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# INVESTING IN WATER INFRASTRUCTURE:
## *Capital, Operations and Maintenance*

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# Summary

All countries face a growing funding gap as they try to keep up with the rehabilitation, operation, and maintenance of aging water infrastructures. New water systems must also be built to cope with growing populations, shifting consumption patterns, and a changing climate. In developing countries,[1] public and private investment has not kept up with demand for water infrastructure, which increases costs in the long-run. The financial crisis threatens to bring even more uncertainty to an already underfunded sector with inherently low capacity to attract investment.

Private investors prefer to work in middle-income countries where the risk is lower, leaving the poorest countries dependent on volatile public budgets and donor commitments. An estimated 75 percent of water investment in developing countries comes from public sources. Slower growth and lower tax revenues imply that donor commitments, public budgets, and household contributions are at risk of diminishing. As a result, the resources available must be maximized through reforms.

The overarching goal of water sector reform is to promote sustainable service delivery by incrementally moving the burden of infrastructure finance from the public sector to shared investment by the public and private sector. Under a national reform strategy, all stakeholders should participate in the reform cycle by adjusting their performance, and each will start at a different point in the cycle commensurate with existing challenges and capacities. Successful reform depends on strong leadership to coordinate a series of sometimes parallel and sometimes sequenced transformations.

Most countries can improve their financial control and ability to weather the current financial climate by helping utilities to move toward cost recovery and by improving public spending. From targeted subsidies to risk pooling and guarantees, public contributions lay the groundwork for sustainable water service delivery. Improving the way public funds are allocated and transferred will help governments leverage private finance in the long run. When supported by sound governance frameworks, these contributions can foster mutually beneficial partnerships between the public and private spheres that can help fill the financing gap. Public Expenditure Reviews and Results Based Financing

[1] Developing countries are defined here as low-income, low middle-income and upper middle-income countries with 2008 per capita GNI less than $12,275, as per the World Bank definition.

are two tools that countries can use to begin identifying their most egregious challenges and piloting more sector development programs that are driven by results.

The international donor community has an important role to play in brokering public-private collaboration and in promoting the consideration of greener planning so that the next generation of water infrastructure is lower maintenance, less expensive, and more efficient. Assessment of tradeoffs at the national level and across water using sectors can yield demand side interventions that are more cost-effective than new large-scale infrastructure. Such interventions can decrease the fiscal burden on poor countries.

# Introduction

This paper provides background information for development practitioners in the water and other infrastructure sectors. It outlines the major challenges related to financing the gap in global water infrastructure, including those systems that provide urban and rural water supply, and sanitation and irrigation services. Water infrastructure finance includes costs for capital works as well as the operations and maintenance costs that motivate sustainable service delivery.

The paper seeks to synthesize the extensive body of literature on this subject into a broad overview, providing some examples of the historical trends in financing, and taking lessons learned from developed to developing countries. Most of the published literature on this topic emphasizes the need for additional financial resources to respond to increasing demand for services. Furthermore, the studies are limited primarily to the water supply and sanitation sector and rely heavily on illustrating means of increasing private sector participation and private financing. In contrast, this paper defines new challenges in the wake of the recent global financial crisis and provides insight into improving the efficacy of water supply, sanitation, and irrigation infrastructure finance from public and private sources.

Given that in developing countries around 75 percent of investments in water are from public resources (loans, grants, technical assistance), this paper emphasizes the importance of efficiencies in the investment and monitoring of public spending. In many instances, additional financial resources will not necessarily result in increased access and better services, but efficiency improvements will reduce overall financing needs; a crucial factor in this era of financial insecurity.

Section 1 introduces the linkages between water infrastructure and growing global challenges, including food and energy security as well as climate change. Section 2 describes investment needs in the sector and details various traditional funding sources. Section 3 proposes a 5 step reform cycle for making better use of limited funding in the sector. Tools for making these improvements are outlined in Section 4. The paper concludes with Section 5, a summary of the challenges and recommendations for the way forward.

A summary version of this paper was published in the 4th edition of the *UN World Water Development Report* (WWDR4) in 2012.

Section 1

# Water in an Uncertain World

Adequate and well-maintained water infrastructure is a necessary condition for economic growth and poverty reduction. From water supply and sanitation to irrigation, flood control and hydropower, investments in water infrastructure need to keep up with global demand. New systems must be built for growing and urbanizing populations, changing consumption and income patterns, and food and energy security demands. At the same time, deteriorating structures require rehabilitation just to maintain current levels of service.

## Background

Research shows that limited access to infrastructure, including those that provide water and energy services, has substantial implications for the poor, ranging from ill health to child mortality (Fay et al. 2005). According to the World Health Organization (WHO), between 85 and 90 percent of diarrheal diseases in the developing world are caused by unsafe water, poor sanitation, and a lack of hygiene education (Pruss-Ustun et al. 2002). Women and girls benefit immensely from well-sustained water supply and sanitation services. For example, the provision of latrines in schools increases the enrollment of girls, and improvements in safe water sources frees women from spending hours every day drawing and carrying water home (WaterAid 2005). Thus, the Millennium Developments Goals (MDGs), with their emphasis on safe water, remain cornerstones of human and economic development.

Between 1990 and 2010 more than 2 billion people gained access to improved sources of drinking water, making drinking water one of the first MDG targets to be met. However, progress towards reaching the sanitation target has been discouraging. Though the number of people with access to improved sanitation rose from 43 percent in 1990 to 63 percent in 2010, in many developing countries, especially those in South Asia and sub-Saharan Africa, it has only reached 30 or 40 percent (UNICEF and WHO 2012).

Halving by 2015 the number of people without access to improved drinking water and sanitation is a necessary condition for reaching other targets, including poverty reduction. Furthermore, providing the right quantity and quality of water for food and energy production will promote economic growth and stability. As a critical input in production and in services, water is directly affected by the current global financial, energy, and food crises (Winpenny et al. 2009).

## Financial Crisis

According to the *Global Monitoring Report 2010: MDGs after the Crisis*, the global financial crisis increased the number of people living in extreme poverty by an estimated 50 million in 2009. An additional 64 million people were more likely to fall into extreme poverty by the end of year the report was published (2010). The report's worst-case scenario projects that an additional 100 million people may lose access to drinking water by 2015 (see Box 1).

Winpenny et al. (2009) highlights the specific impacts of the crisis on various sources of funding. Public resources are more limited and tariff revenues fall as poverty deepens, weakening the financial position of utilities, and decreasing their ability to access private finance (i.e. loans, bonds and equity). As predicted, private investment (stocks, bonds and project finance) in the water infrastructure and services of developing countries has taken a hit since 2008.

In response, international financial institutions (IFIs) have made a renewed commitment to increase assistance to the water sector to offset these changes. These institutions play a key role in mitigating the risks associated with the financial and other crises. IFI commitment to preventing more people from falling into poverty has resulted in more technical assistance, grants, and loans in water. For example, the World Bank Group committed more than US$100[2] billion in 2009 to help countries who had cut spending in services during previous crises to maintain and expand infrastructure. The new funds include a $10 billion Infrastructure Crisis Facility to manage short-term liquidity problems in private systems, and the Infrastructure Recovery and Assets Platform, which will provide an additional $15 billion to many sectors, including water. However, the ability of IFIs to follow through on their commitments is uncertain because it depends on future impacts of the financial crisis on the economies of their donors. Across all sectors, development assistance fell by 3 percent in 2011, which was the first major drop since 1997.

[2] Unless otherwise noted, all values are in current US dollars.

## Climate Crisis

Just as public and private financial flows to the sector are dwindling, climate change is providing another set of economic challenges. More people are experiencing droughts and floods that impact water quantity and quality. The Intergovernmental Panel on Climate Change (IPCC) expects serious shortages of water in semi-arid regions, which will result in an increase in the frequency of droughts (Bates et al. 2008). These changes in the spatial and temporal pattern of water availability make planning for future water supply more challenging. Projecting changes in runoff and streamflow is complex and laden with uncertainty. Incorporating those changes into the hydrologic design of water resources projects and making real investment decisions is even more difficult.

Yet, because the macroeconomic impacts are considerable, countries cannot afford to ignore hydrological variability. Extreme water events affect almost everyone, but the poor suffer the most because of their locations, low incomes, insufficient infrastructure, and greater reliance on climate-sensitive sectors like agriculture. For example, during a three year period, Kenya was hit but an extreme flood that cost its economy 16 percent of gross domestic product (GDP), and by an extreme drought that cost 11 percent of GDP (World Bank 2004a). These dramatic losses will only be exacerbated by poor water management.

