Who lacks water and sanitation service?
A typology of unserved communities

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I. Introduction

At the United Nations Millennium Summit in September 2000, 189 heads-of-state adopted the Millennium Development Goals (MDGs), which set clear, numerical, time-bound targets for making real progress, by 2015, in tackling the most pressing issues developing countries face. Among those targets is Millennium Development Target 10 (as expanded by the 2002 World Summit on Sustainable Development): to cut in half, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.

To help the international community reach the Millennium Development Goals, the United Nations established the Millennium Project, a three-year effort (June 2002- June 2005) to identify the best strategies for meeting the MDGs. Ten thematically-orientated Task Forces comprised of independent experts perform the bulk of the Millennium Project's work; each Task Force is responsible for recommendations related to one or more of the MDG targets. The Task Force on Water and Sanitation (Task Force 7) focuses primarily on how the world can join together to meet MDG Target 10.

Task Force 7 is thus charged with identifying and communicating the strategies and actions needed to expand access to water supply and sanitation both rapidly and sustainably. Task Force members recognize that what constitutes an effective approach will be shaped by specific circumstances at the local, regional, and national levels. Indeed, a recurrent theme in the water supply and sanitation (W&S) planning literature is that 'blueprint' or 'cookie cutter' approaches to extending coverage to unserved households tend to be associated with lower levels of sustainability. It would thus seem prudent to advocate planning and policy approaches that respond directly to the bottlenecks these households face and, by extension, to be sure that such constraints are well identified.

In practice, however, there is often little systematic information at the national or sub-national level about the characteristics of communities and households that lack access to services, as well as about the reasons that they remain unserved. This dearth of information is particularly striking given the considerable number of case studies that have been undertaken over the past few decades to explain the reasons for lack of access in particular communities. How can these individual experiences be used to support broader data-collection and planning efforts that help countries develop effective strategies for expanding W&S coverage?

In this paper, the Task Force presents a typology of unserved communities that distills some of the important insights from the practitioner literature in the form of a conceptual framework that can be employed by governments and their partners in efforts to meet MDG Target 10. Our simple typology includes six kinds of communities in which a substantial proportion of households do not have access to improved water supply and sanitation services (Figure 1).[1]

Whereas access to water supply and sanitation is a function of many technical, financial, and institutional factors, we have sought to distill a multi-faceted analytical challenge into a framework with considerably fewer dimensions. We acknowledge the apparent contradiction between our support of policy and planning that is tailored to local conditions and the development of a typology with generic community categories. In our experience, however,

[1] For the purposes of this discussion, the definitions of "access to improved water supply" and "access to improved sanitation" are those established by the World Health Organisation/UNICEF Joint Monitoring Programme. See Appendix A for details.

governments have neither the time nor resources to carry out detailed investigations of even a substantial proportion of unserved communities. Instead, a set of tools that can aid in the rapid classification of communities into categories whose lack of access to services tend to share the same general explanations—and thus allow for more focused consideration of appropriate policy and planning responses—is a compromise measure that helps avoid the pitfalls of 'blueprint' planning while also posing more manageable data collection and analytical tasks.

Figure 1: A typology of communities with low water supply and sanitation service coverage

Improved infrastructure	***Density***		
	Dispersed (rural)	*Medium (village/small town)*	*Dense (urban/peri-urban)*
Not installed	Type I: Dispersed settlement, little/no improved infrastructure	Type III: Medium density settlement, little/no improved infrastructure	Type V: High density settlement, little/no improved infrastructure
Installed	Type II: Dispersed settlement, improved infrastructure in community	Type IV: Medium density settlement, improved infrastructure in community	Type VI: High density settlement, improved infrastructure in community

The typology presented in Figure 1 comprises two criteria. The horizontal axis represents a measure of density, which carries with it a host of technical and financial implications for improving access to services. The condition of a community's existing infrastructure is represented on the vertical axis. This variable reflects two considerations important to understanding the lack of access to W&S services. The first is whether absolute access (*i.e.*, the physical existence of infrastructure) is the primary explanation of low coverage rates, or if it is better explained by factors such as low effective demand (ability and willingness to pay).

The existence of improved infrastructure in a community also serves as a proxy for the extent to which institutional development will be needed to ensure sustainability of improved infrastructure, based on the assumption that communities with existing but inadequately functioning W&S infrastructure have a greater institutional foundation upon which to build as compared with a community where improved W&S infrastructure has never been installed. This is clearly a simplifying assumption that will not hold in all cases; however, it is a generalization that is consistent with experience in many of the case studies described in the following sections.

Both the water and sanitation policy and planning literature, as well as the broader economic development literature, contributed to this typology. When lack of access is conceptualized as a service delivery problem, constraints are generally classified in terms of supply and demand. On the supply side, low W&S coverage levels are generally attributed to factors such as inadequate financial resources for investment in infrastructure, high *per-capita* costs of supply, and inappropriate technical designs. Among the commonly identified demand-related factors are poverty; limited access to credit; and lack of institutions to facilitate collective action among the unserved. Whereas the bottlenecks facing individual communities are always shaped by local context, in broad strokes we find that the constraints facing, for example, dispersed settlements

with no improved infrastructure (Type I communities) are relatively similar across countries and even across regions.

When lack of access to W&S services is considered within a broader economic-development framework, however, the identification of feasible and effective responses is influenced by a set of policy, economic, and institutional factors that extend beyond the sector itself. Rather than create a third dimension to the typology, we instead discuss how several of these 'macro level' elements should be considered along with community-level information in the development of strategies for increasing access to services in a particular country or region.

Following this introduction, Sections II and III describe in greater detail the six typology categories as applied to water supply and sanitation services, respectively, including common bottlenecks to expanding coverage, possible strategies for improving access, and references to relevant cases. An illustrative example of how the typology might be used for diagnostic and planning purposes is presented in Section IV, using a large metropolitan region as a sample case. The ways in which planning and policy responses for different community types might be shaped by 'macro' level considerations—such as the availability of financial resources and locus of decision-making authority—are discussed in Section V. A brief summary and conclusions comprise Section VI.

II. Access to water supply services

Applying the typology introduced in Section I and reprinted below to water supply services, in this section we describe typical community characteristics, as well as key demand and supply explanations for low coverage levels, in each of the six community categories. We also present for each community type several possible strategies for expanding access, as well as one or more illustrative cases in which services have been successfully extended.

One important supply-side consideration of water is the physical availability of fresh water, yet this issue receives limited attention in our typology. The International Water Management Institute estimates that 30% of the world's population lives under conditions of physical water scarcity (defined as lacking enough water to meet minimum industrial and domestic needs and to maintain current levels of food production. Scarcity is also an important explanation for lack of access to water supply in many local-level analyses. On the other hand, overall the association between physical water availability and coverage is not as strong as, for example, the (inverse) association between poverty and access. In addition, it is important to note that in some cases what is termed "water scarcity"—at least as regards water for domestic purposes—is often the result of decisions at various levels to prioritize water allocation to other uses, and to expend limited budgetary resources on activities other than accessing, treating, and transporting water for household use. For these reasons, and because a planning- and policy-oriented typology is of limited use for cases in which physical water scarcity is the principal barrier to access, we limit our consideration of freshwater availability to its contribution to other constraints such as high *per-capita* costs of supply.

	Low density (rural)	*Medium density (village/small town)*	*High density (urban/peri-urban)*
Little/no improved infrastructure	Type I	Type III	Type V
Some improved community infrastructure	Type II	Type IV	Type VI

Type I: Dispersed settlement, little or no improved infrastructure

Type I communities tend to be found in rural areas with agrarian economies. Household members—typically women and children—obtain water for domestic uses from surface water sources, and occasionally from water vendors. The time devoted to water fetching is often substantial, and both quantity and quality of water supply is lacking.

The supply-side reasons for lack of access to adequate supplies of water in Type I communities are found both in the economics of water supply, as well as in development policy frameworks at the national level. Such settlements are generally unable to exploit economies of scale for community-level water supply solutions, so *per-capita* costs of improvements are high, while the potential for cash contributions from households tends to be low. At the provincial and national level, an 'urban bias' in infrastructure investment policy often pushes Type I communities to the end of the queue for government-financed water supply improvements.

Facilitating sustainable water supply improvements in Type I communities often requires substantial investment in institutional capacity building before improved infrastructure can be installed. Frequently the institutions needed to facilitate collective action for improving water supply are weak or completely absent. Partnerships with national or even international NGOs

may be necessary to develop community capacity for organization and planning of improved services. In other cases, ongoing decentralization programs have provided a forum in which local administrations and community groups are developing planning and management skills by 'cutting their teeth' on a water supply project.

Even if adequate institutional capacity does exist for planning and implementing water supply improvement initiatives, financial constraints often prevent Type I communities from moving forward. Governments and donors are increasingly requiring that communities receiving improved infrastructure contribute toward its cost, both as a means of reaching more communities with limited fiscal resources and as a reflection of the belief that cost-sharing promotes long-term sustainability of installed systems. Flexible strategies that allow in-kind and labor contributions may be important in Type I communities, where cash tends to be scarce.

In Azad & Jammu Kashmir, Pakistan, for example, communities were required to contribute a minimum of 20% of the capital costs in order to obtain an improved water supply system from the Local Government and Rural Development Department (LGRDD); however, this contribution could be made in the form of cash, labor, or dedication of personal land to the scheme. For most communities this meant that residents carried out all civil works, including the construction of water storage tanks, which the LGRDD required to be completed before work on their piped network could begin. Community members were also required to carry construction materials—including pipes that weighed up to 40 kilograms each—from the nearest fair-weather road to the construction site, which was generally several kilometers away over hilly terrain. The LGRDD's approach allowed communities with limited cash resources to nevertheless meet the government's cost-sharing requirements and obtain improved water supply services.[2]

Given the emphasis of the Millennium Goals on *sustained* access to improved water supply services, it is important to recognize that the non-cash contributions that can enable installation of improved water infrastructure are often insufficient for operations and maintenance over the long run. As WaterAid has noted, "in-kind or symbolic contributions that have no relationship to sustainability issues say little about whether the community has the financial and managerial means to sustain a water point over time."[3] Moreover, the commonly employed policy of full community responsibility for operations and maintenance is very likely to result in many Type I communities ending up as Type II communities—unserved because the infrastructure they received falls into disrepair after only a few years.

