	67
Philippines	50,602	95	87
Algeria	19,091	99	88
Myanmar	15,001	86	80
Sudan	14,209	85	78
Kenya	13,721	91	83
Uzbekistan	9,435	99	95
Mozambique	7,186	83	72
Yemen	5,285	84	71
Madagascar	4,890	80	77
Zimbabwe	4,528	100	98
Haiti	3,195	60	52
Democratic Republic of the Congo	2,096	90	82
Liberia	1,523	85	72

Table 1: Countries with urban populations over 1 million where urban drinking water coverage from improved sources is declining[1]

[1] WHO/UNICEF 2005.

Country	Absolute decrease in urban population without improved sanitation (thousands)
Mexico	8,063
Vietnam	3,889
Myanmar	3,458
Egypt	2,964
Pakistan	1,882
Ecuador	815
Dominican Republic	571
Thailand	394
Senegal	297
Chile	284
Haiti	140
Syrian Arab Republica	96
Philippines	44
Honduras	30

Table 2: Countries with more than 20% increase in urban population 1990-2004 that managed to decrease number of urban dwellers without improved sanitation[2]

This revolution has of course occurred at different paces and in various contexts globally and has, crucially been driven in part by more widespread economic development and the growth of city economies. It is undoubtedly true that a key step was the recognition of alternatives to networked sewerage and water supply, the product of early work championed by the World Bank but inspired by many professionals in the field (see for example the work of the Technology Advisory Group led by John Kalbermatten). More recently a more thorough discussion of the environmental and ecological impacts of urban water and sanitation systems has also entered the debate – a move which is both timely and important.

The question this paper seeks to explore however is whether, in this more 'enlightened' time, the interests, and realities of the urban poor are adequately understood and represented in urban systems planning and implementation, or whether, despite twenty years of learning, certain population groups are still vulnerable to a systematic exclusion from basic services provision.

2. The experience of water and sanitation for the urban poor

As mentioned above, the JMP tells us that in general progress is being made in access to water and sanitation services in urban communities around the world **(Figures 1** and **2)**.

The JMP reports several statistics which at first glance seem encouraging, such as the fact that by 2000 85% of the urban population in Africa had 'improved' provision for water supply and 84% 'improved' sanitation. Other data focusing on urban poverty paints a similarly positive picture. The situation in Latin America seems particularly good.

[2] WHO/UNICEF 2005.

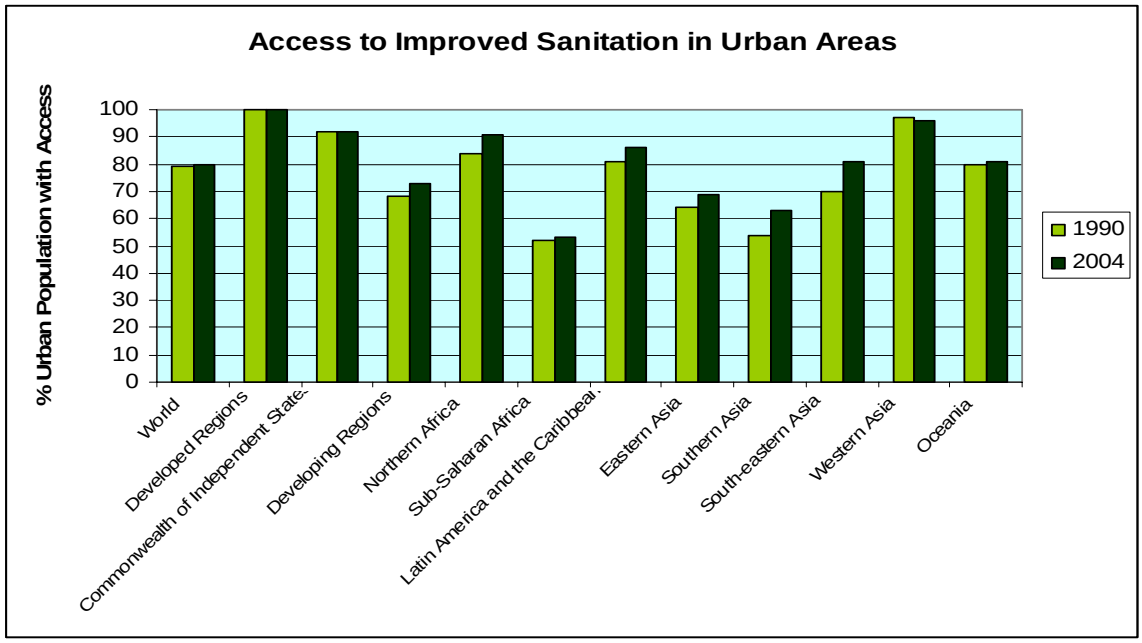

Figure 1

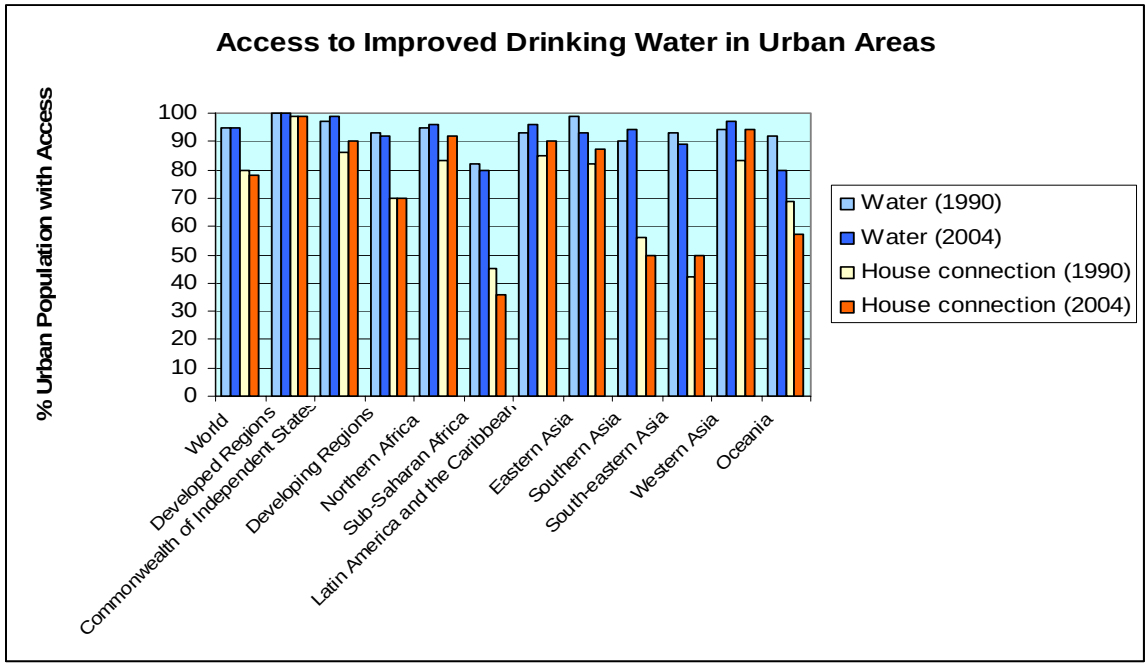

Figure 2

This is indeed surprising for those working in urban areas around the world. What has happened to the almost 4 million slum dwellers of Dhaka, most of whom are not registered as customers of the Dhaka Water and Sewerage Authority[3]? If it is true that 77 percent of people living in major cities in Africa have a water connection and 45% of people living in major cities in Asia have a connection to a sewer, what do we know about the service that these connections provide? Does everyone who has said they have a pit latrine in urban Africa still use it? What can we say to the millions of slum dwellers who have no formal relationship to their local utility service provider and don't know who to ask if they wish to invest in a toilet?

While aggregated national statistics paint one picture of service delivery, the reality may in fact be very different. This happens partly because of statistical anomalies (see Box 1), but also happens because the experience of poor people and the way in which they relate to and gain access to services are not the same or even close to the 'model' of service delivery on which the statistics are largely based[4]. Living close to a sewer and even having a toilet connected to it does not necessarily mean that the toilet works every day of the year, particularly where water supplies are erratic, or that the sewer takes the wastewater somewhere appropriate. What is needed to assess true access is of course much more detailed and nuanced analysis based on local information – this is difficult and expensive.

So from the very start of the analysis, some of the urban poor are vulnerable because the reality of their existence *is not always recognized*. This matters not only for the poor themselves but also for the good operation of urban water and sanitation systems as a whole. There is a strong correlation between the urban poor and the urban unserved – the poor are disproportionately represented amongst the unserved and the unserved are almost exclusively poor. However, since both sanitation (at least in its simplest form as the management of human excreta) and water are essential, whether poor people are formally served or not they will find and use water and they will defecate. Thus not being provided with a formal service does not mean that unserved populations have no impact on water resources and environmental conditions in cities and towns. Logic and good sense dictates that they should therefore be included and acknowledged to enable proper systems planning to occur.

Logic and good sense dictate that they should therefore be included and acknowledged to enable proper systems planning to occur.