Adapting to these changes may require substantial investments in infrastructure and will

### Box 1: The Impact of the Financial Crisis on Access to Improved Water Supply Sources: Three Alternative Scenarios

The Global Monitoring Report 2010 created three possible scenarios to analyze the effects that the financial crisis would have on gross domestic product (GDP) growth in developing countries: the post-crisis trend, the pre-crisis (high growth) trend and the low growth scenario. These were used in projecting the percentage of the population in developing countries who would not have access to improved water sources.

The post-crisis scenario shows the effects on GDP assuming a relatively rapid economic recovery starting in 2010. This is the report's base case forecast.

The pre-crisis (high growth) scenario shows what the effects on GDP would have been had developing countries continued the impressive growth pattern that occurred between 2000 and 2007. The impact that the crisis had on the MDGs can thus be measured by comparing the post-crisis trend with the pre-crisis trend.

The low growth scenario assumes that the things that got worse because of the financial crisis will continue to adversely affect GDP in the medium term, resulting in little or no growth for about five years, followed by a slow recovery.

| | Percent of population without access to improved water source | | | | | |
|---|---|---|---|---|---|---|
| | 2015 Target | 1990 | 2006 | 2015 Estimate | | |
| Region | | | | Post-Crisis | Pre-Crisis (High Growth) | Low Growth |
| East Asia and Pacific | 16 | 32 | 13 | 3.3 | 0.6 | 4.1 |
| Europe and Central Asia | 5 | 10 | 5 | 0 | 0 | 1.8 |
| Latin America and the Caribbean | 8 | 16 | 9 | 5.4 | 4.5 | 7.1 |
| Middle East and North Africa | 6 | 11 | 12 | 8.3 | 7.4 | 10 |
| South Asia | 13 | 27 | 13 | 9.3 | 5.1 | 10.2 |
| Sub-Saharan Africa | 26 | 51 | 42 | 39.1 | 38.8 | 39.8 |
| All developing countries | 12 | 24 | 14 | 10.1 | 9.6 | 11 |

*Source:* World Bank (2010a).

depend on the capacity and resources available in each country. In order to adapt the water resources sector to climate change, the developing nations would need between $13 and $17 billion annually. This amount would only cover hard infrastructure for water supply and riverine flood protection (World Bank 2010b). Extreme variability could stretch the infrastructure and institutional limits of systems that manage water across sectors and even national boundaries (Alavian et al. 2009). To meet demand in water scarce regions, countries will need to look to more innovative and more expensive infrastructure, such as wastewater reuse, and the desalination of brackish aquifers for drinking water.

## Food Crisis

The food crisis is a result of population growth, economic growth, water variability, and the surge in energy prices. These combine to put upward pressure on food prices in the short term, pushing more people below the poverty line. With the

global population estimated to increase to 9 billion by 2050, Hanjra and Qureshi (2010) estimate a 3,300 $km^3$ per year water gap for food production.

Producing more food will require sustainable water management systems that use water more productively. Rosegrant et al. (2002) predicts a severe food crisis by 2025 unless fundamental policy changes are made that alter future water use. If current water policies deteriorate further, such as declining public investment in water infrastructure, 2025 prices for staple crops, like rice and wheat, could be double 1995 levels. Higher prices would lower demand for food in the long run, with a damaging affect on nutrition. However, new investments in irrigation infrastructure and improvements in water productivity can minimize the impact of water scarcity and partially meet water demands for food production (Falkenmark and Molden 2008).

## Energy Shocks and the Green Response

The spike in energy prices between 2003 and 2008 had an impact on the cost of water service delivery in most countries. Most directly, higher energy prices increase the cost of pumping water for treatment and conveyance, but they also have an indirect impact on building infrastructure by making inputs more expensive. Energy demand has fallen as a result of the financial crisis but is expected to rebound as the economy recovers, with developing countries making up 90 percent of the demand by 2020 (McKinsey and Company 2009). Thus, service providers will remain subject to variable, and probably higher, costs for energy inputs. Beyond the cost, the interplay between water and energy is about to get much more complicated.

At the global level, changes in temperature and precipitation will have an impact on energy supplies, which will subsequently affect water use and water costs. First, mitigation policies may require a shift in energy production modalities, from conventional power plants to renewable energy facilities, which can require even more water to generate electricity. Integrating water considerations into low-carbon planning will be essential. Such a shift could also reduce local energy supplies in the short run and increase the price of energy for all, including pumping for irrigation and the cost to treat and deliver water services to end users. Second, the generation potential of hydropower (one such renewable resource), will become unpredictable as rainfall patterns shift.

A green economy agenda is being promoted across developed and developing countries alike to address these challenges. The aim is to transform the way countries do business, including the planning and design of new infrastructure. A green economy would rely on fit-for-purpose infrastructure that makes more efficient use of natural resources. For example, combining physical and natural capital can save costs and help cities guard against natural disasters. Multipurpose projects that deliver benefits to water users, farmers, and energy producers can likewise help countries cope with low water levels during droughts and share risks and benefits across sectors.

The green economy presents both a challenge for improving the design of our water infrastructure and an opportunity to reverse the trend of over-consumption. Estache (forthcoming) argues that low access to water services has further degraded natural resources (for example, people without adequate sanitation pollute aquifers). At the same time, those without access have a unique advantage: they do not face the opportunity cost of rehabilitating existing infrastructure in lieu of using a new, greener technology. In other words, developing countries have an economic advantage in pioneering

green growth strategies. More developed countries, on the other hand, will face a larger cost in switching from old infrastructure to new, more efficient technologies.

But for all countries, green growth will come at a cost. For example, Korea's National Strategy for Green Growth and its Five Year Plan (2009–2013) is expected to cost 2 percent of GDP (OECD 2011a). Estache estimates the cost of greening infrastructure at an additional 20 percent of current sector investment needs for the poorest countries.

Fostering green investment in developing countries will require strong incentives including expanding funding, enhancing political will, establishing a well-defined institutional and regulatory framework and more importantly, initiating policy reforms that would reduce harmful subsidies across and within sectors. It is also critical to increase global environmental research and development (R&D), facilitate technology transfer for clean technologies, and design proper incentive structures that solicit optimal behavioral responses.

Section 2

# Investment Needs and Funding Sources

Water services provide important economic, health, and environmental benefits but are severely underfunded on a global scale. Funding sources, from private investment to utility revenues and public expenditures, have been inadequate to meet past needs and are becoming scarcer as a result of the financial crisis. Nevertheless, investment needs in the sector are large and increasing alongside population growth and urbanization.

The financing gap for water, sanitation, and irrigation infrastructure is difficult to estimate, but approximating future costs will help countries and donors activate more funding and help financiers understand the potential market for private investment.

Fay et al. (2010) asserts that a thorough analysis of investment needs requires four distinct steps:

1. Understand how much is being spent and how that relates to current quantity and quality of infrastructure.
2. Set a target and have it priced. The infrastructure gap is the difference between current spending and the target.
3. Determine how much of the gap can be bridged through improved efficiency.
4. Look at the balance to see the needed additional spending (financing gap).

There are difficulties in each of the four steps. Countries and financial institutions do not account for infrastructure investment in a clear way in national accounts, and inefficiencies in the system are difficult to estimate. Much more information is available on recent capital expenditures than on existing infrastructure stocks. This paper uses estimates from a variety of data sources, and focuses on information related to sub-Saharan Africa, which is a priority region for water infrastructure finance and for which recent data and analysis is available.

## Global Investment Needs

The OECD (2012b) estimates that by 2025 water will make up the lion's share of global infrastructure investment. For just the OECD countries and Russia, China, India, and Brazil, water spending will

top $1 trillion that year, nearly triple the amounts needed for investments in electricity or transport.[3] For developing countries alone, an estimated $103 billion per year is needed to finance water, sanitation, and wastewater treatment through 2015 (Yepes 2008).[4]

In general, low-income countries need to and do invest more (about 70 percent of sector spending) on capital works to reach a larger segment of the population. In contrast, investments in middle-income countries focus on the operation and maintenance of existing infrastructure (about 80 percent of sector spending) to achieve sustainable service delivery (Banerjee and Morella 2011).

The only comprehensive estimate for water investment needs at the regional level is the Africa Infrastructure Country Diagnostic (AICD). The AICD estimates that to close the infrastructure gap in water supply and sanitation (WSS) and meet the corresponding MDG targets in Africa within 10 years, annual investment of approximately $22 billion, equal to 2.58 percent of GDP, is required. Nearly $15 billion of this is needed for capital expenditure, and the remaining $7 billion for operational expenditures. In irrigation, the study estimates that it will take $3.4 billion per year to attain the region's goal of doubling the amount of land under irrigation, with 85 percent of the total going to capital works (Foster and Briceño-Garmendia 2010).