Type I communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
Dispersed (rural)	No/little improved infrastructure: supply from vendors, surface water	▪ High *per-capita* cost of improved infrastructure ▪ Low priority afforded to rural water supply in budget processes	▪ Poverty; limited access to credit ▪ Limited scope for collective action ▪ Low effective demand: availability of locally acceptable alternatives	▪ Capacity building and development of collective-action institutions ▪ Lower-cost technical designs ▪ Targeted subsidies ▪ Community financing supports, *e.g.*, micro-credit or in-kind options ▪ Combined agricultural/domestic water projects

[2] See *In pursuit of good governance: Experiments from South Asia's water and sanitation sector (2004), by J. Davis et al.* New Delhi: Water & Sanitation Program.
[3] Breslin, N. (2003) "Demand response approach in practice: Why sustainability remains elusive." London: WaterAid.

A different approach to addressing the cost issues of water improvements in Type I communities is to consider the possibility of combined irrigation/domestic water supply initiatives. Millions of people throughout the developing world obtain their household water from irrigation facilities, yet planning and policy for irrigation is carried out largely without consideration of domestic users. Exploring the possibilities for incorporating both irrigation and domestic needs into water planning has the potential in many cases to lower costs and to replace environmentally damaging practices (*e.g.*, tubewell irrigation, which can deplete water tables) with more sustainable ones (*e.g.*, drawing seepage from irrigation canals through handpumps).[4]

Type II: Dispersed settlement, improved existing infrastructure in the community

Type II communities share many characteristics of Type I communities, but they have some type improved water supply infrastructure installed—typically shared facilities such as borewells with handpumps. The majority of residents are still considered to be lacking access to services because the volume of water supplied *per capita* is insufficient, and/or because the facilities have fallen into disrepair. Households either manage with these small quantities of water, or supplement them with water from surface sources or vendors.

A fairly large practitioner-based literature has developed around Type II communities that identifies inadequate maintenance as the principal cause of system failure. The public investment neglect and affordability issues that Type I communities suffer has been overcome, at least initially, but sustainability of the installed infrastructure is lacking as a result of inadequate financial resources for operation and maintenance; unavailability of spare parts or technical skills; and/or a weak institutional arrangement for upkeep of the facilities.

Understanding the reasons for the poor performance of a Type II community's water infrastructure is a critical first step in improving coverage. If the level of service installed cannot be maintained by users—because its upkeep is too expensive or requires spare parts that cannot be made readily available, for example—simply rehabilitating the existing infrastructure will almost certainly result in another failure in the future.[5] Whereas governments and donors would understandably prefer to rehabilitate systems rather than install new ones, it may be necessary in Type II communities to re-think technology choice and discuss a range of options with users.

Where financial and supply-chain explanations are not at the heart of the problem, institutional capacity typically is. Communities that have limited experience working together for collective objectives, yet have hastily complied with requirements to form user associations so that water supply improvements can be installed, may be ill-prepared to manage the ongoing responsibilities of water point upkeep, conflict resolution, and financial management. Evidence also suggests that some Type II communities are not fully aware of their responsibilities for

[4] Water quality is, of course, a concern when households use water primarily intended for irrigation. Installing handpumps alongside irrigation canals is just one strategy for improving the quality of water to levels needed for domestic purposes; the water is drawn through a natural sand filter before being pumped and captured. Point-of-use treatment technologies may be another option for households wanting to treat irrigation water for domestic use.

[5] If the economic capacity for operation and maintenance does exist within the community, a different sort of mismatch between supply and demand may exist. In the village of Vellukara, India, for example, the majority of households have private wells, but typically face severe water shortages during the dry season. A piped public tap system installed by local government quickly fell into disrepair because households were only willing to pay monthly fees during those months in which they needed to supplement the supply from their wells. Without this revenue, the system became financially unviable; many village households were forced to return to distant surface water sources during the dry season.

operations and maintenance, and expect government agencies to intervene when problems with system sustainability emerge. In such cases, rehabilitation of existing infrastructure would be a reasonable use of government or donor funds, but only if the underlying institutional weaknesses are addressed.

In Togo, more than 600,000 residents of Type II communities became involved in a program designed to discover the underlying reasons for the high rate of borewell failure in that country's rural areas during the 1980s. Infrastructure rehabilitations were accompanied by social intermediation programs, the training of community technicians, capacity building for village O&M committees, and earmarked public funds at the district level for the provision of spare parts and extension services. Several case studies suggest that this approach has successfully responded to many of the weaknesses in rural water supply service delivery, and has given communities the capacity to deal with both minor and major technical challenges.[6]

The Togo case also raises an important insight regarding long-term support for Type I and II communities. Whereas 'community management' is the dominant planning paradigm in rural water supply for developing countries, mounting evidence suggests that in many cases it is unreasonable to expect communities to assume full responsibility for operations, maintenance, and eventual replacement of improved water supply infrastructure. (Indeed, this goal is not pursued even in many industrialized countries.) In Togo, government assumed responsibility for ensuring that a robust supply chain would allow communities to obtain the spare parts necessary to keep their systems running. In other countries, governments have taken on or contracted out the responsibility of providing post-construction support in the form of technical 'circuit riders'; for offering periodic training in financial management for user associations; and for providing financial support in the event of major system failure not attributable to maintenance neglect.

Type II communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
Dispersed (rural)	Inadequate supply from shared public facilities, *e.g.*, borewells with handpumps	▪ Inappropriate technical designs ▪ Limited investment in operations, maintenance, and expansion ▪ Poor availability of spare parts, technical skills	▪ Inadequate financial resources to maintain infrastructure ▪ Inadequate technical skills to maintain infrastructure ▪ Weak collective action institutions	▪ Assessment of underlying causes of system failure ▪ Rehabilitation with concomitant capacity building for community and support institutions ▪ Replacement of system with level of service that better matches community capacity ▪ Capacity building at local, regional, and/or national level for long-term community support

In sum, it is important that a balance be struck, when marshaling the energy and resources needed to meet the Millennium Development Goal Target 10, between assisting communities to improve their water supply situation in the short run and establishing policies, financing, and institutional arrangements that will improve the likelihood of sustainability for installed infrastructure. Whereas this observation is relevant for all communities in our typology, it is particularly important for Type I and II communities, where the record of sustainability is poorest. Resources and capacity to provide training, technical assistance, and supply-chain support to communities must be available in the long term, whether through local government,

[6] See, for example, UNDP (1988), *Water of Ayole*. New York: UNDP.

NGOs, or external agencies. Because such "software" components of water supply planning receive much less emphasis (and funding) than do more visible construction activities, these elements so critical to sustaining installed infrastructure are often the most difficult to establish.

Type III: Medium density, little or no improved infrastructure

Type III communities often represent the interface between rural and urban settlements—villages that have grown into small towns but whose infrastructure systems have not yet evolved to a level comparable with larger cities. Some wealthier households may have installed private wells, while a substantial proportion of families obtain water from vendors and/or surface water sources.

Type III communities are generally large enough to enjoy some economies of scale in water supply—which means that piped networks will be feasible in at least part of the settlement—but too small and/or dispersed for traditional urban utility management models to operate effectively. There often exists in Type III communities the economic capacity to make considerable improvements in water supply, but the absence of a supportive institutional framework often results in a variety of household-level solutions as opposed to a coordinated community-level effort. Type III communities are generally excluded both from national water supply programs targeting rural areas, as well as from those focused on cities. Local government institutions are often weak and under-resourced. Few households have access to credit.

Extending coverage in Type III communities can happen quickly and sustainably, but planning mistakes are easy to make in this type of settlement. In particular, the question of whether such communities should be viewed more like large rural villages or like small cities has considerable implication for the technologies and management structures that will be adopted. In the town of Lugazi, Uganda, for example, a piped network was installed which provided private connections to a substantial proportion of households, as well as a limited number of public kiosks in the central business district. Households that once used spring water now obtain water supply from their own or their neighbors' private connections, from public kiosks, or from vendors who also patronize the kiosks. In all cases, users pay the full cost of the level of service they receive.

Type III communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
Medium density (small town)	Supply from vendors, surface water sources	▪ Policy vacuum for small town water supply ▪ Limited public and private investment available for small town water supply	▪ Poverty, limited access to credit ▪ Demand captured by private investment at household level ▪ Weak collective action institutions ▪ Insecure tenure and/or low demand among renters	▪ Policy development ▪ Development of collective-action institutions for planning ▪ Partnerships with NGOs ▪ Support of small-scale independent providers ▪ Institutional experiments (*e.g.*, franchising, regional utilities) ▪ Targeted subsidy and credit programs

In the neighboring town of Wobulenzi, the water planning paradigm was more like that of a rural village. Water user groups were established and were given responsibility for managing neighborhood kiosks throughout the town, and most established prices that were lower than the cost of supply. Private connections were also made available to households and businesses who wished to pay the full cost of this improved level of service. These two very different models

stemmed from fundamentally different views of the character and the future of the communities, and gave rise to two unique sets of financial and institutional challenges.[7]

Much less is known about effective strategies for extending sustained coverage in small towns as compared to both rural and dense urban settlements. It appears that allowing for a variety of service options, and expecting the composition of technologies to change rapidly, are important planning principles in these dynamic communities. Considerable empirical research has also demonstrated that provision of financing—even at market rates—can unleash latent demand for improved services and allow households in small towns to move more quickly up the 'water ladder' toward community-level piped networks.