[3] Recent work survey work in Dhaka suggests that they get their water services from a mix of public standposts, unregulated onselling (often from illegal connections) and purchasing from vendors (CUS 2005). Defecation is practiced in unhygienic 'hanging latrines' or in the open.

[4] This comment in no way implies a criticism of the invaluable work of the JMP, merely that the JMP and others struggle to find ways of quantifying the challenges of the urban poor within a global data set.

Box 1: The Things We Don't Know[5]

The literature on underestimations of urban poverty is extensive[6] and the specific examples numerous. Such critiques are important, although it is also crucial to endorse the principal of international monitoring which could potentially provide such useful benchmarks for nations striving to tackle poverty[7]. The major reasons why urban poverty in general, and access to water supply and sanitation in particular appear to be underestimated arise from:

- the use of generalized poverty lines across urban and rural areas which fail to take into account the higher cost of living and monetized economy of urban areas; and
- the use of arbitrary cut-off points to define "urban" spaces. Virtually all governments accept that settlements which concentrate more than 20,000 inhabitants are 'urban centres', but they disagree about where to draw the line between 'urban' and 'rural' for settlements with less than 20,000 inhabitants. Some classify all settlements with only a few hundred inhabitants as 'urban' while others consider most or all settlements with up to 20,000 inhabitants as 'rural'. Since a very significant proportion of the population in virtually all nations live in settlements with between 500 and 20,000 inhabitants (what might be termed small urban centres and large villages), the proportion of a nation's population living in 'rural' or 'urban' areas is much influenced by what proportion of the population in 'small urban centres and large villages' is classified as rural and urban. India and Egypt would be predominantly urban if they classified all settlements with 2,000 or more inhabitants as urban (as many nations do).[8] Peru and Mexico would be much less urbanized if they only classified settlements with 20,000 or more inhabitants as urban. Most nations would be predominantly urban if they classified as urban all settlements with built-up areas with at least 200 inhabitants and with houses at most 200 metres from each other as urban (as in Sweden).[9]
- the difficulty in correlating people's perceptions and reality – when asked if they have access to water or sanitation, some households may answer in the affirmative because they live near to the sewer or water pipe; this may not equate to a reasonable service.

Furthermore data handling practices give rise to two further areas of concern:

- aggregation of data (across regions or cities/towns) which masks pockets or peripheries which are poorly served and limits ability to assess the level of inequality;
- use of long time series fails to capture trends in urban poverty[10].

The reality is sadly different. Taking a very pessimistic view, could it be possible that there are substantial populations who are unserved for reasons which relate to both power relations and money? If this is the case, then there are probably powerful interests at play maintaining

[5] The text in Box 1 was originally prepared for UN Habitat as part of background paper for CSD13.
[6] For a useful summary of sources see for example Satterthwaite (2003).
[7] Such efforts provide vital first-order statistics which at the least help to illustrate the scale of the problem to be tackled. International agencies involved in such efforts are the first to acknowledge the flaws which may arise from definitional or data collection discrepancies at local or national level. Since service delivery and poverty alleviation are both inherently political processes, it is vain to hope that national and international data will not be controversial and hotly contested at many levels.
[8] Satterthwaite (2002).
[9] For summaries of how each nation defines urban centres, see UNDESA (2002).
[10] For a more detailed discussion of data issues, in the context of the PRSPs see Mitlin (undated).

the illusion of adequate services. As long as this is the situation, the results will be poorly planned and badly operated urban systems, poor quality of services delivered disproportionately to the poor, and a high consequent burden of ill health and economic depression.

To understand how and why this illusion of service delivery is created and how it impacts on the urban poor, it is necessary to first understand briefly what sorts of communities are affected and how services would be delivered if the need to do so were to be recognized.

3. A typology of excluded communities and households

The first and most obvious question to ask is: Where do the excluded urban poor live? These 'vulnerable' populations can be broadly (and rather crudely) categorized into five overlapping groups. Those living in:

- slums, shanties, squatter settlements;
- dense and deprived but nonetheless legal inner-city locations;
- small pockets of poverty within wealthier formal communities;
- peripheral growth areas; and
- rapidly urbanizing spaces formerly defined as 'rural'.

The most prominent manifestation of urban poverty is of course slums – these have been broadly defined by UN Habitat as areas exhibiting five key dimensions:

- lack of access to improved water
- lack of access to improved sanitation
- insecurity of tenure
- poor quality of dwelling place (hazardous location, impermanent structure)
- insufficient living area

These types of living spaces also exist within a range of overall urban places which may vary, crudely in terms of size, relative political power and autonomy, population change dynamics, competence and capacity, wealth, and relative significance in national or regional terms.

Finally the overall urban space in a given country or region exists within an economic reality which defines some aspects of the urban experience. We might, for example, assume that the experience of the urban poor in middle and higher-income countries is likely to be different from that of the urban poor in low-income countries.

Global analyses of these features of urban life are difficult because there are not fundamental answers – pockets of different types of poverty exist everywhere. Furthermore, urban places in economies of all kinds are highly dynamic, with rapid growth or progressive decline a prominent feature in many locations. Nonetheless, global data give us some information on the distribution of the most challenging urban spaces **(Figure 3).** UN Habitat offers a useful summary of global trends in urban poverty during the last decade **(Box 2)**[11].

[11] UN Habitat 2004.

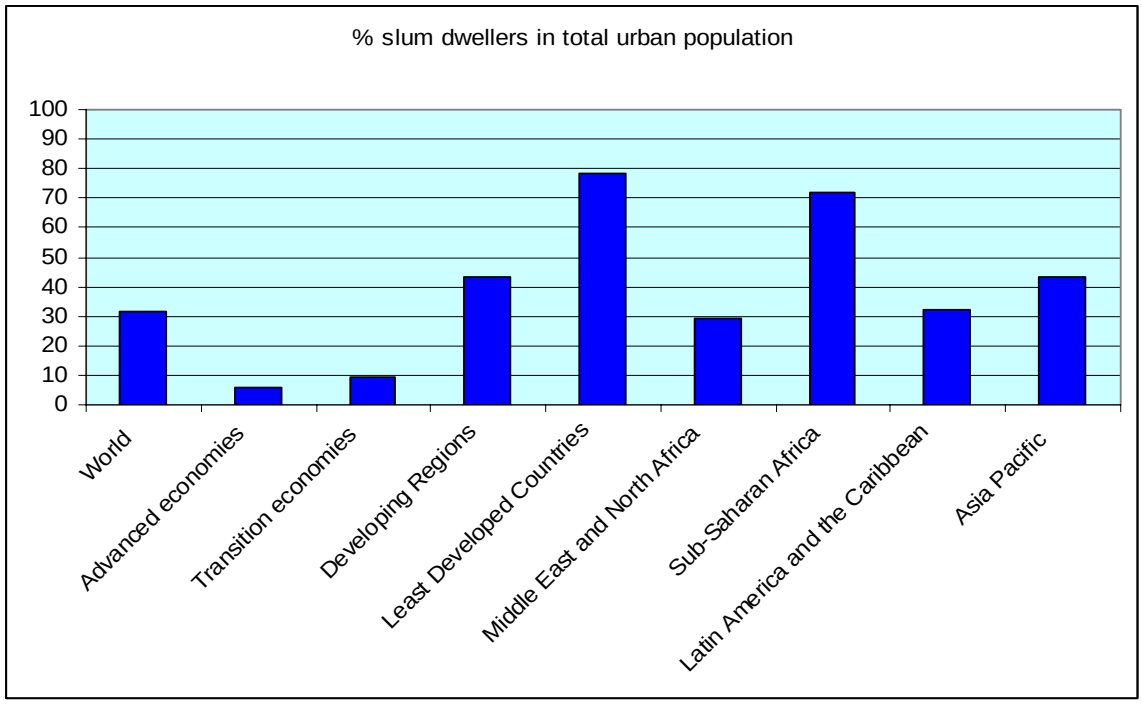

Figure 3

Box 2: Global Trends in Urban Poverty During the Last Decade

Asia-Pacific: an unprecedented decline in income poverty but the largest urban slum population in the world in the context of rapid urbanization
Latin America and the Caribbean: the most unequal distributions in a highly urbanized context
Middle East and Northern Africa: less inequality and fewer slums than in other developing regions, but countries severely hit by conflicts and affected by poor governance
Sub-Saharan Africa: large numbers of urban poor in life-threatening conditions; the highest incidence of urban slums in the world, with fast-growing cities and a rising number of poor refugee settlements
Transition economies: an unprecedented rise of inequality, rapidly declining living standards and more households living in slum conditions
Advanced economies: rising inequality and homelessness, with declining social support in a context of low population growth

Habitat notes some other strong correlations in the global data, notably correlations between the proportion of slum dwellers in the urban population and:

- annual rates of urbanization;
- annual rate of population growth (this relationship is weaker); and
- poverty (as expressed by the percentage of the population living on less than $2 per day).