## Funding Sources

Funding for water infrastructure is mostly paid for by current or future water users or current or future taxpayers (including taxpayers in donor countries). Public sector contributions comprise government tax revenues and official development assistance (ODA), while the private sector contributes in the form of private debt or credit financing and individual household investments.

While private sector contributions follow general market principles, public sector contributions generally seek to promote specific policy objectives, and are therefore provided free of charge or offered at below market rates. Donors and governments often try to promote equal access to water infrastructure and its services. As a result, their intent is to fund infrastructure for populations that otherwise cannot access private finance. In this regard, the two types of funding target different geographic or social spheres.

### Public Contributions

A lack of centralized and reliable information makes it challenging to estimate current public funding to the water sector. Winpenny (2003) estimates that the public sector contributes approximately 75 percent of total water supply and sanitation infrastructure costs.[5] Public contributions include external donor funding and central and local government budgets.

#### *Official Development Assistance (ODA)*

Official development assistance (ODA) includes grants, low interest loans, and technical assistance from donors and international financial institutions to developing countries. According to the Development Assistance Committee (DAC) of the OECD, ODA for water and sanitation has been rising sharply, from average annual commitments in 2002–2003 of $3.3 billion to $8.3 billion in 2009–2010 (last period reported by

[3] The electricity and transport figures are global. The water figure only includes OECD countries and the BRIC 5.
[4] The estimate includes low-income and low- to middle-income countries. Analysis is based on a "top-down approach of using data on infrastructure services and parameters for construction and maintenance costs to model investment needs." (Yepes 2008).
[5] In the mid-1990s, the sector's financial sources were estimated to be as follows: domestic public sector 65–70 percent, domestic private sector 5 percent, international donors 10–15 percent and international private companies 10–15 percent.

DAC). ODA is a key funding mechanism, especially for countries with low public tax revenues to spend on sector investments and/or that are unable to attract private finance. A recent study of 15 countries in sub-Saharan Africa showed that donors contribute around 60 percent of total sector spending (Van Ginneken el al. 2011).

Over the period 2009–2010, aid to water and sanitation primarily targeted regions most in need of improved access. Thus, sub-Saharan Africa received 26 percent of total aid to the sector, and South and Central Asia received 21 percent. In contrast, at the country level, only 40 percent of total funds were given to the poorest countries (OECD 2012a). Nonetheless, for poor countries with sufficient institutional capacity (low income, non-fragile), ODA still comprises the majority of all sector finance, at 0.7 percent of GDP (Banerjee and Morella 2011).

While donors play a large role in service delivery, they also pose obstacles to sustainability. Water infrastructure requires long-term investment, yet donor funds fluctuate between years and are often committed on a project basis.[6] This inconsistency is due to the nature of development assistance, which is often granted in accordance with specific policy objectives, political environments, and recipient country capacities, all of which are subject to extreme variation from year to year.

Donors, however, also provide high value technical assistance to regulators and service providers to improve technical, management, and administrative capacities. Technical assistance is generally paid through grants or the grant components of low interest loans, and can be extremely valuable for improving local institutional capacity to carry out policy reform, execute budgets, manage finances, and design and implement service and infrastructure improvements.

About half of ODA to water supply and sanitation is in the form of loans rather than grants and the financial crisis impacts the ability of IFIs and other donors to finance their loans through capital markets. As borrowing costs increase for these lenders, it may become more difficult for them to lend money at affordable terms or to provide grants to developing countries (OECD 2011b). In fact, in 2011, in the aftermath of the global recession, total ODA to all sectors fell by 3 percent.

### *Public Expenditure*

Sovereign and sub-sovereign governments budget funds to be transferred to local governments to pay for the provision of water services on an annual basis. These fiscal transfers are made possible by tax revenues and can come in the form of cash payments, grants, subsidies or guarantees. Local governments themselves can also provide tax revenues to water service providers. These local contributions are considered public expenditures, and do not include revenues paid directly to service providers by their customers.

While funding needs for the water supply and sanitation sub-sector average an estimated 2.58 percent of GDP per country in sub-Saharan Africa, countries often spend much less. A study of 15 countries in the region showed that, on average, they committed 2 percent of their national budget to WSS. However, a 2008 sample of countries showed that only 66 percent of the domestic WSS budget was executed, and on average, expenditures between 2000 and 2008 were equivalent to about 0.32 percent of GDP (Van Ginneken et al. 2011).[7]

The majority of public expenditure goes to urban areas to the detriment of rural populations. Many countries have passed decentralization

[6] In 2010, for example, 76 percent of ODA in WSS was provided on a project basis.

[7] Includes central and local government expenditures on domestic resources and grants or loans from external funding agencies.

laws in an attempt to give rural communities authority over planning and implementation of their own service delivery systems. In reality, decentralization policies have left many local governments without sufficient funding from central governments to carry out their mandate.

The lack of funding has important implications for countries with large rural populations. In Mozambique, for example, where two-thirds of the population is rural, only 12 percent of the WSS budget is spent outside of cities. Similarly, while $18 million was budgeted for WSS in Mali between 2000 and 2006, only $250,000 or one-tenth of one percent of the budget was transferred to subnational governments. Each of the nine regional offices mandated to provide rural water services received only 22 percent of their recurrent cost budget (excluding salaries) from the central government (Van Ginneken et al. 2011).

## Private Contributions

Like public funding, private investment is also difficult to track as there are various types of finance (debt, equity, project finance, microfinance) and no source that provides comprehensive data on all private funds. This paper uses information from the Private Participation in Infrastructure (PPI) database managed by the World Bank.[8]

### *Private Sector Participation*

Over the last 10 years, private activity[9] in the water sector in developing countries has averaged $2.5 billion annually, or about 3 percent of the investments needed for water supply and sanitation. This is a drastic decline from the decade leading up to 2000 which saw several large private contracts in treatment infrastructure and utility management, averaging $3.7 billion per year, and sometimes totaling up to $14 billion per year when new and existing private activity is included (See Figure 1).

The total value of private activity fell from $58 billion in the decade of the 1990s to $29 billion between 2001 and 2010. The decline in private investment was possibly caused by two factors: a paradigm shift in investment and the financial crisis. The paradigm shift resulted in more investments with smaller values. For example, in 1997, the median capacity of a new treatment plant with private investment was 300 cubic meters per day and by 2010 it had dropped to 40 cubic meters per day (Perard 2012). At the same time, and perhaps for similar reasons, funding dried up during the financial crisis: the number of new projects opening peaked in 2007, and had fallen by two thirds by 2010 (see Figure 2). Furthermore, the financial crisis limited the amount of financing available and lenders became less tolerant of risky investments, water being one of them.

Along with the decrease in overall investment, lending has become more concentrated, both in terms of where money goes and which countries it comes from. Since 2001, the top 20 sponsors (countries investing) have provided 46 percent of private investment. The majority of funds go to China, Latin America, and the Middle East and North Africa. There has been no private activity in Europe and Central Asia or Africa since 2008 and in South Asia since 2010.

In 2011, the most recent year reported by PPI, there was an 8.3 percent increase in lending and 24 percent more projects than the previous year. However, the increase again showed high concentrations in both the regions where

[8] The Private Participation in Infrastructure (PPI) database provides information on 6,000 infrastructure projects dating from 1984 to 2010, owned or managed by energy, telecommunications, transport, or water companies.

[9] Private activity is any large scale private investment in water and wastewater infrastructure or its management. This includes a variety of contract types carrying varying degrees of risk for the private investor or private operator, including concessions, divestitures, greenfield projects, and management and lease contracts.

projects are implemented, and the sponsors providing the investments. China was the largest sponsor of private activity in the world in 2011, mostly investing in domestic treatment plants, and Mexico and Spain were heavily involved in several projects throughout Latin America, providing about a third of all investment.