In towns where such economic capacity does not exist, policies that promote small-scale independent providers (SSIPs) can also increase the range of options available to households and lower service costs through competition and innovation.[8] Growing recognition of the policy vacuum regarding water and sanitation services for Type III (and IV) communities has spurred several important research and policy-experiment activities. In Peru, for example, the Water and Sanitation Program is currently undertaking comparative analysis of several different management models in a number of small towns.[9]

Type IV: Medium density, improved infrastructure in community

Small towns in the Type IV category have installed water supply facilities that either provide an insufficient volume of water *per capita* per day, or which a substantial proportion of households are unwilling or unable to use. Households typically supplement their supply with water purchased from vendors, or perhaps drawn from surface sources. If the level of community water services continues to slide, wealthier households will tend to exit the public system in favor of self provision (*e.g.*, through private wells). Over time, the situation deteriorates as revenues decline and households with the greatest ability to withstand tariff increases (and to provide cross-subsidies to poorer households) invest in private solutions instead.

As with Type II communities in rural areas, it is important to understand the reasons that existing infrastructure in Type IV towns is not providing adequate supply. Simply rehabilitating a poorly designed system will not provide sustained access to improved services in the long run. In many cases, small town systems are over-built as a result of designs based on perceived demand and peak estimates, rather than on dialogue with users themselves. Although technically sound, such systems cannot be supported given the economic base of the community. In Mali, for example, the "overscaled" design of facilities was identified as one of the key explanations for the high rates of failure in small-town water systems.

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[7] See, for example, B. Wandera (undated), 'The post-construction management challenge.' Paper presented at the UNDP/World Bank RWSG ESA Financing Community Water and Sanitation workshop; D. Whittington *et al.* (1999), 'Implementing a demand-driven approach to community water supply planning: A case study of Lugazi, Uganda,' *Water International* **23**(3): 134; and Colin, J., and J. Morgan, "Provision of water and sanitation services to small towns," Report summary of WELL Task No. 323 (Part A).

[8] B. Collignon and M. Vezina (2000), *Independent Water & Sanitation Providers in African Cities.* Nairobi: Water & Sanitation Program.

[9] See "Project EWDAN/PER/26: Strengthening Local Capacity for WSS Provision in Small Towns in Peru," available at http://www.wsp.org/Projects/peru.pdf.

The unsustainability of over-built systems can be further exacerbated by the institutional arrangements for water supply services that are typically found in small towns. Services managed by local government may suffer from under-financing, particularly for O&M, when funds for water are intermingled with the community's general accounts. Water user associations or other civic groups dedicated to water supply service delivery may perform better with respect to financial and accountability matters, but they often lack technical capacity, and also have limited access to state or national sources of support in the event of major problems.

Type IV communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
Medium density (small town)	Supply from dysfunctional network, vendors, and/or surface water sources	▪ Inadequate resources, capacity for O&M of public system ▪ Policy vacuum for small town water supply ▪ Mismatch of technical options with user demand & capacity	▪ Poverty, limited access to credit ▪ Demand of wealthier households captured by private investment ▪ Weak collective action institutions ▪ Insecure tenure and/or low demand among renters	▪ Improve revenue stability for O&M ▪ Capacity building for operations and maintenance ▪ Policy development ▪ Promote small-scale independent providers ▪ Institutional experiments (*e.g.*, franchising, regional utilities) ▪ Targeted subsidy and credit programs

A variety of institutional models are being employed to improve water services in Type IV communities, from regional utilities in South Asia to local *juntas* in Latin America. There is also increasing private-sector involvement in the management of small-town water systems. In Uganda, the national government financed the rehabilitation of several dozen Type IV towns as a prelude to establishing management contracts with six private operators.[10] The World Bank is also supporting pilot projects in franchising for small town water systems.[11]

Type V: High density, little or no improved infrastructure

Urban areas lacking water supply infrastructure typically fall into two categories: (a) newly constructed neighborhoods to which trunk lines have not yet been extended; and (b) unregularized areas where the installation of trunk infrastructure is costly and/or prohibited by law. Households in Type V communities typically obtain water from vendors (ranging from pole vendors to tankers); from privately or communally managed stationary tanks; or from friends, family, or employers located in networked areas.

In areas of new construction, urban development policy and regulation is typically the cause of lack of access. Development permits, for example, may be granted without the requirement of providing basic services. Indeed, at times urban development authorities actually work at cross purposes with water and sanitation agencies. In Lima, Peru, for example, a recent decision of the Vice Ministry for Construction and Sanitation that inadequate water supply was available to develop an outlying area of the city was overturned by the Ministry of Housing, which was under strong political pressure to develop new areas for a national low-cost housing program.

[10] S. Kayaga (2003), "Public-private community partnerships for the poor: The case of small towns water supply in Uganda." Paper presented to the Third World Water Forum, Osaka, Japan.
[11] B. Roche *et al.* (2001), 'Franchising in Small Town Water Supply.' Unpublished report to the World Bank.

In urban slums—defined as unplanned areas in which the majority of residents have title neither to their land or their homes—both the high cost of water supply improvements and an unsupportive policy environment constrain access to service. Such settlements are often located on marginal lands at considerable distance from trunk infrastructure, with steep slopes, rocky or hilly terrain, and irregular layouts. The *per-capita* cost of networked water supply improvements is high, as is the risk of damage to installed systems (through landslides or floods, for example). Even if households were able to bear most of the costs of an improved system, service providers are often prohibited from extending networks into unregularized areas. Municipal and state governments use such proscriptions as urban growth management tools, hoping to discourage the expansion of squatter settlements in already overburdened cities. In other cases, service providers have the authority to extend services to such neighborhoods, but are reluctant given the high costs and perceived risks to investments, as well as the perception of low revenue potential among poor and 'transient' households.

Type V communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
High density (Urban/ peri-urban)	No/little improved infrastructure: supply from vendors, tankers, rainwater, surface water	▪ Growth (newly incorporated areas) ▪ Investment restrictions in unregularized areas ▪ High *per-capita* cost of service ▪ Perceptions of poverty ▪ Inappropriate standards	▪ Poverty, limited access to credit ▪ High proportion of rented dwellings ▪ Insecure tenure ▪ Weak collective action institutions	▪ Urban development policy reform ▪ Promote small-scale independent providers ▪ Partnerships with civic organizations ▪ Regulatory reform (standards, new construction) ▪ Targeted subsidy and credit programs ▪ Household and community financing ▪ Technical innovations, flexible standards

In many cases, efforts to improve water supply services in Type V communities are frustrated by policy constraints at various levels. Where network services cannot be installed, promoting alternative service options is often the most feasible way of improving households' water supply situation. Mobile delivery systems, such as the *aguaterros* in Latin America and tankers in South Asia, are two such examples.[12] In some cases, collaboration between the municipal W&S agency and local entrepreneurs can be effective in extending improved services. In Abidjan, vendors install water lines at the limit of the municipal water company's service area and operate standposts in the city's outlying, unregularized areas.[13] Such solutions are often less efficient than piped service, and can result in households' receiving lower quality service and yet paying higher unit-volume prices.[14] However, where the service-delivery environment is competitive, and/or is effectively regulated (*e.g.*, through involvement of credible civic organizations), these "appropriate tech" approaches can represent a workable strategy for providing reliable water services to Type V households in the short to medium term.

[12] T. Solo. 1999. Small-scale entrepreneurs in the urban water and sanitation market. *Environment and Urbanization* 11(1).
[13] A. Mitter (1999). *Water for the Urban Poor: Cote d'Ivoire's Experiment with Private and Informal Sector Cooperation*. Master's thesis: Massachusetts Institute of Technology, Department of Urban Studies & Planning.
[14] See, for example, Lovei, L., *et al.* (1993). Rent-extracting behavior by multiple agents in the provision of municipal water supply: A study of Jakarta, Indonesia. *Water Resources Research* **29**(7): 1965-1974.

Type VI: High density, improved infrastructure in the community

Type VI settlements are often considered by municipal governments and W&S agencies to be 'covered' with improved service (typically through shared public sources), whereas independent assessments document a high proportion of households receiving very small volumes of water. In Hyderabad, India, for example, households in many colonies served by public taps were found to receive only 20 liters *per capita* per day (lpcd) on average, as compared to 135 lpcd provided to households with private connections.[15] The city's water and sanitation agency, however, does not classify the former communities as 'lacking access to services.' Households in Type VI communities may supplement their water supply with purchases from vendors, or from other households with private connections.

The factors underlying inadequate water supply in Type VI communities are somewhat more varied than with other categories in the typology. In some cases, technical explanations are important, as when a distribution network has deteriorated to the point that it can supply only a minimal quantity of water each day. In other cases, improved services are available, but households cannot or do not take advantage of them. A large proportion of households may live in rented homes, for example, and are reluctant (or are prohibited by landlords) from investing in private household connections. Households may be willing and able to afford the monthly fees associated with improved services, but do not have the credit necessary to pay for up-front installation and plumbing costs.[16] In addition, service providers often afford Type VI communities low priority in their planning and budgeting processes, both because such neighborhoods are perceived as having little revenue potential and difficult working conditions, and because they have limited political clout as compared to more affluent parts of the city.

Type VI communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
High density (Urban/ peri-urban)	Supply from shared public facilities, vendors	▪ High *per-capita* cost of supply ▪ Perceptions of poverty ▪ Inappropriate standards	▪ Poverty, limited access to credit ▪ High proportion of rented dwellings ▪ Challenges of collective action	▪ Promote small-scale independent providers ▪ Partnerships with civic organizations to promote dialogue with service provider ▪ Targeted subsidy and credit programs ▪ Household and community financing ▪ Technical innovations, flexible standards

Strategies for improving water supply services in Type VI communities must thus be tailored to the particular constraints encountered on the ground. Where trunk infrastructure exists but households are unable to afford connections and/or monthly fees, targeted subsidies and credit programs can have large impacts. If large-scale rehabilitation or installation of trunk infrastructure is a necessary precursor for expanding coverage, access to financing at the municipal level is essential. In either case, there may be scope for improving access to services in the shorter term through the promotion of small-scale independent providers (as described for

[15] J. Davis *et al*. (2004). See footnote 2.