Inverse correlations exist with:

- Human Development Index;
- GNP per capita purchasing power parity;
- an index of government effectiveness; and
- an index measuring control of corruption[12]

In summary then, slum dwellers tend to be concentrated in areas with high levels of poverty, high rates of population growth, and weak indicators of governance. This is hardly startling information – but it does make the challenge of reaching the remaining unserved poor urban populations harder because it means that these unserved populations will tend to be located in city spaces with weak capacity to oversee the management of a working urban system.

4. What it takes to get access

4.1 Wholesale and retail services (pipes, taps, pit emptiers and toilets)

As already mentioned, the reason why it is so important to understand both the local and the city environment is that the delivery of essentially 'networked' services such as water and sanitation depends both on the delivery of trunk services (bulk water, water treatment services, secondary distribution pipes, secondary collection and/or transportation systems, wastewater or sludge treatment services and disposal options) and retail services (taps and toilets) (**Figure 4**).

[12] ibid, see Chapter 5 for an expansion of these data.

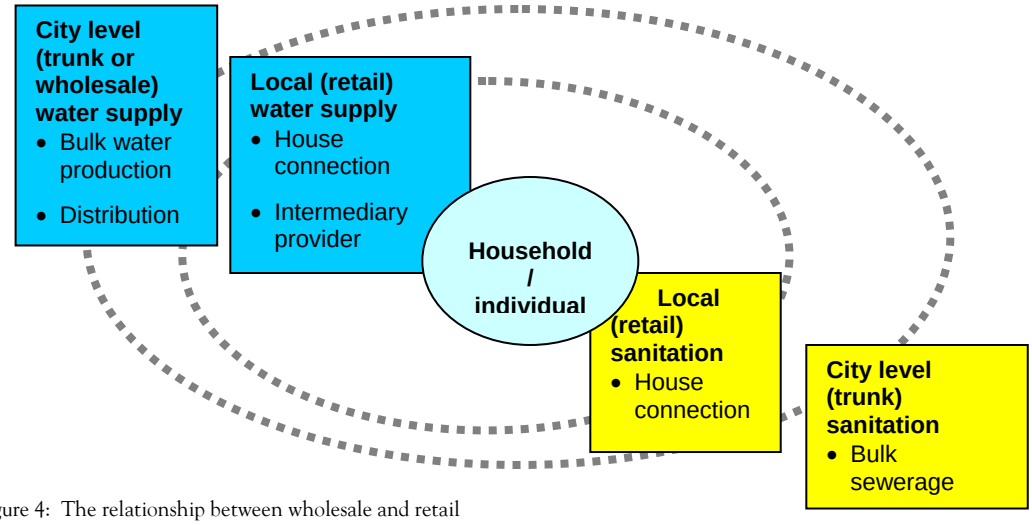

Figure 4: The relationship between wholesale and retail

This is the fundamental nub of the challenge in water and sanitation service delivery to the urban poor; solutions which address what we might term the wholesale end of the business and pay no attention to retail issues (wastewater treatment plants, for example) are as unlikely to result in sustained citywide improvements as those which address retail issues alone. The 2006 Human Development Report notes for example the need for both 'action from below' and 'government leadership' (UNDP 2006).

In areas served by mature utilities water is provided from the city to the household and the corresponding wastewater is managed from the house to the wastewater treatment plant. This 'whole pipe' or 'mature utility' model has formed the foundation of the education of generations of technicians and utility managers, and is therefore implicitly embedded, although rarely recognized, by a huge percentage of sector professionals from many disciplines and sectors (Evans [1995], Evans [2005], Nilsson [2006])[13]. At the same time the potential of community-driven initiatives is widely recognised in other parts of the literature (see for example Chapter 3 of the 2006 Human Development Report) and isolated successes have been well documented. The vital link *between wholesale and retail services*, however, appears to be poorly understood and rarely articulated in modern policy. This is perhaps the single most important reason why the real service delivery routes that poor people use (ranging from water from shared connections, informal resale and vending through to outright theft and, for sanitation, usually open defecation) have not historically been well documented, understood or embedded in policy.

Recent work from the International Water Association, which focuses specifically on urban sanitation, neatly brings together twenty years of analysis to illustrate that this bias and the way it translates through the political economy of planning results in a higher value being placed on city-level interests (such as meeting downstream effluent standards) than on household interests (having a clean safe bucket to defecate into) (IWA 2006). Thus

[13] The degree to which this bias is driven from 'outside' through donor priorities rather than arising from the ranks of professionals working inside each city is hard to assess but perhaps merits further examination.

the interests of the already-uncounted vulnerable urban poor are further sidelined.

IWA recommends using a 'domains' approach to planning to bring the interests of the household into sharper focus (**Figure 5** shows the stylized 'domains' of the city).

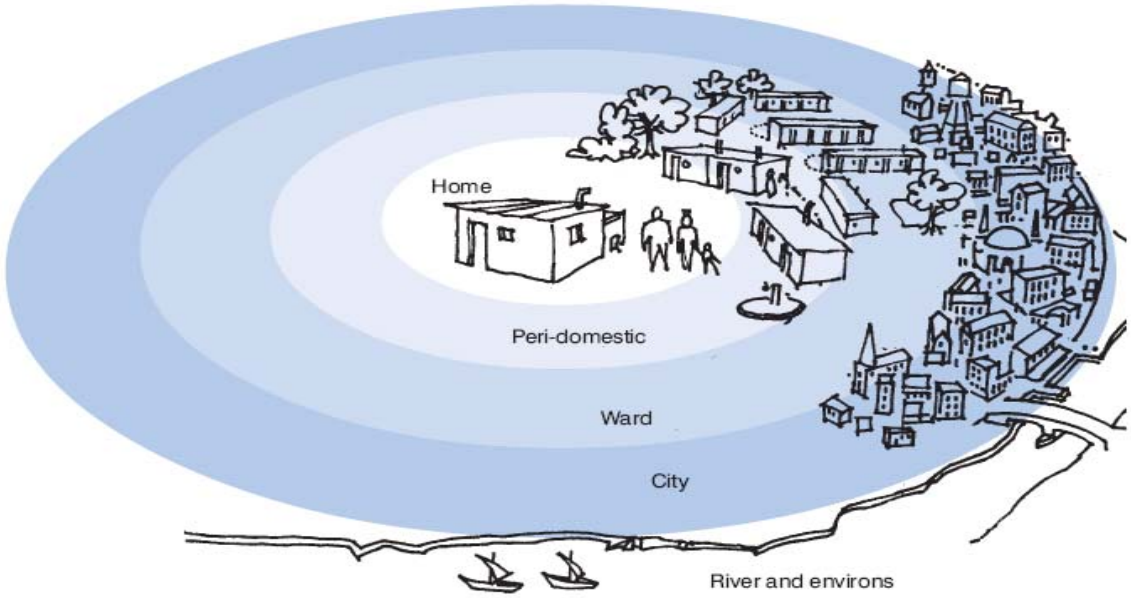

Figure 5: City Domains[14]

In this approach, interests, exogenous factors, constraints and opportunities are analysed across all 'domains' of the city, from the household 'outwards' to the wider environment. This gives the end-user (the person who draws the water or defecates in the bucket) a stronger voice in decision making and should result in a more complete analysis of urban sanitation (and water supply) systems[15]. Of course this approach can only work if the poor have been recognized as legitimate 'customers' or eligible to benefit from public investment – of which more later.

Such a process holds out the hope of more informed planning, although it also begs the question why the IWA *needs* to tell its members something so very obvious and which has been well recognized in the literature for a while. Before we can really understand this we need to first describe what a water or sanitation system really looks like and then return to consider why some parts of it are so much more prominent in investment plans.

[14] This diagram was taken from the DFID Guidance Manual on Water Supply and Sanitation Programmes LSHTM/WEDC 1998 and further developed by IWA (IWA ibid). Section 2 of the guide provides an excellent summary of the health analysis which drives much sanitation decision making and has contributed to the thinking about this framework.

[15] The work of the Sanitation 21 task force of IWA is heavily informed by earlier literature – see for example Wright (1997), EAWAG et. al. (2005).

4.2 Modes of service delivery – sanitation

In technical terms sanitation consists of some combination of:

- a toilet;
- a collection mechanism;
- a transportation mechanism
- a treatment process; and
- a disposal/ reuse mechanism/process.

From the perspective of the city system, it comprises elements that deal with the household environment (the toilet) and elements that deal with issues in the wider environment. In conventional utility models these elements are combined through a water-borne sewer network which connects a water-sealed toilet in the house to a citywide network of collection, treatment (sometimes) and disposal of wastes. However, in the absence of such a unified system (i.e., for most of the world's urban slum population), sanitation usually disaggregates into component parts (toilets, pit waste or sludge management and disposal).

Norms and approaches to sanitation can be very broadly disaggregated regionally – with a greater attention to and provision of networked sewerage in Asia and Latin America, for example, when compared to Africa (**Table 3**). However, the causality of this difference is hard to identify – certainly it arises in part from the wealth of both the countries and cities under consideration in each region.