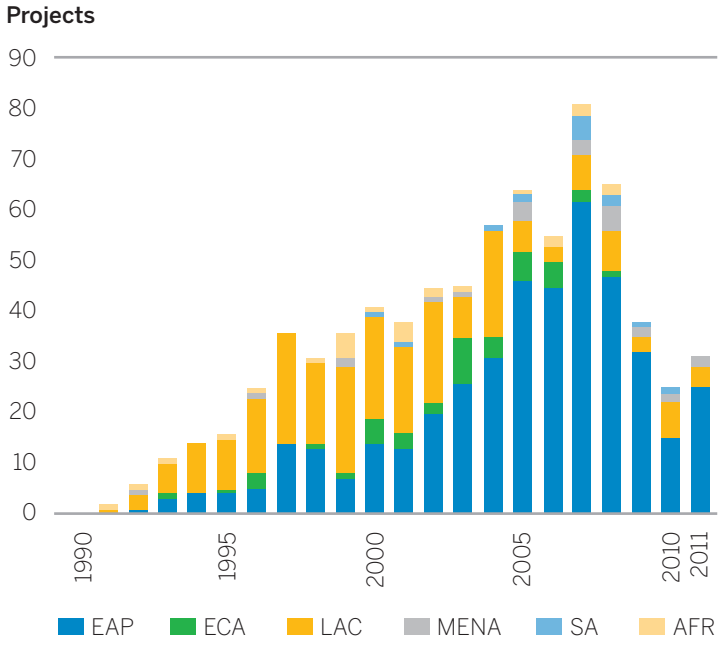
Overall, private participation in water is concentrated in a handful of projects in middle-income countries. Compared to other infrastructure sectors (energy, telecom, and transport), the water sector represents just 1 percent of total private investment in developing countries. Moreover, private participation is coming more often from domestic, rather than international sources. Jimenez and Perez-Foguet (2009) estimate that the portion of private international flows to water supply and sanitation fell by 6 percent between 1995 and 2005, while local private flows expanded by 10 percent. This trend is expected to continue following the global financial crisis.

### *Private Equity*

The recent financial crisis has also kept investors from purchasing equity in water companies. Over the course of 2008, an index of Asian water stocks dropped by 47.5 percent (OECD 2011b). That same year, the OECD reported that developing country water companies, such as Maynilad in the Philippines and Nova Cerae in Brazil, had to postpone their initial public offerings due to poor market conditions.

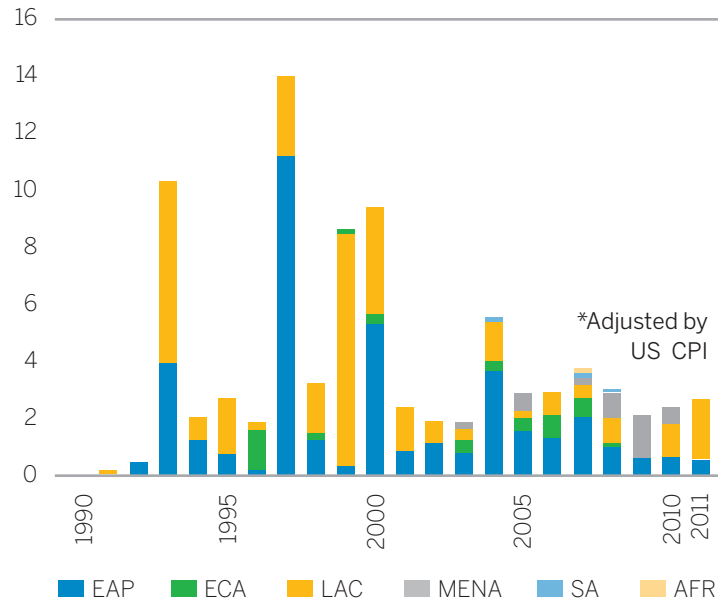
Uncertainty about the future supply of water resources and changes in demand may make investors even more apprehensive about investing in water infrastructure. A 2010 study by Water Asset Management (a global equity investor in public and private water-related companies and assets) and the non-profit organization Ceres estimated the risk to six US water utilities resulting from changes in water availability through 2030 (Leurig 2010). The report informs municipal

**Figure 1: Investment Commitments in Water Projects in Developing Countries by Region, 1990–2011**




*Source:* World Bank and PPIAF
Reproduced from Militaru 2012.

**Figure 2: Water Projects with Private Participation, by Region, 1990–2011**




*Source:* World Bank and PPIAF
Reproduced from Militaru 2012.

bond investors of the potential risks to utility performance associated with changes in hydrologic variability. These risks are not currently reflected in the bond ratings issued by the three largest ratings agencies. Ceres suggests that ratings agencies endorse over-use of water by rewarding utilities that sell more water (and attain higher revenues) despite very real supply constraints in the medium term.

For example, large populations in Arizona and Nevada rely on Lake Mead as a primary water source, but a decade-long drought is reducing available supplies. On the other side of the country, the city of Atlanta may have to reduce supplies by 40 percent as a result of a new judicial order to make more water available for environmental services. While each utility has a different capacity to manage such risks, their ability to attract financing remains more or less unscathed because these issues go unreported. Ceres' analysis sheds light on the real need to factor climate risks and uncertainty into long-term planning, financing and tariff adjustments, as part of comprehensive adaptation plans. For developing countries, failure to address the uncertainty of water supplies today will only exacerbate risks and curtail effective service delivery for the generations to come.

### *Households, Geography and the Poor*

There are large disparities in funding for water sector investments, resulting in lower access rates for water supply and sanitation in rural areas than in urban areas. Public spending exacerbates the rift between urban and rural service levels, as more money goes to capital cities than rural areas or peri-urban slums.

In places where rural water and sanitation services are not provided through public funding, households purchase what they need in the private market, often paying much higher prices than the relatively wealthier customers of public water and wastewater utilities. There are large consumer and producer surpluses and large government revenues to be gained by the formalization of these private water providers, or the conversion of their services into piped networks and household connections, where economies of scale can be achieved.

Household contributions to water and sanitation infrastructure (i.e. toilets, septic tanks) are also not well documented, but are a large portion of overall investment. Four countries responding to the 2012 Global Analysis and Assessment of Sanitation and Drinking Water (GLAAS) survey reported that household contributions were between one-third and two-thirds of all sector funding. Another source puts household contributions in sub-Saharan Africa closer to one-third of all sector funding, at 0.3 percent of GDP (Banerjee and Morella 2011).

Urban slums receive similarly low levels of public investment. Unlike rural areas, however, slum dwellers do not own the land on which they live and thus do not qualify for access to services. Moreover, if these residents want to purchase WSS services from private providers the dense layout of slums can be an obstacle for building below ground infrastructure such as septic tanks or water pipes.

Section 3

# Financing the Gap

Developing countries need to invest around $103 billion a year to meet sector demands in WSS, on top of the estimated $15 billion needed for climate change adaptation measures. The financial crisis has reduced the amount of money available from both private and public sources and may continue to do so. Countries need to make use of all available resources through more efficient and effective combinations of funding. Each stakeholder, from service providers to regulators and central governments, has a role to play in securing long-term sector finance. Each should bring its contributions to the table to leverage the resources of the others.

## Barriers to Sector Finance

In an ideal world, service providers would recover their costs and remain in a healthy financial position to provide sustainable services in the long run. This would be done by attracting capital from the private sector to make needed investments, and generating sufficient revenue from users to service loans and pay recurring costs.

In reality, this rarely happens because the water sector faces several inherent challenges that restrain private investment in its infrastructure and services. Potential investors perceive many risks in the delivery of water supply, sanitation and irrigation services. First, water is a politicized commodity that is considered a public good on one hand and a high-value economic input on the other. To reach health, economic, poverty or other goals, governments could change water policies and plans at any given moment. Future water policies (whether wastewater has to be treated or drinking water has to be paid for) are uncertain, and tariff levels are subject to political interference.

Second, many utilities in developing countries have sub-par operational management. For example, assets are not inventoried, the location of pipe networks is not fully known, and the current and future customer base is undocumented. This makes it very difficult to estimate costs and revenues or design long-term business plans. Given the lack of information and the potential lack of control over price setting, local governments and providers do not have credit ratings that investors can use to estimate risk.

Finally, most water infrastructure is built for a service period of around 20 years. This means that the upfront costs are large and the repayment periods are long, making them unfavorable to commercial lenders. Thus, even when trying to attract finance on a project basis, providers have difficulty

making the case to financiers that theirs is a "bankable" project. The rate at which they could borrow on the private market is too high given the tariff rates they can charge and the inherent risks of the sector.