[16] These costs may be particularly high in urban settings where W&S agencies are subject to technical standards that are often excessively stringent or inappropriate. Many former colonies in Africa, for example, use construction standards that were adopted without modification from Western Europe.

Type V communities above). Because the relationships between households in Type VI communities and their public service providers are often characterized by a lack of trust and understanding characterizes, bringing credible third parties into the institutional arrangements for planning, construction, and service delivery can also be an effective strategy. In Ahmedabad, India, three well-known NGOs partnered with the Municipal Corporation to implement an upgrading project in 27 low-income neighborhoods. Not only did the NGOs provide critical financial intermediary services for the project, but their staff helped both households and Municipal Corporation staff to appreciate one another's perspectives and constraints.[17]

[17] J. Davis *et al.* (2004). See footnote 2.

III. Access to sanitation services

When considering how a typology of the unserved relates to sanitation services, three inter-related observations emerge. First, despite the fact that sanitation services arguably have greater public-good characteristics as compared to water supply, in practice sanitation is often a private household matter, organized and financed by users, whereas water supply commands considerable attention in the public policy and planning sphere. This feature of sanitation services leads to a second observation, namely that the key leverage points in expanding sanitation coverage involve generating demand and influencing decisions made at the household level, which may suggest a rather different set of policy and planning strategies to expanding sanitation *versus* water supply coverage.

	Low density (rural)	*Medium density (village/small town)*	*High density (urban/peri-urban)*
Little/no improved infrastructure	Type I	Type III	Type V
Some improved community infrastructure	Type II	Type IV	Type VI

These insights raise the third, important issue of hygiene. For households and communities to reap the full health benefits of improved sanitation technology, regular use of their facilities must be accompanied by proper hygiene behavior. The extent and import of such learning and behavior change is arguably much less for households to take advantage of improved water sources (although education and skill building are important for ensuring the sustainability of installed infrastructure). At this time, the Joint Monitoring Programme's definition of "access to improved sanitation" does not incorporate a consideration of hygiene. As noted in Section I, our typology adheres to this definition, and thus the focus of this section is on expanding access to improved sanitation infrastructure in a community. We feel strongly, however, that hygiene promotion must be an integral part of sanitation projects, apart from the social marketing efforts designed to boost demand for improved sanitation more generally.

One reason that public knowledge of and interest in improved sanitation services is typically lacking in developing countries is that sanitation often has no institutional home at either the national or sub-national level. The effects of this institutional void include a low profile for sanitation in national budgetary debates; low priority for sanitation policy and program development, including initiatives that could promote awareness or facilitate household actions for improving services; and weak or absent national standards for sanitation. For all communities in the typology, the creation of a national-level institutional home for sanitation—whether a ministry of its own or a department within another ministry (*e.g.*, water or health)—is perhaps one of the most important steps that countries can take in their quest to meet the Millennium Development Goal for sanitation.[18]

[18] See p. 112, "Achieving the Millennium Development Goals for Water & Sanitation: What will it take?" Interim report of the Task Force on Water and Sanitation. December 2003.

Type I: Dispersed, little or no improved infrastructure

Households in Type I communities typically use unimproved sanitation facilities, such as open pit latrines; collect excreta in buckets or plastic bags within the home; or relieve themselves out of doors. Given the high rates of poverty, limited or complete absence of institutions dealing with sanitation in rural areas, and the availability of 'traditional' sanitation practices that may be acceptable to residents (*e.g.*, defecation in agricultural croplands), effective demand for improved sanitation in rural communities is often very low.[19]

On the supply side, it is important to note that subsidies for improved sanitation services have been declining in recent years. For Type I communities, the costs of simple technologies may be low, but so too is demand for them, which means that incentives such as subsidies or financing may be critical to expanding coverage. Indeed, strategies that improving affordability—paired with social marketing efforts—may be more cost-effective than large-scale education and campaigns aimed at influencing private household investment decisions.

More generally, careful thought needs to be given to education programs intended to increase appreciation of the links between sanitation, hygiene, and health. In some cases communities' understanding of these relationships is indeed limited, and education can help generate demand for improved services. In many other instances, however, households have simply pursued other investments in a rational priority-setting process. "Awareness campaigns" may need to take greater advantage of modern marketing strategies, focusing on basic human emotions such as pride, shame, and competition, in order to make real progress in rural sanitation.

Type I communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
Dispersed /Rural	No/little improved infrastructure: unimproved on-site facilities (*e.g.*, open pit latrines), bucket/bag collection; open defecation	▪ Declining subsidies for sanitation ▪ No institutional home for sanitation ▪ Low budgetary priority for rural sanitation	▪ Poverty ▪ Limited access to credit ▪ Low demand for sanitation improvements	▪ Institutional development at national and subnational levels ▪ Social marketing and education, possibly through partnerships with civic organizations ▪ Targeted subsidies and credit programs ▪ Combined agricultural/ sanitation programs

In West Bengal, India, for example, the Medinipur district rural sanitation project was launched in 1990 and involves UNICEF, state and district level governments, a religious NGO (the Ramakrishna Mission), and voluntary grassroots community level organizations.[20] The project was designed as a "people's movement" and strives to discourage open-air defecation through education and social marketing. Community mobilization and education is carried out by trained motivators from the communities themselves, using home visits, motivational camps,

[19] We use the term 'effective demand' to mean the willingness and ability of a household to contribute the time and/or resources necessary to obtain a good or service.

[20] Chowdry, Kamla, "Ramakrishna Mission: Service and Salvation," September 26, 2002; Sengupta, Chandan, "Our challenge: Latrine for all." 27th WEDC Conference. UNICEF. Lusaka, Zambia, 2001, pages 203-206; UNICEF, "Sanitation-The Medinipur Story: Intensive Sanitation Project," West Bengal, India, Calcutta, India; and UNICEF, "Invest in Children, Advance Sustainable Development: In India, success in improving sanitation," press release.

exhibitions, and the use of visual aids such as flash cards and calendars. Over the course of ten years, the project has increased coverage of improved sanitation services from almost zero to 80 percent, with the construction of some 1.2 million latrines throughout West Bengal.

Given that many households in Type I communities are engaged in farming, sanitation programs could also, where feasible, provide information about the potential for human waste to be used as an agricultural resource. Some sanitation technologies—such as the twin-pit latrine—are well suited to the collection and safe removal of excreta, which can be applied as fertilizer to crops. These added benefits may help convince households with low levels of service (*e.g.*, open pit latrines) to invest in and maintain improved facilities.

Type II: Dispersed, improved infrastructure in the community

Many W&S specialists relate anecdotes about rural communities in which a high percentage of households have access to improved on-site sanitation facilities but rarely utilize them. In Nicaragua, for example, new latrines were not used by women because their feet could be seen from outside, which violated customs of privacy.[21] In Sri Lanka, children were prohibited from using latrines because of parents' safety concerns; the facilities were located at some distance from the dwellings, and had designs that could allow smaller children to fall into the pits.[22] Similar accounts of public latrines that were built too far from public spaces such as markets, or whose arrangements for upkeep were vague or not enforced, are also common in the W&S literature.

Type II communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
Dispersed /Rural	Dysfunctional or under-utilized private or public on-site facilities (*e.g.*, improved latrines)	▪ No institutional home for sanitation ▪ Declining subsidies for sanitation ▪ Mismatch between level of service supplied *versus* demanded ▪ Bundling of water & sanitation improvements	▪ Low effective demand for improved sanitation ▪ Weak institutional arrangements for upkeep of shared facilities ▪ Poverty ▪ Limited access to credit ▪ Insufficient knowledge/skills for facilities maintenance	▪ Social marketing and education, possibly through partnerships with civic organizations ▪ Rehabilitation, modification, and/or relocation of facilities to improve acceptability to users ▪ Training and education for households and/or private-sector actors in O&M functions ▪ Targeted subsidies and credit programs

Where failing sanitation facilities are privately owned and maintained, it is not surprising to find that they have been installed by households as a prerequisite to their receiving improved water supply. Although this 'bundling' strategy has been successful in some communities, in others it has led to the construction of 'white elephants' which households have little interest in using or maintaining. Where sanitation facilities are shared or public, failures tend to be associated with

[21] United Nations International Research and Training Institute for the Advancement of Women, "Women, Water, and Sanitation," in *Women and the Environment: A Reader,* Sally Sontheimer, ed. (Monthly Review Press, New York, 1991), p. 123.

[22] Fong, M., Wakeman, W., and Bhushan, A. 1996. *Toolkit on Gender in Water and Sanitation.* Washington, DC: The World Bank.

inappropriate institutional arrangements for operations and maintenance, or with inadequate consultation during planning that resulted in inappropriate technical designs and/or facility siting.

Making progress in improved sanitation coverage for Type II communities is frequently quite similar to working with Type I communities, because the key leverage points often relate to households' attitudes and behaviors. If facilities have been reasonably well designed but inadequately promoted, social marketing efforts can help socialize good sanitation practices and encourage households to make use of neglected facilities. Training may also be necessary to build households' skills for keeping their facilities clean, safe, and well-functioning. Where major design or siting problems exist, as with the examples provided at the start of this section, financial resources may also be critical to modifying and/or relocating facilities such that they are acceptable to users.

Type III: Medium density, little or no improved infrastructure

As is the case with water supply, sanitation planning at the rural-urban interface can be particularly challenging. Type III communities with little or no improved sanitation infrastructure typically use unimproved on-site facilities such as open pit latrines, overburdened public facilities, and/or open defecation for their personal needs. Both rural and urban sanitation programs often exclude these medium-density settlements, resulting in the same type of policy vacuum noted with reference to water supply in Section II.