	House or yard connection for water (%)	Connected to sewer (%)
Africa	43	18
Asia	77	45
Latin America and the Caribbean	77	35
Oceania	73	15
Europe	96	92
North America	100	96

Table 3: Proportion of households in major cities connected to piped water and sewers [16]

In regions where utilities or local governments have as yet made very limited investments in sanitation, we typically see households with very limited access to poor quality latrines, usually (if they exist at all) simply structures which concentrate contamination in a given place (a local water body, wasteground, or sometimes in a shallow pit) and an embryonic citywide sewer network which connects a tiny proportion of the population to nonfunctioning wastewater treatment plants.

In some cases, downstream collection and disposal have been partially addressed by small private entrepreneurs (WSP 2005a, WSP 2005b, Katui-Katua, M. and G. McGranahan 2002, Kjellen and McGranahan 2006, WUP 2003) and by communities (several examples, including the Orangi Pilot Project, and the Community Toilets constructed in Pune and several other Indian cities with support from NGOs, have been well documented). This, however, does not always address wider environmental issues since, if the incentives are not right, such service providers cannot afford to make extra efforts to dispose of wastes safely or appropriately.

Effective urban sanitation requires a system of service delivery which responds both to household and wider community and city

[16] WHO/UNICEF (2000) cited in UN Habitat (2003).

interests. In the absence of well-resourced and fully skilled utilities responding to public policy signals which balance out these interests, it seems likely that such a system will continue to rely on a chain of service providers, each responding to incentives at a different level in the system. The role of the policy-maker is thus to create the right incentives at each level in the system to meet the requirements of the system as a whole.

It is commonly said that what is lacking in urban sanitation is the right technological solutions. I would argue that this is not the case. **Table 4** shows us a range of technological 'answers' to the questions posed in each domain of service delivery. The question seems to be not so much what technology should be prescribed, but rather what policy triggers and incentives are needed to create conditions for someone to fill service delivery gaps in each domain, using the most appropriate combination of available technologies. The incentives are in turn created by a range of regulatory instruments and price setting – the key decisions relate to the deployment of public finance to swing the benefit-costs ratios of investments in different elements of the system[17].

4.3 Modes of service delivery – water supply

In water supply the 'wholesale' or bulk element is either provided through a utility network system (big pipes) or through point sources (improved services generally being provided from deep tubewells fitted with a handpump or submersible pump, while poorer quality services may result from use of dug wells, ponds and rivers, or other contaminated sources). Retail services may be provided through house connections served either by the utility network or a small local private or community-managed network or, more commonly, through an unregulated public standpost, a kiosk or regulated standpost, a community water point or vendors (see **Box 3**).

Turning to Table 4, again we see a broad range of technologies and management mechanisms by which water supply services can be delivered. The most striking conclusion once again is that such a range of services is most likely to be delivered most effectively by more than one service provider (major utility companies may not make the best water vendors and sometimes communities do the best job of delivering retail services). Thus, the conventional model of a utility delivering water to the tap in the house might be replaced by a supply chain comprising utility, local government, small private provider, civil society organization, and/or the household itself. Such a vertical disaggregation of roles and responsibilities calls for a different policy response than the 'mature utility' model (although some mature utilities have some relevant experience through the sale of water to 'condominials', usually apartment blocks and institutional customers).

[17] This question of costs and price is complex although it has sometimes been typologised as a simple choice between full cost-recovery tariffs and subsidised services. In fact in many urban situations the quality of financial analysis is so poor that the nature and scale of the public subsidy cannot be readily quantified. Nonetheless, the influence of well-targeted public subsidies has been well illustrated in many cases (see, for example, a description of the national sanitation program in Mozambique - WSP (2002)) as has the importance of good pricing and the disastrous effects of poor targeting of public subsidies.

Box 3: Alternative Modes of Service Delivery (water supply)

Water vendors make up a significant part of the water service delivery system in some cities and towns. While the total scale of the vending market is difficult to assess, it clearly plays a key role in many informal areas (UN Habitat 2003). Kjellen and McGranahan (2006) note that the 'lower' boundary between vending and shared connections is difficult to distinguish, while at the 'upper' boundary of the market there is an overlap with small private network distributors. Nonetheless vending appears to be widespread and has been reported in all regions. Well-documented examples include:

- sales of bottled water;
- handcart and hand-carried sale of water usually by container; and
- water trucks selling water into the customers' containers, or into a ground tank.

Small utility networks sometimes referred to as aquateros – appear most common in Latin America but are also to be found in East Asia and Africa. Bulk water is either purchased from the utility or produced from ground or surface sources and on-sold to private customers.

Community water points and private water kiosks appear to be common in all regions – the term 'kiosk' is most commonly identified in Africa while community water/sanitary points are a particular feature in parts of South Asia. Community water points and kiosks can be distinguished from unregulated standposts because they have formalized management arrangements.

4.4 Special considerations for sanitation and hygiene

The experience of accessing urban sanitation differs in certain important ways from the experience of accessing water (Evans 1995). Firstly the nature of sanitation in urban areas requires some level of coordinated action from multiple households (this point is cross-referenced in a later paper for this conference). This is in stark contrast to a water supply where individual households can make significant changes by their own actions. The benefits of sanitation are unlikely to be realized by households who act in isolation. Research is increasingly indicating that a significant proportion of the population, particularly in congested urban settings, need to change their behaviours for individuals to realize health benefits. The issue becomes even more critical when good operation of the sanitation system is also dependent on reasonable standards of solid waste management and maintenance of stormwater drainage channels. Thus, even if there is space for on-site sanitation, households may be ill-advised to invest on their own. This need for concerted local action becomes even more pressing where congestion or cultural norms demand the use of networked sewerage. Thus, urban sanitation may require specific support targeted towards communities both to promote behaviour change (the choice of investing in and using a sanitary facility) and to support collective action.

Secondly, the success of an urban sanitation system is highly dependent on the operation of downstream systems (sewerage or sludge management) unlike the water supply which is dependent on the operation of the *upstream* system. In a water supply the incentives for the utility service provider and its 'influential' constituents (i.e., the middle classes) are to keep the upstream system working; a poor household/community need only to make the connection in some form or another to access a working service. By contrast, in the case of sanitation the downstream system is 'nobody's business'; incentives to make it work, up to the point where a poor community is dependent upon it, are very limited. The community is heavily constrained in its ability to influence the operation of downstream services (either trunk sewers, pit waste management or responsible reuse of excreta from ecological toilets). The result is that many poor households and communities, and many of their potential small scale service providers, are reluctant to make

		Sanitation Systems		Water Systems
Retail or Local Elements	**Household services**	• Dry toilets • Dry urine diversion toilets • Pour flush slabs • Waterless urinals • Water closet (various types)	**Household services**	• House and yard taps • Private tubewells • Vendors • Tankers • Onsale from neighbours • Rivers, ponds etc
	Community services	• Community sanitation blocks • Community-managed networks • Community-managed community/public toilets	**Community services**	• Yard taps • Community water points • Kiosks • Small private/community networks
Movable boundary	**Collection**	• Fossa Alterna • Oil drums and containers • Vaults and chambers • Collectors/secondary sewers	**Production (local) or Transportation**	• Utility networks (distribution) • Utility bulk sale to intermediary • Private/community networks
Wholesale, city or utility elements	**Transportation**	• Cartage systems (with/without septage stations) • MAPET and Vacutug systems (with/without septage stations) • Settled sewerage (small diameter) • Main sewers • Sewerage pumping stations		
	Treatment/re-uses	• Co-composting • Dehydration • Planted soil filter • Anaerobic digestion • Baffled reactor • Upflow anaerobic filter • Upward flow anaerobic sludge blanket reactor • Facultative and maturation waste stabilisation ponds • Constructed wetlands • Duckweed ponds and other aquatic plant systems	**Bulk production and Treatment**	• Surface or groundwater production (Utility or private) • Water treatment plant (various WTP technologies)
	Disposal/re-use	• Reuse of wastes in gardens, urban agriculture or sale to agricultural market • Disposal to downstream areas • Reuse of sludge		

Table 4. Selection of Service Delivery Elements (sanitation and water)

any investment at all in sanitation, knowing that in the medium to long terms septic tanks or latrine pits will be full or sewers will block[18].

Finally, demand for sanitation has a different dynamic to demand for water. Jenkins and Sugden (2006) develop a useful analysis of the stages through which urban families make decisions relating to sanitation investments. The details are less important here than the fact that this process usually requires some level of sustained support over time if households are to come to value the private benefits of investments in sanitation in a way which justifies spending scarce household resources. It is also worth mentioning here that investments in sanitation, while important in their own right, are unlikely to realize their potential health benefits without a linked investment in promotion of changes in hygiene behaviours (Luby, et al. [2005], Laxminarayan et.al., [2006], Stephens [1995], T. Jenkins and Sugden [2006]). The impact of hygiene on health is well-documented (Curtis et al. 2000, Evans et al. 2004) and most commentators agree that this is an area where public investments are justified, particularly in urban areas.