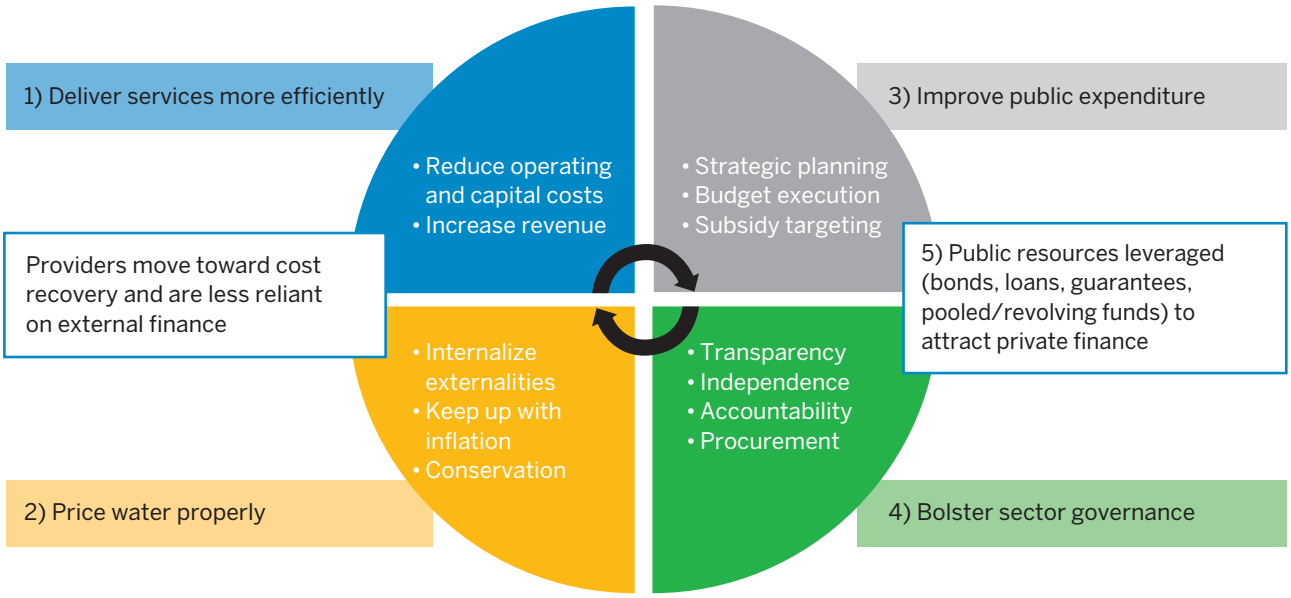
## The Reform Cycle

This section proposes a five part reform cycle to address these unique water challenges in an effort to narrow the financing gap (see Figure 3). The reform cycle should be used as part of an overarching sector plan that incorporates the needs of all sector stakeholders. The agenda is a circular process, meaning that a stakeholder can enter at any of the steps depending on the existing conditions in a given service area. The parts are like moving pieces that require the cooperation of various stakeholders, and as such, some reform steps can be implemented in parallel with others. The majority of successful reform cases in the water sector have been the result of long-term restructuring of sector institutions, policies and incentives, supported by strong leadership.

The reform cycle has five parts:

1. Service providers deliver services more efficiently: Service providers must reduce a range of inefficiencies to increase revenues and lower costs. In the case of new infrastructure, this includes selecting the appropriate technology (given existing operational capacity and regulatory environment) that is affordable to maintain.
2. Regulators price water properly: Governments must recognize that water services will be most sustainable when treated as an economic good. Regulatory agencies should consider financial, resource, and environmental costs when pricing water so that the resource is conserved for long-term growth. Environmental costs should be progressively incorporated based on the improvement in the provision of services.
3. Governments improve public expenditure: Governments have an important role to play in correcting market failures to improve access and equity across

**Figure 3: The Reform Cycle**



income groups. Subsidies can be better targeted by making them more explicit and tied to policy objectives. Budget transfers can be more predictable, more strategic, and better executed.

4. All stakeholders work to improve sector and corporate governance. This requires a sound framework for interaction among stakeholders including roles and responsibilities as well as separation between policy formulation and service delivery.
5. Governments and donors leverage resources to crowd in private investment. In line with their political and institutional capacity, governments should pool risk and funding needs across local governments to help them access private markets at lower rates. The implicit subsidies garnered from municipal bonds and concessional loans can be better targeted. Donors can continue to provide guarantees and other risk mitigation instruments.

## Service Providers: Deliver Services More Efficiently

Inefficiencies in water provision come in many different guises and can cause low water productivity, high rates of drinking water consumption, and increased flows of wastewater that need to be collected and treated. Beato and Vives (2008) argue that removing technical inefficiencies (water losses) and managerial inefficiencies (in metering, billing and collections, asset management, corruption) can generate resources, enhance profits, and reduce the need for new investments. These inefficiencies act as an implicit subsidy that must be gradually removed as long as the marginal benefits to efficiency gains exceed the marginal costs of their implementation.

In Africa alone, water utilities loose approximately $1 billion a year due to operating inefficiencies associated with poor maintenance, overstaffing, high distribution losses, and under-collection of revenues (Foster and Briceño-Garmendia 2010). The AICD concludes that Africa's resources would go considerably further if various inefficiencies (amounting to $2.7 billion a year) could be addressed.

Reducing non-revenue water, improving billing and collections, and selecting the right technology are three of the most important efficiency improvements that any service provider can make. All of these are mechanisms for "greening" existing infrastructure, which at the same time free up more revenue to be used for rehabilitation or to expand capital outlays. These reforms, however, should be conducted as part of a long-term improvement plan that considers undertaking the other four steps of the reform cycle in order to ensure the sustainable delivery of service.

While non-revenue water (NRW), billing and collections of tariffs, and technology choice can have catalytic impacts on cost recovery, there are many other efficiency factors in the management and operations of a service provider. When planning for costs savings, it is important to unbundle the source of inefficiencies to determine which ones are the most costly and, hence, make the most sense to tackle.

### *Non-Revenue Water (NRW)*

Non-revenue water is one of the largest sources of inefficiency in water utilities (see Box 2). Almost $14 billion is wasted each year in lost revenue. This includes, in developing countries, an estimated 45 million $m^3$ of treated water that physically leaks daily from urban water supply systems and another 30 million $m^3$ that is delivered to consumers but is not billed due to pilferage, corruption, and poor metering (Kingdom et al. 2006).

An estimated 40–50 percent of the water produced for delivery in developing countries is lost as NRW (Kingdom et al. 2006). The benefits from reducing non-revenue water are obvious; utilities in these countries urgently need

### Box 2: Reducing Non-Revenue Water in Brazil

Inaccurate metering, unauthorized consumption, and leakages all result in non-revenue water. NRW reductions should be considered within the broader context of utility reform in order to ensure that appropriate funds and resources are allocated. The full scope of the problem should be identified at the onset by characterizing the sources of NRW through a baseline assessment.

The private sector has much to offer in devising and implementing solutions for different NRW challenges. Private players can develop new technology and provide investments and incentives for project performance. Options range from delegated management under public private partnership (PPP) contracts, to technical assistance contracts and outsourcing of key utility functions to improve performance.

Under a performance-based services contract, a private firm's remuneration is based on enforced operational performance measures. This strategy was adopted by the Companhia de Saneamento Básico do São Paulo (SABEP), the water utility that serves the São Paulo Metropolitan Region in Brazil. The private contractor assisted the utility in improving the production and delivery of water through activities such as better micro metering. This increased revenues and reduced the debt load. The outcome of the 3-year contract led to an increase in total volume of metered consumption by 45 million $m^3$ and a revenue increase of $72 million.

*Source:* Kingdom et al. (2006)

additional revenues to finance expansion and to ameliorate intermittent supplies and poor water quality. But such programs require strong institutional capacity and substantial financial resources. Reducing NRW is not only a technical issue. If water tariffs are too low, the costs related to reducing NRW may exceed the benefits of saving water, as any water "saved" can only be sold at very low costs.

#### *Billing and Collections*

Improving billing and collections goes beyond delivering invoices. Transferring management of billing and collections to a service provider that has financial autonomy will give the provider a direct financial link to the users, who can leverage that relationship to demand better services. In an irrigation scheme in Awati, China, for example, tying staff salaries to the fee collection rate resulted in a 98 percent collection rate. In contrast, government managed irrigation schemes in Nepal, where water fees were provided to the national treasury rather than the entity charged with system maintenance, achieved a collection rate less than 30 percent (Easter and Liu 2005). Moreover, when local or regional government is the payee some users, such as public entities or other politically connected enterprises, could get preferential treatment for their water bill.

Autonomous organizations that have strong user participation and are transparent in the way they set water charges are more likely to achieve high collection rates. The case of the Kyrgyz Republic demonstrates how when water user associations collectively pay for shared infrastructure investments in irrigation, service delivery and subsequent farm output improve, creating a virtuous cycle of paying for and receiving good quality water services (see Box 3).