Somewhat different from the case of water supply, however, is the fact that 'leapfrogging' to a substantially higher level of service in Type III communities is often difficult to accomplish. Whereas households in these communities have often been exposed to sewage systems and would appreciate the convenience and status that toilets with sewers would convey, these are costly technologies, and on-site facilities may be a more appropriate choice given the economic base of the community. In such cases, many of the same strategies that can be effective in more dispersed communities—targeted subsidies, the provision of financing services, and social marketing—are also relevant for households in Type III settlements.

Type III communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
Medium density (small town)	Service from dysfunctional public facilities, unimproved private facilities, open defecation	▪ No institutional home for sanitation ▪ Policy vacuum for small town sanitation ▪ Limited public and private investment available for small town sanitation	▪ Limited effective demand for sanitation improvements ▪ Limited access to credit ▪ Low demand among renters	▪ Social marketing and education, possibly through partnerships with civic organizations ▪ Regulatory reform (standards, new construction) ▪ Targeted subsidy, credit, and/or financing programs

Where a high proportion of households are renting their homes, planners face an additional hurdle to boosting demand for improved sanitation. In such cases, marketing and financial incentives may need to target landlords in addition to residents themselves. For communities located within the jurisdiction of strong local government, regulation of new construction may be

another strategy for guiding development of Type III communities toward universal access to improved sanitation.

The relatively higher densities of Type III communities also provide an opportunity for improved public facilities to be successful, if they are carefully designed. Countless anecdotes exist in the water and sanitation sector regarding public facilities that, once constructed, quickly fell into disrepair because communities lacked the interest or skills to maintain them. Examples do exist, however, of public facilities that function reliably and are well maintained. In India, the NGO Sulabh International has installed 5,500 pour flush toilets that are operated on a fee basis and are maintained by attendants who live at the facilities. Through gradual technology development, careful attention to sustainability, and strong efforts in marketing and promotion, Sulabh's facilities are considered to be a model for sustainable public sanitation services.[23] Such facilities may be particularly suited to central market or business districts in Type III communities, where effective demand is likely to be highest.

Type IV: Medium density, improved infrastructure in the community

Evidence of the risk of pursuing the 'leapfrogging' approaches mentioned above can be found in many Type IV communities throughout the developing world, where piped sewer networks have been installed but have not been utilized and/or maintained. Either an overly optimistic projection of household demand for improved services, inadequate resources and incentives for network maintenance, or both, leads to deterioration of the system and leaves households reliant upon unimproved sanitation services. In some small towns in Peru, for example, fewer than 10% of households have connected to piped sewerage networks, despite the results of community assessments indicating that this level of service was preferred by a majority of residents. Once households were confronted with the need to pay substantial connection fees and monthly service bills, most decided to retain their existing service—ranging from open defecation to poorly constructed on-site facilities—which rendered the new sewer networks financially infeasible.

Type IV communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
Medium density (small town)	Dysfunctional or under-utilized private and public facilities	▪ No institutional home for sanitation ▪ Policy vacuum for small town sanitation ▪ Inappropriate technical designs and/or facilities siting ▪ Limited post-construction support for sanitation	▪ Limited effective demand for sanitation improvements ▪ Limited access to credit ▪ Low demand among renters ▪ Inadequate knowledge, resources for O&M of facilities	▪ Rehabilitation/promotion of connections with concomitant capacity building for revenue stability and O&M ▪ Support of improved facilities that better match community capacity and demand ▪ Innovative technologies, *e.g.*, wastewater irrigation systems ▪ Social marketing and education, possibly through partnerships with civic organizations

[23] Water Supply and Sanitation Collaborative Council, "Vision 21: Water for People—A Shared Vision for Hygiene, Sanitation and Water Supply." See also Sulabh International's website at http://www.sulabhinternational.org/.

Many of the observations related to making progress with Type IV communities' water supply services are relevant for improving access to sanitation as well. If up-front connection fees are the primary obstacle to households pursuing sewer connections, targeted subsidies or credit programs may help unleash a latent demand for improved services. If the institutional and economic base of the settlement cannot support the operation and maintenance of a sewer network, however, facilitating connections is a short-sighted strategy that will likely result in another system becoming defunct. Scarce resources may be better spent on helping households make improvements to on-site facilities instead.

In some cases, innovative technical approaches may help increase the financial viability of sewerage service for Type IV communities. In Mexico, Pakistan, and several other countries, for example, sewage water recycling for agriculture is being undertaken in communities at the urban-rural boundary.[24] This practice can save substantial costs of treating sewage water, while also creating benefits in the form of usable water and fertilizer for agriculture. Technical capacity is important in such systems, however; for example, care must be taken to ensure that the concentration of fertilizer nutrients in the water is not too high, and that agricultural workers using recycled sewage water are equipped with protective gear. In sum, whereas recycling sewage water in agriculture is not without its problems, evidence suggests that these problems can be managed, and the practice can generate considerable benefits both in terms of W&S service delivery and food production.

Type V communities: high density, little or no improved infrastructure

In Type V communities—typically newly constructed neighborhoods to which trunk lines have not yet been extended, or unregularized areas where the installation of trunk infrastructure is costly and/or prohibited by law—households largely rely on inadequate public, shared, or private facilities and/or open defecation, creating substantial environmental health hazards in these cramped settlements. Improving sanitation in crowded urban areas is perhaps one of the most formidable challenges in meeting Target 10, and for the water and sanitation sector more generally. Given the high densities of these communities, on-site technologies are often infeasible because of limited land availability and the potential for contamination of drinking water supplies. Sewerage systems, on the other hand, are expensive to construct and often cannot be operated and maintained with revenues obtained from low-income households.

Type V communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
High density (urban/ peri-urban)	Unimproved private, shared, or public facilities; open defecation	▪ No institutional home for sanitation ▪ Growth (newly incorporated areas) ▪ Investment restrictions in unregularized areas ▪ High *per-capita* cost of service ▪ Inappropriate standards ▪ Perceptions of poverty	▪ Poverty, limited access to credit ▪ High proportion of rented dwellings ▪ Insecure tenure ▪ Weak collective action institutions ▪ Low effective demand for sanitation improvements	▪ Urban development policy reform ▪ Partnerships with civic organizations ▪ Regulatory reform (standards, new construction) ▪ Innovative technologies and flexible standards ▪ Targeted subsidy and credit programs

[24] See, for example, 'Striking the right balance for wastewater irrigation,' International Water Management Institute, http://www.iwmi.cgiar.org/news/wastewater.htm.

Obtaining the substantial investment required to improve sanitation services in urban areas has been a major obstacle to expanding access in Type V communities. Some progress has been made, however, in lowering the costs of improved urban sanitation. For example, some observers have noted that the high *per-capita* costs are often the result of overly stringent technical standards adopted without modification from industrialized countries.[25] In Brazil, these standards were modified to allow development of "condominial" sewerage technology in the 1980s, with the aim of extending sanitation services to low-income communities. This technology has now become a standard sanitation solution for entire urban areas in Brazil, irrespective of income levels. Condominial sewers reduce *per-capita* costs of service by replacing the traditional model of individual household connections to a public sewer with a model in which household waste is discharged into branch sewers, and eventually into a public sewer through a group (or 'block') connection.[26]

Another type of technical innovation has helped to address the "lumpy" nature of investment for urban sewer system that often forestalls sanitation improvements in Type V communities. The unbundling of sewer networks into several smaller systems serving different zones within a city can help accelerate sanitation improvements in some cases. In Bangkok, Thailand, for example, a wastewater master plan developed for the entire metropolitan area in 1968 was shelved for 16 years because of its prohibitive cost. In 1984, the plan was revised under a Japanese (JICA) technical assistance program such that the inner part of Bangkok was divided into 10 sewerage zones, each with an independent collection and treatment system. This approach has allowed progress to be made with sanitation improvements gradually; it is also interesting to note that the total investment required for this phased approach is less than what would have been required for the original, single city-wide project.

In much of the literature on urban sanitation, institutional constraints are considered to be as important as technical and financial challenges in explaining low rates of coverage. For example, many Type V communities are prohibited from receiving improved sanitation infrastructure because service providers are prohibited from operating in unregularized areas (see p. 11). In addition, despite the fact that low-income urban communities tend to have more influence than, say, dispersed rural villages, they still often lack the capacity for organizing, planning, and levying demands on government and service providers. For their part, municipal water and sanitation agencies often find it difficult to initiate a dialogue with low-income communities—and often have little incentive to do so. In such cases, programs that involve new partners, whether donor agencies, international NGOs, or local civic organizations, can help break the paralysis that often characterizes sanitation planning in Type V settlements. The NGO administered Orangi Pilot Project in Pakistan, for example, forced municipal authorities to confront the problem of inadequate sanitation to Karachi's largest unplanned settlement by constructing privately financed sanitary latrines and sewers that emptied into municipal drains.

[25] For instance, the technical standards for sewers in some African countries include pipe specifications intended to ensure that networks withstand snow loadings—clearly an artifact of the European climates in which the standards were developed.

[26] G. Watson. 1999. *Good Sewers Cheap? Agency-Customer Interactions in Low-Cost Urban sanitation in Brazil.* Washington, DC: World Bank.

Type VI communities: high density, improved infrastructure in community

Residents in Type VI communities may have trunk sewers in their neighborhood, but a substantial proportion of households do not have individual connections and instead rely on overburdened public facilities, bucket latrines, or defecation outdoors. Often these settlements represent Type V communities that have been regularized and serviced with public infrastructure; as such, important institutional hurdles (*e.g.*, proscriptions against public service provision) and financial obstacles have been overcome. At the household level, however, the installation of a trunk sewer is often met with considerably less investment in individual service connections as compared to the laying of a water main.