Thus, in addition to the straightforward delivery of services, there is a case to be made for cities to invest in several 'support' activities, including providing support to build community capital and support joint action, the promotion or marketing of sanitation, and the promotion of key changes in hygiene behaviours.

[18] The well-known case of the Orangi Pilot Project is an honourable exception to this case but also serves to illustrate the issue; Orangi is physically located in such a way that community sewers are able to discharge freely into downstream drainage channels. Thus community actions and investments do result in a working service. The existence of reliable water supplies is a further factor in the proper operation of this system.

5. Vulnerabilities in accessing water and sanitation services

5.1 The Problem for Poor People

Thus in summary, the problem for poor people who live in the most disadvantaged community spaces is that conventional policy does not respond to their reality; it does not engage with approaches to service delivery which work[19]. Thus despite the wide range of technical solutions available, and the often-prominent national commitments made to significantly improving access, progress remains slow.

I would argue that this is often to do with the political economy of decision making and resource allocations. To understand this I have used a framework first developed by UN Habitat (UN Habitat 2003) to examine the apparent reasons why poor populations in urban spaces remain vulnerable to remaining unserved. **Figure 6** shows this framework graphically.

The approach shows us that most of the 'first-order' vulnerabilities can be traced back either to a fundamental resource constraint or to deeply embedded political power structures ('third' order barriers). To explore this further we start by looking at the 'obvious' first-order vulnerabilities. These are the reasons most commonly given for an immediate inability on the part of those responsible (local government or utility) to deliver a service *to certain populations*.

[19] In comparison, poor populations living in slightly wealthier towns and cities with more committed administrations may find their needs would be met but that resources are lacking – usually because the needs are so great..

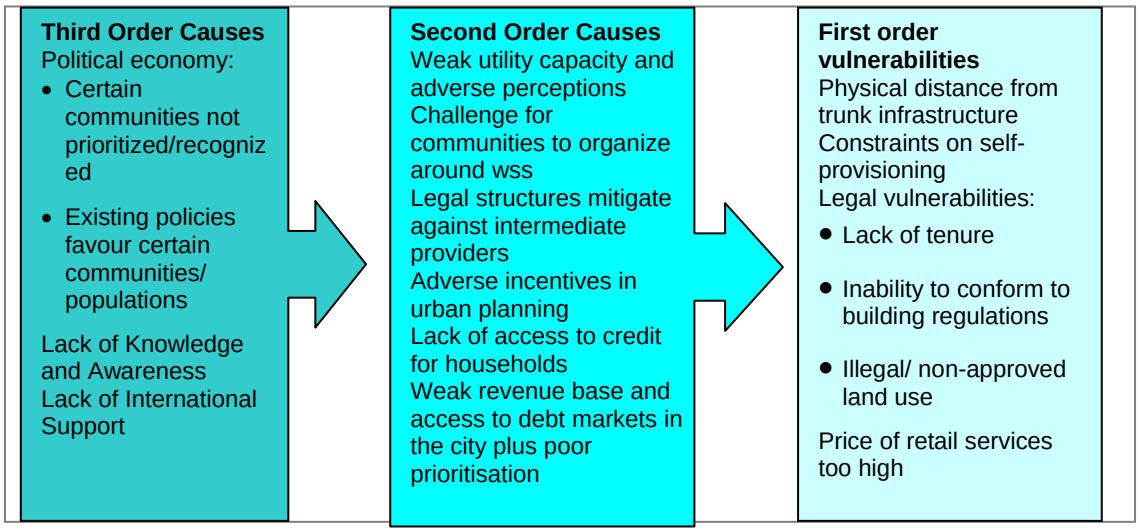

Figure 6: Vulnerabilities and their causes[20]

5.2 Proximate or First Order Vulnerabilities

5.2.1 Trunk services

Barriers to accessing trunk services are created by the way in which systems are planned and developed alongside the development of the urban space. Poor communities and individuals are particularly vulnerable here since they lack voice and access to such decisions. They are also vulnerable because of the nature of the physical space in which they live and because legal norms mitigate against them. The outcome is that many of the unserved remain distant from sources of bulk water.

(a) Physical distance means certain communities don't have access to bulk water

By their very definition some 'poor' communities are located physically far from the trunk network. This is a particular challenge for peripheral growth areas and rapidly urbanizing spaces. It can also be true for long-established slums, particularly when they are large; the existence of a trunk water main or main sewer does not mean that people living in a large unplanned settlement can make use of it. The history of urban development in many cities means that some long-established communities are equally excluded from trunk services because they were systematically excluded in the initial planning process.

This distance matters for two reasons. Firstly and most obviously it means it is technically hard to deliver a service. Secondly, and perhaps more importantly, it means that the unit costs of connecting such communities may appear high compared with some other formal, more central, better planned or smaller communities. Of course, the unit cost of new connections is neither the only nor the most important criteria in planning. However, it is fair to say that it is a useful one to use when limited funds can be diverted to making connections to other communities who may be more attractive for a range of other reasons.

(b) Constraints on self provisioning

[20] This figure is developed from ideas presented in UN Habitat *Water and Sanitation in the World's Cities: Local Action for Global Goals* (2003) Chapter 3

In the absence of reliable trunk supplies, it is worth questioning what prevents communities from solving the problem independently. The answer is that of course communities *do* find sources of water, but these are often ad hoc and expensive. This is usually because legal or physical constraints prevent communities from accessing local sources of bulk water at regulated prices. There are often very good reasons why bulk water cannot be provided close to every urban community. Groundwater contamination or overuse means that many cities regulate against the development of private tubewells. Developing surface water into safe supplies is expensive and usually requires significant economies of scale to be economical. Thus many communities, excluded from the formal network, struggle to find an alternative source and must turn to inadequate or illegal sources instead.

5.2.2. Retail Services

Barriers to accessing services at the retail end of the market relate principally to price and the willingness of service providers to provide a service. Here the poorest communities are vulnerable either because again, their views and realities are under-represented, and often misrepresented, at the level of policy making or because of a lack of resources. The first and most obvious area where this happens is in the arena of discussions about rights to service.

(a) constraints mean that certain communities are not entitled to access services

Legal constraints to access come in many forms. Most obviously and typically are those cases where some form of formal tenure is required in order for householders to be *entitled to a public service*. This strong link between tenure and access is prevalent in all regions of the world (see **Box 4**). However it is also true to say that this link is often claimed spuriously – in many countries, while there is a 'commonly held' view that this constraint exists, even in the minds of householders themselves, it may not in fact be the case. In some cases too, national commitments to basic services for all citizens should surely be powerful legal counter arguments. In Dhaka, for example, a group of dedicated NGOs established a methodology for supporting the development of community water points and sanitary blocks by acting as a guarantor for a community wishing to take a water connection from the water authority (DWASA). Despite the success of this approach and both national and DWASA-level policy commitment to provide basic services to the entire population, the water authority continues to maintain a position that services cannot be provided in most slums (Dhaka WASA staff personal communication).

Box 4: Tenure and Services

UN Habitat suggests that between a quarter and half of the population of many cities in Africa, Asia and Latin America live informally or illegal settlements (UN Habitat 2003). The link between tenure and services may exist in a number of forms. In some cases the service provider is precluded from operating in certain illegal settlements, in other cases, particularly where private sector contracts are used, the contract may not require the operator to work in areas or with households who lack legal title and since these are often the most expensive and difficult areas, the operator will not prioritise them. Often households are required to produce the land title documents as part of the application process, either to prove ownership or to assist in the delineation of plot boundaries.

In other cases the legal barrier is more complex. Commonly, building regulations create barriers which make it hard for households living in poorly planned informal or low-income areas to *make themselves eligible* for basic services. In Bobo-Dioulasso in Burkina Faso, for example, householders have to build a toilet in their house before legal tenure will be granted. While this policy is in many ways progressive, it also makes it hard for the poorest to access some form of cheaper alternative service through formal delivery channels.

A third form of legal barrier is created by urban land use planning, whether this takes place in local government or through specialized agencies. In many regions of the world land use plans, structure plans and zoning create artificial inflations in the land market, which render them difficult to tackle, particularly for poor and disempowered households. Examples abound of communities, settled for many years, who are nonetheless deemed to be 'temporary' because the land on which they live was once allocated for a use for which it is now wholly unsuitable..

These legal barriers, both real and perceived, are often in themselves sufficient to prevent formalized retail services from reaching certain communities. However, further barriers may arise through the physical realities of poor communities and through the regime of pricing.

(b) physical challenges in serving some communities

Slums, by their very definition, tend to be dense settlements made up of impermanent structures, characterized by narrow lanes and an almost complete absence of planning. While the nature of slums does vary, these characteristics tend to remain constant and are often also a feature of other types of poor urban settlements (for example, the dense overcrowding of tenements and semi-permanent structures in peripheral growth areas are familiar in most regions). Added to this, many illegal and new settlements grow up in areas which are physically challenging. The informal settlements or favelas of Sao Paolo, for example, are located in a range of challenging places (see **Table 5**).