Another key to collections is the ability of the service provider to disconnect non-paying customers as an incentive to pay. Tolerance of arrears in customer payments or low collection rates act as an implicit tax on utilities. Likewise, tolerance of pilferage is an implicit subsidy to consumers. These policies reduce the revenue

needed to carry out maintenance or invest in new infrastructure. Forty years of experience in Cote d'Ivoire has shown that a policy of disconnecting when in arrears, and quickly re-connecting after bills were settled led to a 98 percent collection rate from residential users (McPhail et al. 2012).

### *Technology Choice*

Technology choice has a significant impact on the cost of capital expenditures as well as long-run operations and maintenance costs. Moreover, as stated in the World Bank's *Inclusive Green Growth* report, "Infrastructure choices have long-lived and difficult-to-reverse impacts on the carbon, land and water intensity of future patterns of development" (World Bank 2012). Where water infrastructure is built, industry and populations tend to follow. That is why the decision to use one technology over another can have implications for several generations of water users, and requires consideration of social, financial, and environmental costs.

The cost of supplying water and sanitation services varies widely with the level of service provided, especially in rural areas where population densities are lower and transport costs are higher. These large cost differentials, coupled with the fact that an expensive, high-quality service is likely to be used only by richer consumers, offer a rationale for providing a minimum level of service to consumers. This means, for example, constructing standposts in lieu of household water connections, or improved latrines in lieu of septic tanks. If such a minimum service level strategy is used, overall spending needs for low-income, non-fragile countries in Africa could drop by nearly 3 percent of GDP, and could reduce the funding gap for the whole of sub-Saharan Africa by 64 percent (Banerjee and Morella 2011).

Technology can also be transformational in filling the water gap for a green economy (see Box 4). While new treatment systems and dams can supply more water, there are a variety of lower-cost, and often greener, options for managing demand. For example, large quantities of water can be saved in India through the use of more drip irrigation technologies in order to avoid the exploitation of new raw water sources. But this can only be achieved as long as the agricultural frontier is not expanded, which could lead to an increase in water use. This demonstrates the complexity and linkages of policies that span one sector. In China, industrial water reuse could save water and reduce the need to build expensive conveyance systems.

Many of these technologies already exist and are in use in developing countries. Service providers, donors and governments should analyze the costs and benefits of new and different technologies, and promote better alternatives to conventional water infrastructure where sensible. This can be difficult in countries where procurement rules prevent entry of new engineering and construction firms, where sourcing new materials is cost prohibitive, or where technical capacities exist for only a limited number of technologies. Many countries also face corruption and nepotism challenges given historical ties between politicians and suppliers and developers of infrastructure and services. Improved governance and transparency in procurement, and in some cases reform of procurement rules, will be required to enable the use of new solutions (technologies, design, and management) for water infrastructure.

### *Managing Uncertainty*

As shown in Box 4, demand management measures can help service providers achieve efficiencies at low cost in the short term. These improvements can have the added benefit of making utilities more resilient to the impacts of climate change. However, without such planned efficiency improvements, some utilities have to resort to ad hoc measures, like rationing water or interrupting service when faced with a disaster. According to a 2010 study, this can alienate

customers, reduce revenue, and increase costs. The study, *Climate Change and Urban Utilities: Challenges and Opportunities*, provides survey data from 20 large water utilities around the world. It shows that while utility managers are concerned about decreased surface water availability and water quality, and would prefer not to take ad hoc measures, they also lack the resources needed to integrate climate change into their planning (Danilenko et al. 2010).

Utilities need to take a long-term approach to climate change, which often requires supply side measures as well as demand management. Adapting to these changes requires planning infrastructure to meet future demand in addition to protecting against potential scarcity or abundance of water. This could require investing in new raw water sources to diversify the resource base, expanding treatment facilities to accommodate larger flows, or using desalination, recycling or multi-purpose storage facilities. The authors of the study warn service providers not to use climate change as an excuse to over-design systems, and recommend they take an integrated approach to planning that relies on flexible designs and the use of climate action plans to mitigate risk.

## Price Water Properly

Water is a scarce resource, which when delivered as a service, should be sold as an economic good. Pricing water to reflect the marginal cost of service delivery creates a market where people and industries are willing to pay, and service providers can afford to meet demand in the long run.

The optimal way to price water is by using a cost recovery model, whereby service providers can turn a profit through selling their services, and re-invest revenues in long-term system maintenance and rehabilitation. Tariff regimes that do not allow for cost recovery provide an implicit subsidy to consumers that can distort market incentives.

However, including economic incentives in water pricing has proven difficult. Many people argue that water should be provided for free or at a price that is below its real financial, resource,

### Box 3: Water User Associations: An Essential Component to Improving Cost Recovery in Irrigation Systems in the Kyrgyz Republic

An on-farm irrigation project was implemented from 2000 to 2008 in seven administrative regions of the Kyrgyz Republic. The project was aimed at increasing crop production through reliable and sustainable water distribution. On-farm infrastructure was also rehabilitated under the management of water user associations (WUAs).

Members from each participating WUA signed an agreement to repay 25 percent of the on-farm rehabilitation costs, raise irrigation fees to support the operation and maintenance activities of their associations, and pay the water supplier an irrigation service fee for water delivered to the WUA's head gate. Considerable success was achieved:

- Performance of targeted WUAs (166,000 members), managing about 710,000 hectares (70 percent) of the country's irrigated land, was improved.
- Infrastructure that fed 120,000 hectares was rehabilitated, and water delivery to farmers in 80 percent of the rehabilitated systems now closely matches irrigation water demands.
- Three agricultural seasons later, irrigation service fees had doubled on average and collection rates by WUAs amounted to close to 100 percent of total assessed fees.
- Overall cost recovery for operation and maintenance increased from about 20 percent to 60 percent and at least 80 percent of water users were found to be satisfied with the performance of the WUA.

*Source* : World Bank (2008)

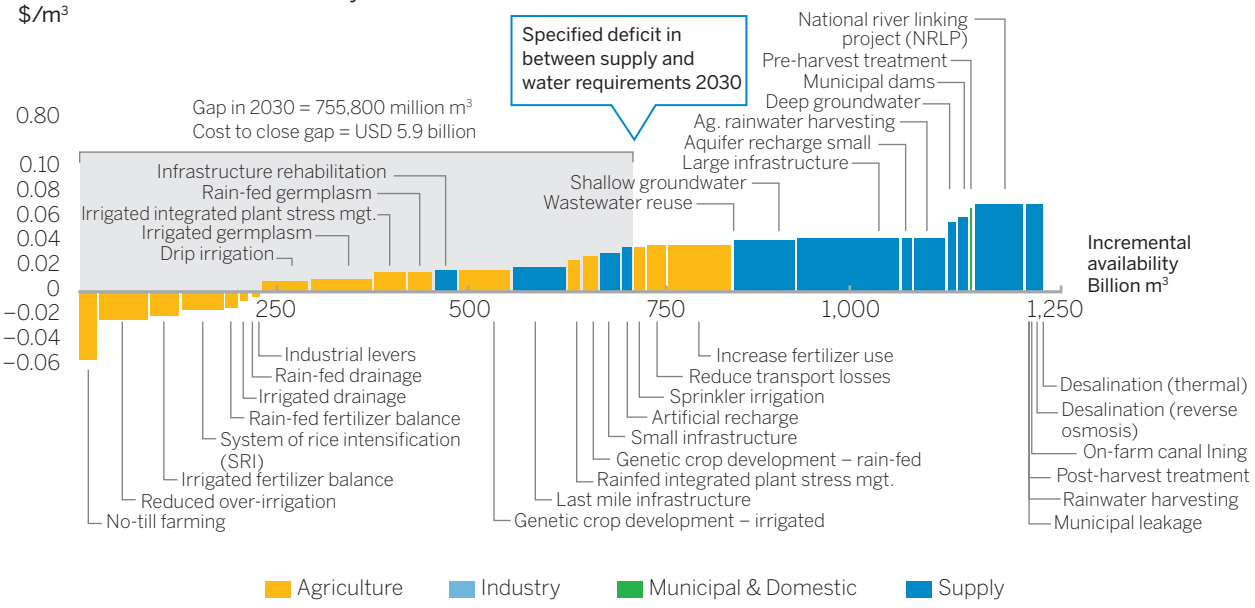
## Box 4: The Cost of Agricultural Water Demand

The 2009 report, *Charting our Water Future: Economic frameworks to inform decision-making*, is a study carried out by the 2030 Water Resources Group and led by the International Finance Corporation and McKinsey & Company. It provides an evaluation of the scale of the water challenge, estimating that by 2030, global water requirements may grow by over 40 percent from 4,500 billion $m^3$ to 6,900 billion $m^3$.