Type VI communities

Density	*Existing service*	*Common explanations for low coverage rates*		*Possible policy & planning responses*
		Supply side	*Demand side*	
High density (urban/ peri-urban)	Service from shared public facilities; bucket latrines; open defecations	▪ No institutional home for sanitation ▪ High *per-capita* cost of household level service ▪ Perception of poverty ▪ Constraining standards	▪ Poverty, limited access to credit ▪ High proportion of rented dwellings ▪ Limited access to credit ▪ Low demand for sanitation improvements	▪ Targeted subsidies, financing programs ▪ Social marketing and education ▪ Partnerships with civic organizations ▪ Innovative technologies, flexible standards

Households' unwillingness and/or inability to invest in improved sanitation services in Type VI communities is understandable given the high costs of waterborne sewerage that is often required in dense urban settlements. Social marketing and education may be effective in raising awareness and shaping preferences for improved sanitation, but substantial progress in expanding coverage is often possible only if cost-saving technical designs, targeted subsidies, connection-fee financing, or some combination of these strategies is employed.

Many households in Type VI settlements may also lack the space to install individual toilet facilities; substantial renovations are often needed to accommodate indoor plumbing in dense settlements. In some communities, improved facilities that are shared by two or more families may be a good compromise that requires less expenditure and sacrifice of limited dwelling area per household. In other cases, private-sector and/or community managed public facilities may be a workable alternative (see p. 18).

IV. Diagnostic applications of the typology: An illustrative case

From a planning and policy perspective, the typologies presented in Sections II and III are useful to the extent that they improve understanding among decision-makers of the constraints to extending W&S coverage, and thus allow for the formulation of strategies that better address bottlenecks encountered on the ground. In this section, we consider a hypothetical case study of how the water and sanitation typologies could be used to improve planning and policy development in one extended metropolitan area. Whereas the majority of the data used in this example are drawn from an actual case, we present it as a theoretical application of the typology so as to encourage readers to imagine how these tools might apply to cases with which they are engaged.

In this case, we consider an extended metropolitan area of just over six million residents, which are distributed among the principal city (4.75 million), eleven smaller towns (400,000 total), two unregularized areas (850,000 total), and several small villages (45,000 total). Of these six million, the regional W&S authority considers 20.6% (1.24 million) to lack access to improved water supply and 24.5% (1.48 million) to be without adequate sanitation services (Table 1). These unserved are believed to be concentrated primarily in low-income neighborhoods in both regularized and unregularized areas of the center city (*i.e.*, Type V and VI settlements); in addition, approximately one third of the small town residents are considered to lack access to improved W&S services (Type III communities).

Table 1: Distribution of unserved households (regional W&S authority data)

	Number (% of all unserved in greater metropolitan area) without access to…	
	Improved water supply	Improved sanitation
Type I: Dispersed, little/no improved infrastructure	None	None
Type II: Dispersed, some improved infrastructure	None	None
Type III: Medium density, little/no improved infrastructure	132,000 (11%)	132,000 (9%)
Type IV: Medium density, some improved infrastructure	None	None
Type V: High density, little/no improved infrastructure	637,500 (51%)	637,500 (43%)
Type VI: High density, some improved infrastructure	475,000 (38%)	712,500 (48%)
Total number (%) of residents without access	1,244,500 (20.6%)	1,482,000 (24.5%)

Senior staff of the agency feel that they have few options for extending community infrastructure to the unserved in either the Type III or the Type V communities, which together comprise roughly 62% and 52% of households lacking access to improved water and sanitation services, respectively. The agency does not receive sufficient revenues from customers to cover their operation and maintenance costs, much less to extend their network to newly developing areas in the periphery of the region, even if financing could be secured. The authority has also been instructed by state government not to provide improved services to the roughly 850,000 residents who are occupying land to which they do not have title. From the perspective of the W&S agency, the municipal and state institutions responsible for urban development must require that developers finance the cost of trunk infrastructure extensions to new developments, and must also decide how to facilitate infrastructure improvements in unregularized communities.

The remaining residents who do not have access to improved services are believed to reside in low-income neighborhoods scattered throughout the city center. Agency staff believe that these poor households simply cannot afford the monthly fees associated with improved services (despite the fact that current tariffs cover only about 40% of operating costs); instead, these residents rely on public facilities that do not satisfy the JMP definition of 'improved services.' Agency officials feel that, given its already precarious financial position, the water authority itself cannot consider strategies such as subsidies to facilitate coverage expansion in these neighborhoods.

In sum, the map of this metropolitan region based on the assumptions of the W&S agency appears something like Figure 2A. Most of the policy and planning responses that would have a substantial impact on the numbers of unserved are beyond the agency's control; indeed, they are beyond the scope of sector institutions more generally. With additional information derived from a rapid collaborative assessment, however, the problems of access to W&S service in this region begin to look somewhat different (Figure 2B)—and more options for making progress in coverage expansion begin to emerge.

First, we find that almost one half of the unserved in the small outlying towns (66,000) actually live close enough to water and sewer mains to obtain household connections, but have continued to use vended water and public latrine facilities. Clearly the water authority needs to obtain additional information on such settlements to better understand what is impeding these Type IV (not Type III) households from improving their water and sanitation services. It is particularly important to understand the constraints for these communities before additional investment in improved infrastructure is undertaken in other small towns.

Second, the number of households in this region's unplanned settlements who do not have access to water supply is actually lower than what has been estimated by the regional water authority. Dozens of small W&S development projects sponsored by NGOs and elected officials have brought improved water service to roughly 170,000 more residents of unregularized areas than the regional authority's estimates. (The agency's figures regarding access to improved sanitation services in these communities, however, are generally correct.)

Third, the regional W&S authority has substantially underestimated the number of households in the central city zones who lack access to services, particularly to sanitation. The difference in findings is largely attributable to erroneous assumptions on the part of W&S agency staff concerning the functionality of public tap and toilet facilities. Moreover, the authority's perception that the affordability of monthly fees is the primary explanation for these Type VI households' lack of access needs to be re-evaluated. In fact, several micro-credit programs administered by NGOs in the inner city have been quite successful in tapping poor households' latent demand for water supply and sewer connections to the city's network. More than 9,000 households have obtained connections through these programs, which provide market-rate financing that allows families to amortize the connection fees (on average equivalent to three months' income) over six to twelve months. Experience from these programs indicates that these up-front fees, not monthly service fees, were the primary obstacle to improved service among these families (which is consistent with a fairly large body of W&S planning literature). Connection-fee financing will not be enough to bring the possibility of a network connection within reach of all poor households in this city, but it is one strategy that likely has more potential than the W&S authority had hitherto believed.

Figure 2A: Distribution, typology of unserved (water authority)

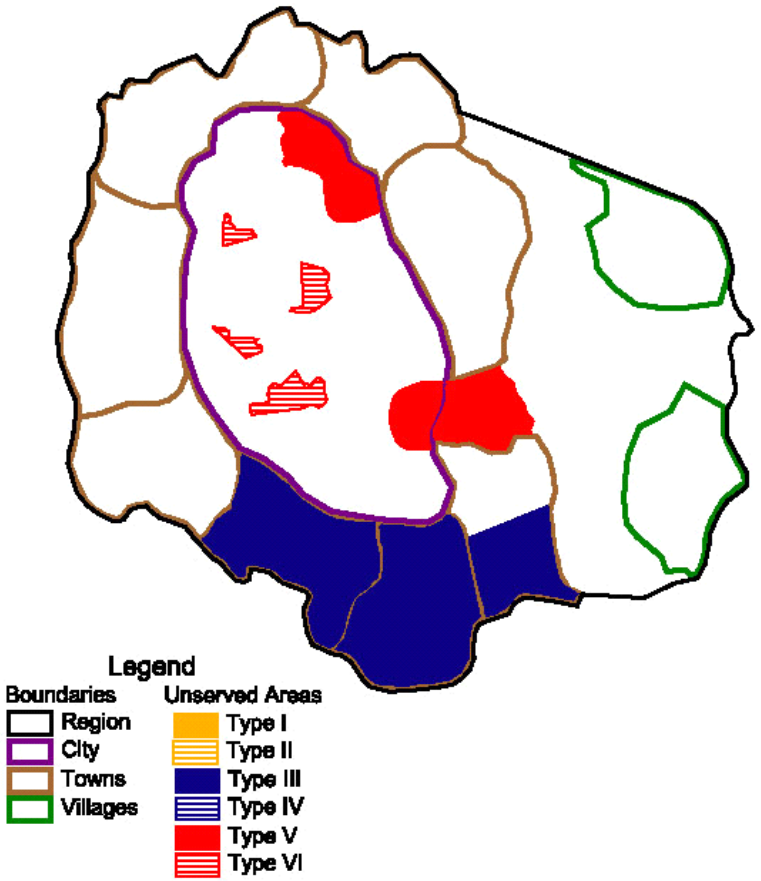
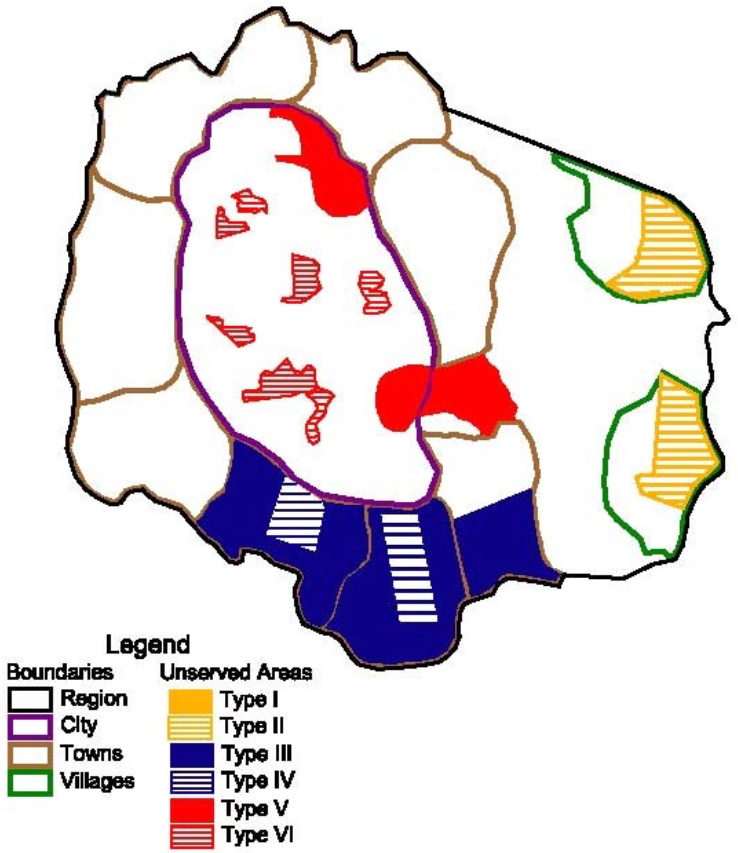


Figure 2B: Distribution, typology of unserved (collaborative assessment)



Finally, the water authority has not included in its assessment of the unserved the approximately 45,000 residents of the low-density communities at the far reaches of its jurisdiction. These predominantly agrarian households received shared tap systems and latrines through a rural development program several years ago; thus, they were considered to have access to improved services. A rapid assessment in this area, however, suggests that perhaps half of these residents actually rely on surface water, and a majority practice open defecation in agricultural fields. The water authority thus also has approximately 5,000 Type II households within its borders.