Locations	% of favelas
River banks	49.3
Land suffering periodical flooding	32.2
Steep slopes	29.3
Land being eroded	24.2
Wastetips and landfill sites	9

Table 5: Location of Favelas in Sao Paolo[21]

Such physical challenges render service delivery challenging. Most forms of on-site sanitation become almost impossible to

[21] Smolka (2002) cited in Un Habitat (2004).

implement, but excavating and laying sewers is also difficult. Water supply to the home may be practically impossible in some locations. In these cases household level services would seem often to be precluded – in many of these areas well-managed shared facilities seem to be the best option[22].

(c) Price

One of the most commonly quoted reasons for poor households not accessing formal water and sanitation services is price. The poor, we are told, cannot afford to pay. This view manifests itself in a number of ways, most notably in a strong and resilient dedication on the part of many politicians to cross subsidies for consumption for water delivered at the house or through a shared connection (such subsidies are usually associated with the delivery of a water bill). Such cross-subsidies often take the form of an Increasing Block Tariff (IBT), which sets a subsidized price for water at low levels of consumption (say for the first 5m3 consumed in a month) and a compensatory higher price at higher consumption levels[23]. Policy makers tell us that this will enable the poor to gain access to small quantities of cheap water and is therefore a progressive strategy. In fact, there is strong evidence that IBTs do little to benefit the poor, particularly in cities where a significant number of poor households are not yet connected to utility services or where sharing a connection is a common coping strategy for the poor (see **Box 5**)[24].

Furthermore, research repeatedly reveals that poor households in fact have a high willingness to pay for services, provided that the service is reliable. It is also true that, where they are not able to access well-regulated services, many poor households pay significantly more than those who are connected, for a lower level of services[25].

This suggests that even where cost-recovery tariffs are in place, the price for water consumption may not in fact be a barrier for a significant number of currently excluded households. It is, however, interesting to note that connection fees *do* appear to constitute a significant barrier to access. While the logic of the connection fee remains hard to defend (see for example PPIAF [2001]), it remains popular as a surefire way to generate income for struggling utilities and to offset one-off connection costs. For poor households with little or no capacity to save and no access to credit, such a one-off payment is often an insurmountable barrier.

In general, unconnected poor households pay higher amounts and a higher percentage of weekly income than connected households precisely because they are *not* connected to the network. Measures to remove the barriers to

[22] These data also point to the fact that, while the author concurs with the view that resettlement (often termed 'slum clearance') is not a valid or effective urban policy in general, some communities may never be able to permanently settle in their current locations due to unavoidable physical constraints. Only trusted and highly competent urban governments will be able to make and manage such a distinction. Gaining the trust of the population is a first step in such a process.

[23] This is different from a cross subsidy between user types (from industrial users to domestic users for example), which is also popular.

[24] Of course, where connectivity is high and a significant number of poor people are connected, the IBT may be of interest in public policy although it also sends weak economic signals for effective demand management.

[25] UN Habitat cite a ratio of 10-15 to 1 between the price of water from vendors and kiosks and the price of water in a household tap (UN Habitat 2003). This differential reflects the reality of the costs of vending in an adverse regulatory regime, and often the nonexplicit subsidy inherent in the official tariff – it does not necessarily mean that vending and kiosks are a bad thing when placed in a proper policy context.

connection might significantly improve their financial position. Such measures may well include allowing varying levels of service and the judicious and explicit deployment of public funds to subsidise access. If we assume that most utility service providers want to increase revenue and that most local governments have some sort of commitment to providing service we must look elsewhere for reasons why these price barriers cannot be overcome.

Poor communities are vulnerable to noninclusion because of their physical location and legal status, and because external policies around price and service delivery are not responsive to their situation. But in each case there appears to be a set of secondary factors which create the conditions for vulnerability in these communities. These relate in a large part to institutional structures and money.

5.3 Second Order Causes

Box 5: Why IBTs don't work[26]

IBTs don't always benefit the poorest because: unconnected households don't get any benefit; households with shared connections pay more (and the poor often share); and connections which may result in low-consumption are not attractive to the utility.

In fact the IBT tends to deliver benefits disproportionately to the non-poor since all connected households get the benefit of some subsidized water and it is the non-poor who tend to be connected.

5.3.1 Institutional structures

(a) Utility capacity and perceptions

Perhaps the answer lies in the second set of barriers at the retail end of the market, which relate to the willingness or otherwise of utility service providers to work in communities that are commonly perceived as 'dangerous', 'challenging' or in some way 'undeserving,' and where credit risk is considered to be high (PPIAF 2001, WUP 2003). Many utility companies and local government providers appear to prefer not to work with certain communities. This is a problem particularly for communities which have the characteristics of slums – where planning is weak and the information base may be limited. While such reluctance is at least understandable, it does little to explain why alternative strategies are not more popular. Why, for instance, is it not more attractive for utilities to organize bulk sales to third-party providers in such communities? While examples of this exist, particularly in Latin America and East Asia, it is less common than would be expected. Technicians appear unwilling to use or are unfamiliar with the types of solutions which might actually work in the slums, and it is therefore relatively easy for them to dismiss such communities as 'unservable'. This position is often reinforced by building regulations and technical norms and standards which establish that some technologies (usually the most expensive) are allowed and others are not. When such technological barriers are broken down the impact can be impressive (see **Box 6**).

[26] Boland and Whittington (2000).

Box 6: What Can Condominials Do for You?

In El Alto, Bolivia, a partnership between the water operator, the regulator and civil society groups, with support from external support agencies, was required to introduce and normalise the use of condominial sewers to serve an area of the city which had very low coverage. (Condominials were initially introduced in Brazil and have become mainstreamed there). In El Alto the local population were unwilling to adopt any form of on-site sanitation because of their cultural beliefs, but there was initial reluctance on the part of the water company to provide conventional sewerage which, due the demanding technical standards in place, had a very high investment cost. Furthermore, very low water consumption cast doubt on the viability of conventional sewers. By creating political 'space' for innovation, the external support agencies were able to facilitate a change in approach, which has ultimately resulted in a change in Bolivia's national standards to allow some forms of shallow and condominial sewers.

In parallel those responsible for service delivery are often genuinely uninterested in the issue. The political economy of rapidly expanding urban spaces rarely operates in favour of the large and largely 'expendable' population of the urban poor. Quick fixes for the growing middle class are more likely to take priority despite the fact that the regulatory 'means' to promote pro-poor service delivery has been well analysed (see **Box 7**).

(b) Communities tend not to organize well around water and sanitation issues

The second issue relates to upward or demand-side pressure from poor people in the process of water and sanitation decision-making in urban areas. This lack of voice varies regionally; conventional wisdom tells us that in general urban communities in parts of Latin American tend to organize better around such issues than many communities in South Asia or Africa, for example. Interestingly it often seems easier to organize *against* change than for it – as in the case of the well-organised opposition to a proposed private sector contract in Cochabamba, Bolivia. Pushing for progressive change or challenging the status quo seems to be a longer and harder process and therefore requires more support and is more prone to fail. However, it does sometimes succeed; recent successes in India for communities promoting community toilet blocks in Mumbai and other cities are the result of long-term pressure based on the hard-won experience of implementation on the ground. Compared with other regions Latin America seems to have a longer and deeper tradition of citizens' action. In general though, water and sanitation are difficult topics for many communities to address. This is particularly true for communities with ambiguous security of tenure or for those that benefit from service via illegal channels. It is also difficult for communities to know what to lobby for and who to talk to. Institutional responsibilities are often fragmented (Dhaka has at least four agencies responsible in part for water and sanitation, for example) and there are sometime complex technical issues at the heart of the discussion. It is therefore difficult for some communities first to organize themselves and then to project a powerful message in the right direction.

The many examples of successful community provision suggest that this is a barrier which can be overcome, but only when conditions are right. In the face of multiple barriers, including lack of access to appropriate trunk services, it is unrealistic to expect every poor urban community to succeed in establishing community-based solutions, nor would it be equitable or technically appropriate to do so. Rather the role of the city should be to create the conditions under which community-based or alternative service delivery is the norm and can grow without significant transaction costs to the community.

Box 7: Public Service Agreements and Private Sector Contracts – Tools for Promoting the Interests of the Poor

While there has been a heated debate related to private sector participation in water and to a lesser extent sanitation service delivery, this has tended to obscure the fact that the regulatory and contractual tools to promote access for very poor people are probably very similar: These might include:

- **promoting expansion of services to unserved households.** This can be done through establishing coverage targets and linking these to workable incentives, and by making it attractive for the utility to connect new consumers (by means of pricing policy, which generally remains in the public sector).
- **encouraging multiple service providers.** This is achieved firstly by avoiding 'exclusivity' clauses which prohibit alternative service providers and by creating incentives for the utility to 'on-sell' and/or delegate service delivery to third parties.
- **allowing multiple service levels and a range of pricing.** This can be done by reviewing and amending existing technical standards (while maintaining necessary minimum outcome standards), and focusing on outcomes, not inputs, in PSAs and contracts.