Demand for agricultural water, which currently accounts for 71 percent of water used, is expected to rise from 3,100 billion $m^3$ to 4,500 billion $m^3$ by 2030. In percentage terms, this will be a slight drop (to 65 percent of 2020 global water withdrawals), but water for agriculture remains a major challenge. Agricultural demand is projected to be most significant in the poorest regions, such as India (1,195 billion $m^3$), sub-Saharan Africa (820 billion $m^3$), and China (420 billion $m^3$).

Closing the water supply–demand gap has financial implications. According to the report, the cost of closing the 2030 gap will range from \$0.10/$m^3$ to over \$0.50/$m^3$. Without a new, balanced approach, these figures call for an additional annual investment in upstream water infrastructure of up to \$200 billion, which is more than four times current expenditure.

**India – Water availability cost curve**
Cost of additional water availability in 2030
\$/$m^3$




Various interventions for meeting India's 2030 water demand are presented in the cost curve above. Each intervention is represented by a block. The width of the block shows the amount of water that will become available as a result of the intervention, and the height shows the cost per cubic meter. The least cost options (on the left side of the graph) comprise demand-side efficiencies in irrigation. Existing technologies, such as drip and sprinkler irrigation, can be used to save water, so that the more expensive supply-side interventions (building treatment systems and dams) are not needed. The cost curve for China, on the other hand, demonstrates how industrial water use efficiencies can save significant resources at little cost. Each country has to find the appropriate mix of interventions to fund the gap.

*Source:* 2030 Water Resources Group (2009)
Reproduced from Water Resources Group 2009.

and environmental cost. Historically, water services have been systematically underpriced. As a result, achieving full cost recovery solely through user charges will now require large tariff increases that are politically difficult to manage. However, if service providers become more profitable they will be able to offer better quality services, expand their market, and potentially cut marginal costs across the board.

### *What is Cost Recovery?*

Cost recovery is the ability of a service provider to take in sufficient revenues from customers to cover their current and some of their future costs.[10] These include operations and maintenance costs (to deliver the service) as well as capital costs (including recuperation of asset depreciation over time and savings to pay for future capital investment needs).

Water fees are collected from users for two main objectives (see Box 5). The first objective is to cover the direct financial cost of the service to guarantee sustainable services. These direct costs cover basic operation and maintenance of the service, the renewal of existing infrastructure, and the possible capital expansion of water services. In many countries, most utilities and irrigation agencies charge only a fraction of these direct costs to users. The median utility in the developing world barely covers its basic operation and maintenance costs.[11] In 2008, operating revenues covered 105 percent of operation and maintenance costs, down from 111 percent in 2000. This is shown in Table 1, where the global median operating cost coverage ratio (total annual operational revenues/total annual operating costs) is provided.

A large number of utilities with an operating cost coverage ratio equal to or less than 1 (1 being breaking even) increased from 35 percent in 2000 to 43 percent in 2008. Over the same time period, average operation and maintenance costs more than doubled, rising from $0.31 to $0.66 per cubic meter. Most of the increase happened after the fuel crisis when energy costs grew to 4 percent as a portion of total operation and maintenance costs (Van den Berg and Danilenko 2011).

While most countries do recover their operating costs, many do not, and there is wide variation among countries. Figure 4 provides a snapshot of operating cost coverage ratios across regions, using the most recently reported data in IBNET. Latin America and the Caribbean and East Asia and the Pacific have the highest recovery rates. Considering the average revenues they generate (see Figure 5), Africa and Europe and Central Asia have relatively low cost recovery. South Asia has the lowest revenue per cubic meter sold and,

[10] The long-term financial sustainability of a service provider, or its ability to meet operations and maintenance, and capital costs, depends on recovering costs from users and/or receiving predictable and sufficient public/donor funds.

[11] Most of the utilities participating in IBNET are from developing countries.

**Table 1: Median Operating Cost Coverage Ratio in Utilities**

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|
| Operating cost coverage ratio | 1.11 | 1.13 | 1.10 | 1.11 | 1.08 | 1.07 | 1.07 | 1.08 | 1.05 |
| Standard deviation | 0.55 | 0.56 | 0.58 | 0.61 | 0.57 | 0.56 | 0.55 | 0.54 | 0.50 |
| Number of utilities reporting | 579 | 615 | 723 | 999 | 1,151 | 1,173 | 1,379 | 1,229 | 930 |

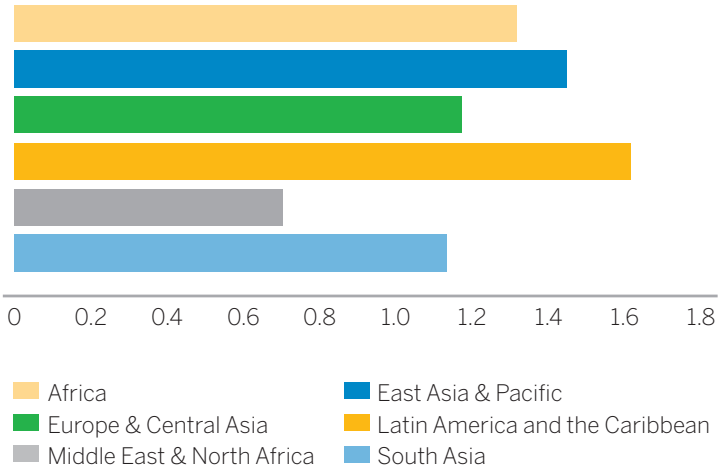
*Note:* The data collection cycle of 2008 was not yet complete at the time of publishing the source material.
Reproduced from Van den Berg and Danilenko 2011

as expected, barely covers its operating costs, and the Middle East and North Africa is the worst performer, bringing in tariffs that are equivalent with the global average, but covering only about 70 percent of operating costs.

Developing countries are not the only ones challenged to translate higher costs into higher prices. Even in the United States, where affordability concerns are relatively low, some water supply and sanitation utilities do not charge rates high enough to recover costs. Twenty-five percent of drinking water and 40 percent of wastewater utilities in the country do not charge their consumers the full cost of service (Anderson 2010).

Cost recovery is perhaps even more elusive in the irrigation sector, where measuring and monitoring water use proves more difficult at the farm level. Easter and Liu (2005) show that recovering full costs in developing countries is rare, with examples ranging from recovery of 12 percent of operation and maintenance costs in Argentina to 70 percent in Tunisia.

**Figure 4: Average Operating Cost Coverage Ratio by Region (2004–2008)**




*Source:* IBNET (2012).
* 92 countries were included in this data set; Africa (32); EAP (8); ECA (24); LCR (15); MNA (8); and SA (5). All numbers are as of latest reporting year for each country. Latest reporting year varies from 2004–2009. The ratio is the average ratio for all utilities reporting, which also varies per country. See source for details.

### *Incentives for Conservation*

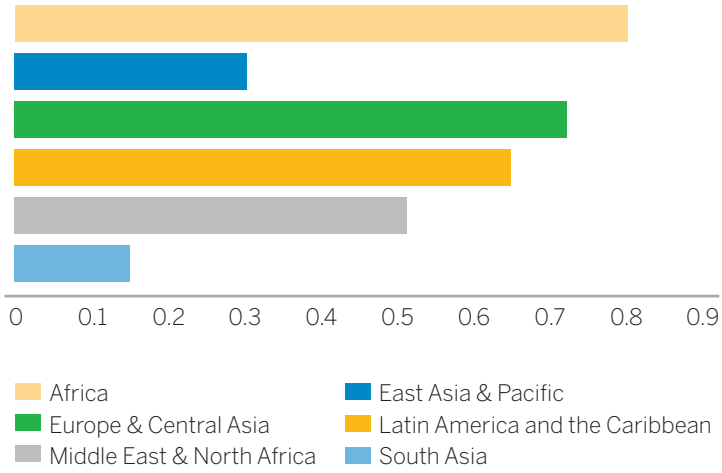
The second objective of collecting water fees is to provide incentives to use water more efficiently. Charging low tariffs can result in unsustainable levels of water consumption that can cause the depletion of water resources. In turn, this can raise future production costs as water can only be found by drilling at greater depths or conveying from longer distances.

McPhail et al. summarize the relative advantages of different pricing policies in the irrigation sector. Pricing irrigation water based on the volume of water used rather than the area under irrigation can prevent overuse but can also be more difficult and costly to administer, and can make revenues less predictable as users vary water use over time (McPhail et al. 2012). Likewise, charging lower tariffs for water-saving technologies (like drip irrigation instead of flood irrigation) or for growing crops that are less water intensive can save water and increase productivity. In addition to tariffs, other demand management measures include quotas and water rights that can be traded between farmers. However, these require more sophisticated monitoring and administration.