The collaborative assessment carried out to verify the water authority's information about unserved households in the region took less than one month, and was able to exploit a number of existing investigations rather than requiring a large data-collection effort of its own. In one sense, this rapid appraisal has uncovered the fact that the water authority's task is actually a bit more daunting than previously believed: the percentage of households in the region who lack access to water supply and sanitation is 22% and 29%, respectively, rather than the 21% and 25% initially believed.

On the other hand, evidence suggests that the authority's current sense of paralysis may not be entirely well-founded. It is true that only with considerable capital investment will improved water supply and sanitation services be extended to the more than half a million residents in the region's Type III and Type V areas. At the same time, authority officials have used the results of the collaborative assessment to tap sources of investment capital that are formally beyond its reach. For example, the authority has brought to the attention of state-level institutions and the media the finding that 170,000 residents in communities originally thought to have no improved public W&S infrastructure (Type V) actually do have access to piped water. State law requires that water supply improvements in urban areas be accompanied by sanitation—or, at a minimum, drainage—improvements. Elected leaders who have used discretionary funds to improve water supply for their constituents in such settlements are now being pressured to make parallel investments in sanitation and drainage as well, in compliance with state requirements for public health protection.

With regard to the several hundred thousand residents who live in settlements with improved community infrastructure but do not have access to improved water and sanitation services themselves, the water authority has, on a trial basis, revised its policy for new connections. Customers will now be offered the option of paying their connection fees, with interest, in installments over a six-month period. This policy has stimulated considerable response among households, particularly in the small town (Type IV) communities, but also among the urban poor in Type VI settlements.

For their part, local NGOs and community groups have used the collaborative assessment findings, along with state norms for service provision, to lobby the water authority for the rehabilitation of public taps and toilet facilities in low-income neighborhoods throughout the city. In addition, they have used the spatial data regarding the location of underserved communities to force a review of water authority staff in the lowest performing districts. Overall, however, relations between the authority and civic groups have improved considerably as a result of the collaborative assessment, which has been attributed largely to the process of sharing and discussing the perspectives and constraints of different actors in the W&S arena. A follow-up workshop is planned that will bring agency officials, NGOs, research groups, and donor agencies together to continue collaborative efforts in devising strategies for expanding coverage to unserved households.

V. National-level considerations in formulating strategies to expand W&S coverage

As demonstrated in Section IV, having a better understanding of the location and characteristics of those lacking access to improved water supply and sanitation services is helpful for identifying important bottlenecks, as well as a set of possible strategies for extending coverage to these households. Choosing among these strategies requires additional consideration of constraints and opportunities posed by the national and sub-national institutional, economic, and policy frameworks.

For example, the potential for success of many of the strategies for expanding access to water supply and sanitation described in Sections II and III depends on the extent to which fair and well-functioning legal institutions are in place, as well as the extent to which government power is regulated by law. Regulatory approaches for coverage expansion, including service requirements for new construction or rental properties, require monitoring and enforcement capacity. Rule of law, including contract enforcement and protection against state capture of private investment, is also important for efforts to attract private firms to the W&S sector.

In this section, we discuss three other facets of this 'macro' framework that substantially influence the potential for different W&S planning strategies to succeed in extending access to improved services: aggregate financial resources availability; the institutional landscape for water supply and sanitation planning and service delivery; and the allocation of decision-making authority among tiers of government.

Aggregate financial resource availability

Whereas financial constraints have been repeatedly identified in this document as a principal explanation for low levels of W&S service coverage, a distinction should be made between the absolute lack of resources and the need to redistribute potentially sufficient existing resources such that Target 10 can be met. In some countries, *e.g.*, those falling in the upper right-hand corner of Figure 3, sufficient financial resources exist to provide universal coverage, but their concentration among wealthier households leaves a substantial proportion unserved. Sizeable gains in coverage can result from policy and institutional arrangements that encourage the redistribution of resources.

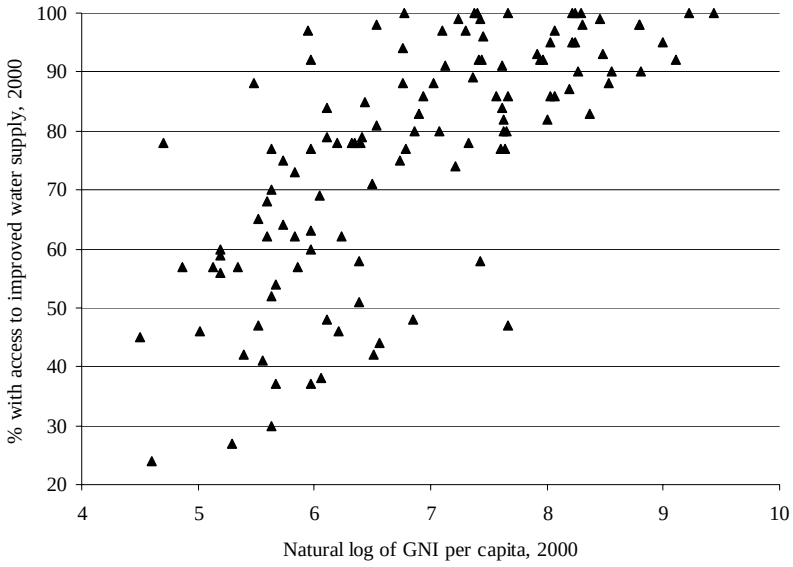
Many countries in Latin America would be considered to fall into this category, and some of the best known examples of cross-subsidy programs for public service delivery come from the region. In Chile, for example, a government-funded program of targeted subsidies helps poor households to pay their water and sanitation bills by covering 25-85% of the monthly tariffs.[27] In the illustrative case discussed in Section IV, it appears that there would also be scope for such redistributive strategies, given the fact that even the provision of market-rate financing was sufficient for several thousand households to obtain W&S connections.

It is also important to recognize that many nominally 'redistributive' approaches currently employed in the W&S sector of developing countries actually confer very little benefit to poor households. For example, 'lifeline' or increasing block tariffs only benefit households who have

[27] See, for example, Gomez-Lobo, A. 2001. "Making water affordable: Output-based consumption subsidies in Chile." In Brooks, P., and Smith, S. (eds.), *Contracting for public services: Output-based aid and its applications.* Washington, DC: The World Bank.

service connections, which typically do not include the poorest.[28] Programs that do appear to be effective in improving access—particularly connection fee financing as described in our case example above—are much less common.

Figure 3: Increasing *versus* redistributing resources to expand W&S coverage



In other countries (*e.g.*, those in the lower left-hand corner of Figure 3), pervasive poverty creates binding financial constraints to coverage expansion. Such constraints are particularly acute for poor countries with a large number of Type V communities, *i.e.*, densely settled urban areas without improved water and sanitation infrastructure. Even considering the cost savings that might be reaped from technical innovations (p. 19), investment needs are often tremendous—particularly for urban sanitation—and far beyond the capacity of governments (much less users) to finance on their own. For such countries the challenges are to mobilize the necessary resources from the international community, while also working to ensure that national budgetary processes, policies, and institutional arrangements give priority to investment in basic water and sanitation services for the poor.

In Uganda, for example, the water and sanitation sector has been prioritized in the country's Poverty Reduction Strategy Paper (PRSP) process, following the identification of inadequate W&S services as a top development priority among poor households consulted in a Participatory Poverty Assessment (PPA). These findings, as well as strong advocacy from civil society organizations, encouraged the Ugandan Ministry of Finance to earmark one third of the funds received under the Highly Indebted Poor Country (HIPC) initiative for the water and sanitation sector.[29]

[28] For other limitations of 'lifeline tariffs' as a poverty alleviation tool in developing countries, see Whittington, D. (1992). Possible adverse effects of increasing block water tariffs in developing countries. *Economic Development and Cultural Change*, **41** (1): 75–87.

[29] For more information, see "Water Supply and Sanitation in Poverty Reduction Strategy Papers in Sub-Saharan Africa: A Benchmarking Review of 12 Countries and Exploring the Way Forward," by Thomas Fugelsnes and Meera Mehta. Water & Sanitation Program, Nairobi, October 2003.

The institutional landscape for planning and service delivery

A fairly broad consensus exists regarding the ideal institutional arrangement for water supply and sanitation policy development, planning, and service delivery. Broadly speaking, central government should have responsibilities for policy development, some financing, and oversight; subnational governments (*e.g.*, states or provinces) should coordinate planning and technical support as necessary; and local administrations should have primary responsibility for service delivery, whether directly, in partnership with civic or private organizations, or wholly contracted out.