(c) Legal structures mitigate against intermediate providers

Linked to this there is often a genuine legal barrier to small-scale alternative providers. Such barriers can be manifested in a number of locations in the legal framework – either in regulations which prevent certain businesses from being providers or through exclusivity clauses in local government or private sector contracts. This results in a scarcity of safe alternative options for some communities. It may also raise the price of third-party services because providers build the risks associated with working illegally into their prices.

(d) Adverse urban planning

Finally, many of the primary barriers can be traced back to the incentives embedded in urban planning processes which do not provide for the reality of urban growth. These are linked both to the land market and to the lack of voice that poor households experience. They are also probably linked to the inertia that exists in many land-planning systems – an inertia which is not aligned with the rapid pace of urban development. The result is that many poor urban communities, slums, peripheral areas and pockets of poverty simply don't exist in the urban 'plan' – it renders them effectively invisible at higher levels of policy-making.

5.3.2 Lack of money

(a) Lack of access to credit in the household

Many of the barriers, particularly that of price, could be considered to be a function of money available to poor households, but it is probably more true that these are a function of lack of access to credit. Much of the evidence suggests that poor families can and will pay consumption tariffs when services are reliable; the real barriers are more to do with the up-front costs of accessing services, either in the form of a connection fee to the utility or the contribution to a community asset such as a community sanitary block. Many of the well-known cases illustrate that communities can overcome these barriers if the conditions are right (the work of SEWA in India and OPP are relevant but by no means unique).

Of course, there will always be some for whom true cost-recovery tariffs are beyond any ability to pay. In each case, it is a matter of public policy to determine at what level tariffs should be set to maximize benefits and to ensure equity. But this has to be done within the context of the overall financing of the system. Too often utilities or cities opt for marginal cost pricing or even prices below marginal costs, without establishing the financial basis for covering all the other costs associated with service delivery. Public subsidies can play an important role but only if they are themselves sustainable in the long run.

(b) Lack of money in the city

Even where communities have the financial resources to pay for retail services, it still remains the case that many cities are unable or unwilling to steer trunk investments towards certain communities. Again, lack of money is often cited as the reason, and indeed many developing-country utilities are very short of capital and are unable to access credit markets. The global costs of meeting the water and sanitation MDGs have been assessed by a number of agencies. A commonly cited figure of US$50 per capita for urban water and sanitation probably underestimates the costs of downstream management of wastes, but may overestimate capital costs because it does not allow for significant use of non-networked options, which generally cost less initially (WELL 2004). Very few of the existing estimates include a well-developed assessment of the long-term operational costs, which are, over the coming years, likely to exceed the initial investment requirements. In any case, the numbers are large and can only be reduced by judicial planning and a reduction in some of the underlying assumptions about appropriate services. Even then cities have to work out how they are going to find these funds – without investments in trunk services, the 'retail' end to the business cannot achieve much.

None of this explains, however, the fact that once funds are available, the priority is rarely connections for the underserved or unserved. Furthermore, it does not explain why alternative arrangements, such as establishing bulk retail tariffs and only selling utility water to registered vendors, or establishing septage stations for proper disposal of wastes, are not more popular. These types of interventions are low cost and would generate additional revenue for the utility. Since it is almost certain that many potential customers of such systems will currently be stealing water in various forms and contaminating the environment, it seems perverse that such approaches have not gained greater prominence.

Where limited funds are available, there is a logic to giving priority to economic activities as well as to self-supporting activities, particularly if the funds are made available on a loan basis. One real problem is that little effort is made to discriminate between the kind of loan financing that should be used to fund supplies to economic and high-end domestic consumers and the grant funding needed to provide the basic infrastructure to supply the poor, who may not be able to finance the up-front costs. Further, this issue points to an area which has challenged policy makers for many years; that is, how to design urban services reforms in ways which benefit the poor. The conclusion drawn by many commentators is that reforms, in and of themselves, can benefit poor and excluded populations because they can render the utility financially independent and thus in a position to raise capital to extend services. Since many of the poor are unserved and most of the unserved are poor, this can have a direct benefit on poor populations. Challenges to reforms arise, however, if they are planned without due attention to the reality of service delivery. Once again, a lack of knowledge and understanding of the disaggregated market for services which reach poor households and individuals can damage the quality of reforms

and generate stiff resistance (McGranahan and Satterthwaite 2006).

5.4 Third order or root causes of vulnerability

Institutional constraints and costs thus appear to mitigate against the poor household and community, whether in slums, peripheral growth areas or small pockets of poverty. However, in most cases, it seems that there are do-able technical or policy instruments that could be brought to bear to improve service delivery. So the underlying question has to be: What really constrains decision making that results in effective service delivery to these communities?

One of the conclusions has to be that it is the *nature of these communities themselves* which makes them most vulnerable. The truth is that certain communities and households lack voice in decision making because they are not considered to be the primary constituents of the agencies charged with serving them. Ultimately in some cases it may be that the politics of power and access to influence means utilities and local governments are unwilling to create the conditions that would enable *these communities* to have access to basic services delivered by a range of providers offering appropriate services. The result is a policy environment which favours some communities over others[27].

This bias is reinforced by a lack of knowledge and awareness that solutions do exist and that they are often relatively simple and affordable. Where there is potential to make changes in the policy environment it is not always the case that the success of community-based solutions or the important role played by small scale providers is well known or understood. Progressive policy prescriptions can themselves unwittingly mitigate against progress being made. The Government of Egypt for example has committed that the population are universally entitled to sewerage connections. This progressive policy commitment actually makes the costs of providing 'improved' services impossibly high.

Finally, it has been argued that all of these biases are reinforced by a lack of attention from international agencies (UN Habitat 2003). This lack of support manifests itself in two ways; firstly in terms of lack of overall support for and promotion of urban water supply and sanitation issues as a whole and secondly as a bias against the types of policies and approaches that seem to actually work. .

Could these be the underlying reasons why segments of the urban population remain systematically excluded from access to safe, affordable and reliable water and sanitation services?

If so, then the counterbalancing force has to come firstly from communities themselves. Community-driven solutions are visible all over the world and they have to provide part of the impetus for promoting a change in culture in other cities and other regions. Part of the solution has therefore to lie in empowering communities to become stronger in the process of urban decision making. A second driver is naturally the process of economic development. Cities are the engines of growth for many countries and, as such, the same economic forces which drove British municipalities to finally accept the need to invest in public infrastructure may well begin to play a part in other regions of the world. Finally, it is the task of all external supporters of that process is to push for a more appropriate form of investment, which will result in robust and sustainable systems that can work for everyone, including the poor, in the long term.

[27] For an analysis of how national and local sanitation planning can be impacted by political economy see for example Tayler and Scott (2006).

6. A Summary of Vulnerabilities

Certain urban populations are vulnerable to exclusion from effective service delivery. In general these are the households or individuals located in areas of the city that are characterized by poor or absent planning, density, poor-quality housing, lack of or ambiguous tenure and low access to basic urban services. Most households and individuals in this group are income poor. However, while some are slum dwellers or live in peripheral growth areas (often termed peri-urban), many live in pockets of poverty within better-off districts. Further, generalized terms such as 'slum dweller' themselves mask a wide range of urban realities. The challenge of defining such populations plays out in the lack of reliable aggregate data on their access to services. This unreliability is exacerbated because international benchmarks for access tend to ignore the reality of accessing basic services that they face.

In addition to weak data on access to and quality of services, these populations are vulnerable to exclusion for a number of key reasons:

- They may live far from trunk infrastructure;
- They face constraints on self-provisioning in the absence of trunk infrastructure;
- They face legal barriers to access including lack of tenure, failure or inability to meet building regulation requirements, and residence in areas which are 'zoned' for alternative land uses;
- They live in areas which are technically difficult to serve; and
- They may be priced out of accessing formal services.

However, what has been argued here is that these clear primary vulnerabilities arise largely because of structural constraints in the city as a whole. These include:

- weak utility capacity and perceptions;
- challenges to communities organizing around water and sanitation;
- legal structures which mitigate against alternative service providers who could reach the community better;
- adverse incentives in urban planning;
- lack of access to credit; and
- weak revenue base and poor access to debt markets for failing utilities.

These structural constraints in turn may be the product of underlying political economy issues in city governance including:

- certain communities not being the priority for decision makers; and
- existing policies favouring influential populations.

These constraints are reinforced by:

- a lack of knowledge and awareness of approaches which work; and
- a lack of well-targeted international support promoting the interests of the unserved populations.

The play of these vulnerabilities and their causes is not uniform across urban spaces in all regions of the world. This typology is not a blueprint, but merely an indicative framework which suggests how it may be possible to identify the level at which financial instruments could be employed to change incentives and remove the fundamental vulnerabilities of certain urban populations.

7. Cross-Cutting Conference Themes

7.1 Introduction

Other work carried out in preparation for this conference highlights the particular challenges facing poor and excluded populations in urban areas, which arise because of rapid and dynamic changes in the nature of the urban space (with a focus on population growth and climate change) and because of the progressive failures of systems designed to deliver basic services

including health care. The vulnerabilities of the urban poor with respect to their access to water supply and sanitation are strongly exacerbated by the rapid pace of change. Even in cities where the political economy favours services for these excluded communities, policy makers and those charged with delivering the services are often struggling to make up a massive backlog; keeping pace with rapid change may sometimes be a step too far. Nonetheless, in the sections below we briefly review how these dynamics affect the vulnerabilities of the urban poor with respect to service delivery.

7.2 Population growth and migration

Urban areas in low- and middle-income nations now have more than a third of the world's total population, nearly three quarters of its urban population and most of its large cities. They contain most of the economic activities in these nations and most of the new jobs created over the last few decades. They are also likely to house most of the world's growth in population in the next one to two decades.[28] (text of the paper on Building Climate Change resilience prepared for this summit).

The failure of many urban (and national) governments to recognize and adapt to the inevitable and powerful forces of urbanization is a core problem at the root of good systems planning for water supply and sanitation. 'Incoming' populations are commonly regarded as 'temporary' and the public policy prescription is often a combination of 'slum clearance' and rural development to counter rural-urban migration. Such responses, of course, do nothing to stem the growth of urban areas and reflect a general reluctance or inability to embed urban policy in a more general economic policy framework. They also reinforce biases against services being provided to some specific populations (including slums, peripheral growth areas, dense urban infill).

This problem is not universal and there are some honourable exceptions. The city of Mumbai has recently developed a range of services appropriate for housing areas which do not conform to the building and planning regulations of the city; in Latin American cities some utilities offer retail services in the form of small private water networks, community-managed condominials for sewerage, and water and licenced vending. Ougadougou in Ghana still has a strategic sanitation plan which is based on the provision of shared toilets and management of pit wastes. Nonetheless, globally these examples are in the minority.

Population growth has three important impacts on the city, which have relevance to water and sanitation services:

- It results in the development of new informal areas often on the periphery of the city, or on land which is 'zoned' for other purposes – such communities are often located far from existing trunk infrastructure (although sometimes they may be close to transmission mains or water treatment plants). They grow rapidly with little overall control or vision, leaving little space for rational planning of street layouts or development of core services.
- It results in 'densification' of existing communities – placing additional demands on existing services and rendering retailing in previously unserved areas increasingly challenging technically.
- It results in an overall increase in demand, which can steer investment away from the retail end of the business into development of additional bulk water production and wastewater treatment capacity.

Fundamentally, population growth in unplanned areas also increases the impression of *difficulty* for city planners who may have

[28] United Nations (2006)

some commitment to reaching unserved communities. 'If only these people would stop coming or stop multiplying, we could do something to help'.

Given that urban population growth is not going to stop, it is necessary for the policy response to reflect it. Several key elements would therefore need to be built into urban water and sanitation planning;

- a realistic assessment of future population size and subsequent demands;
- a realistic assessment of likely patterns of settlement – and an acceptance that at least in the short term this is unlikely to change (the Victorian sewerage of London was built to serve the slums that existed then; it still works in today's less-densely settled city areas);
- a dynamic approach to planning that can adapt plans to reflect urban settlement patterns as they arise. The use of more 'modular' systems carries huge benefits for rational systems operation anyway – zoning the city's water supply to respond to growth as it happens also enables better management and can result in significant reductions in physical losses from the system. Similarly wastewater treatment systems can be decentralised, and the use of horizontally disaggregated sanitation systems (with a mix of service arrangements for different areas of the city) allows a more nuanced response as settlement patterns develop;
- the use of more vertically disaggregated service delivery mechanisms that enable more rapid and responsive investments in trunk services and enable progressive development of services in growth areas. A city which is committed to delivering some services through a well-regulated vending system can more rapidly respond to growth than one for which reticulated systems are the only option for example.

Of course if local government gains the trust of its urban constituents it can also begin to influence patterns of settlement, thus enabling even better planning of the water and sanitation system. A city with a history of providing at least basic services to all will have more credibility if it seeks to prevent development of some areas for justifiable reasons.

Finally, the reality of urban growth does mean that there will be increasing demands on the scarce resource – clean drinking water. This also suggests that cities will increasingly have to focus on better management of the system (physical losses may account for more than half of production in many urban networks) and demand management – including more rational pricing regimes. The challenge here is that what is needed affects the wealthy and the currently served most. Once again the needs and interests of future 'unserved' consumers may lose out to the interests of current consumers. Thus the political economy of the city needs to be aligned with these interests for them to be built into the planning of future systems.

7.3 Adaptation to climate variability and change

In regard to climate change [cities in low-income countries] already house a large proportion of the population and the economic activities most at risk from extreme weather events and sea-level rise – and this proportion is increasing and likely to continue increasing (text of the paper on Building Climate Change resilience prepared for this summit).

As already mentioned in Section 5 many unserved urban people live in parts of the city that are particularly at risk of both catastrophic

and what might be termed 'low level' weather-related events (flooding, landslides, extreme storms, seawater inundation and so on). In the coming years the impact of such events will undoubtedly become more severe for many of these populations, both because of the effects of climate change and also because, as pressure on urban land markets rises, urban populations will be forced to move into more and more extreme locations. (In Europe this effect is evident for both poor and non-poor homeowners in the increasing number of new housing developments which are located in vulnerable flood plains and the consequent rise in building insurance premiums.)

In addition to many of the points made in Section 7.2 above (particularly the need for systems to be dynamic and responsive to change), this has three additional implications for planning urban water and sanitation systems.

- The proportion of the urban population for which high-cost reticulated systems are the most appropriate level of service will fall. There will be increasing areas of many cities which cannot be regarded as suitable for long-term development but which are likely to be inhabited in the short to medium term because, between extreme events, they are (if barely) habitable and respond to the needs of workers to be located close to the workplace. These spaces will merit investments in services which are easily 'portable' (the use of regulated vendors or community-managed water points and toilets) or low cost.
- Linked to this, the system may have to include elements that are appropriate to areas which face specific risks. One example is to reduce reliance on shallow ground water in areas which will increasingly be subject to seawater inundation. Latrines suitable for high-water table areas may increasingly be appropriate in areas where groundwater levels are rising and so on.
- Finally, the system will increasingly need to include capacity to rapidly respond to natural disasters and provide appropriate water and sanitation services to internally displaced populations.

The authors of the summit paper on this theme note that, despite some 'honourable exceptions,' few cities have developed the plans and capacity to respond to the increasing risks which will be faced by some urban populations. Once again it is important to recognize that investing against future risks to currently 'unserved' populations is unlikely to be high on the agenda for many urban elites. Part of the key here is to link such plans and investments with the idea of maintaining the integrity of the urban system as a whole. This has two aspects: firstly poor and unserved populations need increasingly to be integrated into the city's vision of itself and its economic future – this is hard but may in some cases be do-able; secondly the interlinked nature of the urban system needs to be understood by decision makers – protecting water supply and sanitation services in vulnerable areas is critical, not only to protect those who reside in that area, but to protect the integrity of the urban system as a whole.

7.4 Population health systems

A later paper for this conference highlights the real risks faced by urban populations who are excluded from accessing basic water supply and sanitation services. It is not the purpose of this section to reiterate that argument. However, it is perhaps useful to reiterate two key aspects of urban sanitation planning in particular that can have a significant impact on health outcomes in vulnerable communities. These are:

- the need to invest in changing hygienic practices, particularly hand washing with soap; and

- the need to provide support for community or joint action in vulnerable urban communities.

It is also important to draw from the analysis of health vulnerabilities the important linkages between sanitation in terms of excreta management, and the related urban services of solid waste management, storm water drainage and the management of hazardous and industrial wastes. Once again, the excluded populations are often also those whose location in the city renders them most vulnerable to the negative impact of failures in these systems (in the most extreme cases, for example, populations who live on or around rubbish dumps, close to industrial units and along drainage channels are most at risk from severe adverse health impacts). These populations can gain enormous benefits both from a coherent citywide approach to planning investments in all these services, and also from support which places their interests and views higher up in the policy-making agenda.

8. Looking to the Future

It is undoubtedly true that the challenges of reaching unserved and underserved urban communities, most of them poor, many of them at increasing risk of natural disasters and all of them dynamic and in a state of rapid change, is immense. It is also undoubtedly true that the tools to address their needs do exist; given the appropriate economic and financial levers, most cities *could* deliver basic services to most if not all of the poor and vulnerable. Technical solutions are available. Furthermore, countless communities and individuals have demonstrated their potential to participate as part of the solution. If there is a strong bias *against* doing what is needed amongst some urban elites, this is at least matched by the rights and in many cases articulated demands of vulnerable people themselves. It is the role of governments and international agencies to respect and respond to those demands in ways that will result in sustainable and effective water and sanitation for all.

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