One lesson of the past decade is that focusing on the development of this type of institutional arrangement as a prerequisite for increased financial flows to the sector has probably contributed to the slow rate of coverage expansion for W&S services. By contrast, an assumption underlying the typology presented here is that any community, situated in virtually any type of national institutional framework, can and should make progress in extending services in the immediate term. Recognizing what parts of this institutional framework are comparatively strong and capitalizing on them—even as the weaknesses of others are being recognized and strengthened—is an approach consistent with the 'learning by doing' perspective advocated by the Task Force.

As one example, the country of Peru is currently in the midst of two institutional changes that are very important for the water and sanitation sector: the creation of a national level Vice-Ministry of water and sanitation, and the devolution of W&S service delivery responsibilities to local administrations. The new Vice-Ministry has been working to develop a strategic plan that will guide its activities over the next several years, and various programs are being considered that will help build capacity in the country's weaker *municipalidades*. In the meanwhile, what can be done to help the several millions of Peruvians living in Type II and Type IV communities (villages and small towns with existing, but poorly functioning and/or underutilized W&S infrastructure) to gain sustained access to services?

One possible strategy might be to capitalize on the strong institutional presence that Peru's Ministry of Health has throughout the country. Rather than waiting for the Vice-Ministry of water and sanitation to establish regional offices and vet its strategic plan, perhaps W&S liaison persons could be placed in the field offices of the Ministry of Health who could (1) build on the credibility and rapport already established among communities, and (2) begin ground-level work on capacity building in local administrations to help improve the management of their deteriorating water and sewer networks. (This strategy might have the added benefit of helping to cultivate collaboration across sectoral agencies as well.)

For countries that have limited public institutional capacity beyond major metropolitan areas, partnerships with domestic or external NGOs, or even with private-sector consulting firms, can bring badly needed planning and management expertise to unserved communities. For example, such strategies have been used to expand access to W&S services in Indonesia's Kecamatan Development Program, which provides grants to villages within selected districts for infrastructure, economic, and social services projects that residents select and plan themselves. The project is administered through a large consulting firm which trains, deploys, and supervises facilitators and community organizers throughout the country. Similar experiences can be found in every region of the world, particularly in donor-assisted projects. Evaluations of these initiatives suggest, however, that care must be taken to avoid situations in which this 'short term'

solution for improving W&S service delivery becomes a permanent arrangement that fails to contribute to capacity building and development of local institutions.[30]

Civil society organizations can also play an important role where public institutions lack the capacity (or perhaps the interest) to extend W&S coverage to unserved communities. In India, for example, faith-based organizations have made important contributions in expanding services to poor communities, such as with the Ramakrishna Mission in the Medinipur Intensive Sanitation Project in West Bengal (see p. 15). In Pakistan, the Orangi Pilot Project has become one of the best known NGO initiatives in the provision of sanitation. In the 16 years since its inception, the project has directly and indirectly helped about one million urban dwellers to obtain access to improved sanitation services.[31] In Africa, partnerships between international and domestic NGOs—such as the collaboration between UK-based WaterAid and the Mozambican ESTAMOS Organização Communitaria—have brought improved water and sanitation to millions of previously unserved residents.

In sum, it is easier to generalize about the obstacles to expanding W&S coverage to unserved communities than it is about the kinds of institutional arrangements that should be pursued to overcome those obstacles. Public, civic, and private organizations may all be effective, as demonstrated by the diverse cases presented throughout this document. The lesson that emerges from these experiences is that taking stock of all available institutional resources that could be tapped in the quest to meet Target 10 is one essential component of national and sub-national planning for the MDG process.

Locus of decision-making authority

Despite the fact that institutional decentralization for public service delivery is proceeding to varying degrees in most countries around the world, many bottlenecks to extending water supply and sanitation coverage lie neither at the local level nor within the authority of service providers themselves. Chronic underinvestment in both construction and maintenance of W&S infrastructure, for example, is often the outcome of state or national budget processes in which water and sanitation is pitted against any number of competing claims for limited resources. Policies related to land tenure are also generally established at the state or national level, as are technical standards for water and sanitation systems and regulations governing the management of employees in public service agencies. One objective of the typology exercise is thus to identify not only constraints to expanding W&S coverage and possible strategies for overcoming them, but also to identify the individuals and institutions whose buy-in will be essential for success.

The process of identifying bottlenecks to extending W&S services can also help spur innovative ideas for dealing with long-standing obstacles. For example, in the state of Gujarat, India, for example, state policy prohibits the extension of public services such as water and sanitation to settlements on public land. The municipality corporation of Ahmedabad, however, launched an upgrading project in which communities situated on municipal land, or on land owned by an absentee landlord, were allowed to participate (while those on state land were not). In order to encourage community participation in the upgrading program, the municipal corporation offered

[30] See, for example, J. Edstrom (2002), "Indonesia's Kecamatan Development Project: Is It Replicable?" Environmentally and Socially Sustainable Development Network, Social Development Paper No. 39. Washington: The World Bank.

[31] See NGO profile: Orangi Pilot Project. *Environment and Urbanization* **7**(2): 227-236.

a virtual 10-year tenure guarantee. The guarantee does not confer an exchangeable deed to the slum resident; instead, the city commits itself to not initiating any action that would require the community's relocation for a period of ten years. Notably, it is unclear whether the municipal corporation can legally provide such a guarantee for land that is owned by either another branch of government or a private landholder. Both the city and slum residents appear willing to gamble on the policy, however, which has not been successfully challenged in court.

With respect to stringent technical standards that make the cost of improved water and sanitation services prohibitive, considerable experience now exists with the practice of piloting alternative technologies in an attempt to influence national standards for W&S infrastructure. In Bolivia, for example, the El Alto pilot project was the 'proving ground' for condominial sewerage that eventually led to the adoption of a national standard for this technology. Such successful experiences can also accelerate adoption of new, appropriate standards for other countries. Support for Bolivia's pilot was engendered in part by the successful implementation of condominial sewers in Brazil; the experience of both of these countries contributed to Peru's designating condominial sewerage as an appropriate sanitation technology for urban areas.[32]

The difficulty of tackling civil service reform—and, by extension, the incentives that staff of public water and sanitation agencies face—is a topic that has received considerable attention in the development literature in recent years. As with issues such as tenure, standards, and financing, managers of W&S agencies often feel impotent in their efforts to motivate staff toward customer responsive, pro-poor service delivery. Employees often have guaranteed positions and promotions based entirely upon seniority, which leaves managers with virtually no 'carrots and sticks' to influence behavior or performance. Yet even under these conditions, cases exist in which small investments (*e.g.*, in uniforms, training opportunities), partnerships with civic organizations, and public outreach through the media have had substantial impact on worker motivation and the relationship between W&S agencies and their customers.[33]

In sum, tracing the impediments to expanding W&S coverage to those actors and institutions with the power to remove them is important for ensuring that efforts and resources are directed at the true, often underlying, constraints to increased access. This exercise can also be valuable for identifying strategies that may not be apparent when viewing the coverage challenge from the perspective of the service provider alone.

VI. Summary and conclusions

Attaining the Millennium Development Goal Target 10 requires reliable information about the households and communities that lack access to improved water supply and sanitation. Achieving the target in a cost-effective manner requires, additionally, that resources be allocated toward resolving the binding constraints that prevent households from receiving improved services. Service providers, governments, and donor agencies all collect information on the number of unserved; however, few attempt to classify these households (beyond rough rural *versus* urban categories) in a way that provides insights about the key leverage points for progress in coverage expansion to occur.

[32] Additional information is available on the Water & Sanitation Program's condominial website: http://www.wsp.org/condominial/indexeng.html.
[33] See, for example, J. Davis *et al.*, 2004 (*op cit.*). See footnote 2.

The typology of unserved communities presented in this paper reflects both a concern among Task Force members for the dearth of systematic information about the households that lack access to improved W&S services, as well as the recognition that large-scale data collection activities are not feasible, nor necessary for the development of sound policy and planning advice for extending coverage. We know, for example, that across all six community types, unserved households tend to share two characteristics: they are poor, and they have limited 'voice' in priority-setting and resource allocation decisions (often because their collective-action institutions are weak or non-existent). Making progress in extending sustained access to water and sanitation services thus requires the mobilization and/or redistribution of resources, institutional capacity building, and the reorientation of policies such that basic service provision to the poor is prioritized, which are all recurrent themes in the W&S literature.

The typology exercise helps us to move beyond these general principles, however, by considering where limited time and resources should be concentrated (and, conversely, where particular strategies may have a high risk of failure). With a modest amount of information about the location and characteristics of unserved communities, strategies and action plans can be developed that better exploit local opportunities and address local constraints. Equally important, when designed as a collaborative exercise (as with the case described in Section IV), a typology assessment can bring often antagonistic stakeholders together in a process that promotes dialogue and mutual understanding, stimulates the development of innovative strategies, and brings the MDG Target 10 within reach.

Appendix A

The UNICEF-WHO Joint Monitoring Programme defines access to water supply and sanitation in terms of the types of technology and levels of service afforded. Access to water supply services is defined as the availability of at least 20 liters per person per day from an "improved" source within one kilometer of the user's dwelling. "Improved sources" are those which are likely to provide "safe" water such as household connections, boreholes, *etc*. (Table A-1). Unfortunately, the information currently available does not allow us to establish the relationship between access to safe water and access to improved sources.

Table A-1: Classification of water sources

Improved water sources	Unimproved water sources
Piped household connection	Unprotected well
Public standpipe	Unprotected spring
Borehole	Vendors
Protected dug well	Tanker trucks
Protected spring	
Rainwater collection	

Excreta disposal systems are considered adequate if they are private and if they separate human excreta from human contact (Table A-2).

Table A-2: Classification of sanitation facilities

Improved facilities	Unimproved facilities
Household sewer connection	Service/bucket latrines (with
Household toilet with septic tank	manual removal of excreta)
Pour-flush latrine	Shared or public latrines
Ventilated improved latrine	Open pit latrines
Simple pit latrine	

Additional information on the Joint Monitoring Programme's methodology can be found on line at http://www.wssinfo.org/en/122_definitions_en.html.