Water use efficiency will become more important as water scarcity increases. To guarantee economic sustainability, users should be charged the full supply costs, plus the costs created by any economic and environmental externalities.[12] Economic externalities include the costs to producers and consumers, while environmental externalities include those imposed on public health and ecosystems. However, quantifying externalities is difficult and users must be willing to pay the additional cost, which is why few systems in the world include them in their pricing structures.

[12] Externalities can be positive (i.e., benefits) or negative (i.e., costs). If externalities are positive, the economic costs of the water service are lower than the financial costs; the opposite is true when the externalities are negative.

**Figure 5: Average Revenue per Cubic Meter Water/ Wastewater Sold, by Region (2004–2008)**




*Source:* IBNET (2012).
* 94 countries were included in this data set; Africa (33); EAP (9); ECA (24); LCR (15); MNA (8); and SA (5). All numbers are as of latest reporting year for each country. Latest reporting year varies from 2004–2009. The ratio is the average ratio for all utilities reporting, which also varies per country. See source for details.

Inadequate cost recovery is not only a function of low tariff levels but also of low collection rates, unaccounted-for water and other operational efficiencies covered earlier. A 2009 evaluation of water sector projects conducted by the Independent Evaluation Group of the World Bank concluded that for the WSS projects, the factor that contributed most successfully to meeting cost recovery targets was improving collection rates (IEG 2009a). Most often, this involved increasing the capacity and willingness of water institutions to collect fees from beneficiaries. Increasing water tariffs also had a discernible impact on overall project results.

### *Tariff Reform*

If they cannot sufficiently reduce costs through efficiency improvements, regulators can work with utilities to identify reasonable tariff increases to improve cost recovery rates. The timing and sequencing of such tariff reform is critical to successful implementation. In some cases increases in tariffs are required before service quality improvements can be made (for example, in the case of cash strapped service providers). In other cases, tariff increases can only be justified after improvements have been made (for example, in cases where customers are already unsatisfied with service and are unlikely to pay more).

Raising tariffs when service quality is low can be an especially difficult task, but it has been done. Colombia in 1990 faced severe problems

**Box 5: European Union Water Framework Directive on Water Pricing**

Article 9 of the European Union Water Framework Directive (WFD) required member states to adopt water pricing policies by 2010 that provided adequate incentives for efficient use of water resources. Water service costs include environmental costs, and are based on the polluter pays principle whether that user is industry, agriculture or households. The principle aims to mitigate environmental problems through reliance on economic efficiency.

The WFD's concept of cost recovery includes two levels: 1) financial; and 2) environmental and resource costs.

- **Financial costs** (the full cost of supply): This includes the costs of providing and administering water services. It includes all operation and maintenance costs as well as capital costs.
- **Resource costs:** These represent opportunities lost to other uses as a result of the depletion of the resource beyond its natural rate of recovery (for example, losses linked to the over-abstraction of groundwater).
- **Environmental costs:** These refer to the costs of damage that water use imposes on the environment and ecosystems (for example, aquatic ecosystems can be damaged).

*Source:* Garrido and Calatrava (2010); Francois et al. (2010); Commission of the European Communities (2000).

with cost recovery in urban utilities and at the same time needed large-scale capital investments to keep up with demand. A bold decision to raise tariffs incrementally from $0.33 per cubic meter in 1990 to $0.78 in 2001 created sustainable service delivery in the long run. The price increase for customers caused a large drop in consumption, from 34 to 19 cubic meters per household per month, which meant that new major capital outlays could be postponed or eliminated. The government also used revenues from wealthier households and industry to cross-subsidize poorer households (World Bank 2012).

Like Colombia, many developing countries are raising tariffs to cover increasing costs, as data from the International Benchmarking Network for Water and Sanitation Utilities (IBNET) database show. Between 2000 and 2008, the average revenue per cubic meter of water sold (a proxy for tariffs) nearly doubled from $0.37 to $0.71 in the utilities participating in IBNET (See Table 2). As discussed earlier, operation and maintenance costs have doubled over the same period, and these costs are being passed on to customers in the form of higher tariffs. These reforms are also helping to reduce consumption. Between 2000 and 2008, consumption in low-income countries fell sharply from 138 liters per capita per day (lcd) to 75 lcd (Van den Berg and Danilenko 2011).

Even when nominal operating costs remain the same from one year to the next, tariffs should still be increased to account for inflation. Not keeping up with inflation can create a perverse incentive to consume more water as prices per cubic meter drop in real terms.

In Mali and Madagascar, proper pricing of WSS tariffs could improve revenue by an estimated 1.2 percent of GDP (Banerjee and Morella 2011), and comprises nearly 80 percent of all potential efficiency improvements. Governments, however, are under political pressure not to raise tariffs to cost recovery levels, and often believe that customers are either unwilling or unable to pay the full cost of service. Recent evidence from one of the world's poorest regions, sub-Saharan Africa, suggests that this is not the case. In low-income countries where 10 percent of the population is connected to a network, an additional 30 percent of the population could afford to pay a connection fee as well as a fee of $10 per month (with water priced at $1/cubic meter). The remaining 60 percent of the population could pay $6 per month (Banerjee and Morella 2011). Many potential network customers are already paying much more than this for water supplied by private tanker trucks. This data suggest that more analysis is needed to understand market conditions in these countries and advocate for extending networked services where financially feasible.

Another way to achieve cost recovery through tariffs is to cross-subsidize among different classes of water users. Cross subsidies, whereby industrial users pay more to support

**Table 2: Average Revenues per m³ Water Sold (in US$) – Median Values**

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|
| Average revenues | 0.37 | 0.34 | 0.28 | 0.32 | 0.37 | 0.43 | 0.50 | 0.63 | 0.71 |
| Standard deviation | 0.34 | 0.34 | 0.37 | 0.42 | 0.47 | 0.50 | 0.53 | 0.59 | 0.51 |
| Number of utilities reporting | 567 | 632 | 725 | 982 | 1,137 | 1,154 | 1,188 | 1,203 | 878 |

*Note:* The data collection cycle of 2008 was not yet complete at the time of publishing the source material.
Reproduced from Van den Berg and Danilenko 2011.

residential use, are quite common in WSS, and the direct fiscal repercussions are small. The IBNET shows that high levels of cross-subsidies tend to be more common in low-income countries than in middle-income countries. It also notes that tariff levels are around 1.35 times more per cubic meter for non-residential users than for residential users (Van den Berg and Danilenko 2011).

Whether cross-subsidies can work depends largely on the existing tariff structure and requires willingness to pay, or lack of a cheaper substitute, on the part of non-residential water users. Depending on the market structure, some service providers must take great care in retaining their high paying users. In 2000, Uganda's largest utility risked losing its industrial customers because tariff rates were 230 percent higher than residential rates. In order to maintain an optimal customer base, the utility reduced the industrial tariff rate gradually as it increased the residential rate (USAID 2005).

Tariffs help ensure quality service delivery by creating a fair market value for water and by keeping service providers accountable to their customers. In addition, tariffs are often the most concrete revenue source for a service provider and thus offer predictable cash flows, which are not provided by ODA, fiscal transfers or subsidies.

## Governments: Improve Public Expenditure

When consumers do not pay the full cost of the service (either because of tariff levels or an inability to collect the fees), the finance gap must be bridged by contributions from future consumers, current or future taxpayers, or a combination of these. Deciding how to allocate the costs of services to different groups of consumers and taxpayers depends on political preferences, but also on the structure of the water market in the area serviced by irrigation water, drinking water or wastewater collection and treatment. It is important to reach an explicit agreement on who pays for the uncovered part of the costs of the water services. Without such agreements governments risk an implicit deferral of the real costs of water services into the future, seriously hampering the short- and medium-term sustainability of the services.

In developing countries, most of the financing gap is filled by public sources, including utility and consumer subsidies. However, these sources of revenue are less predictable than tariffs from users because they are affected by a host of external factors. Moreover, government transfers are a mechanism for realizing national planning and policy objectives, and have varying degrees of efficiency in spending. Nonetheless, if well-implemented through sound targeting and predictable budgeting and execution, public expenditure can provide the cash flow needed to jump-start reforms that can ultimately reduce reliance on public funding by attracting private investment.

### *Public Budgets*

As discussed in Section 2, many central governments do not follow through on planned commitments to the sector. One reason that budgets fail to be implemented is that they are rarely linked to policy objectives, such as poverty reduction or economic growth. Public Expenditure Reviews conducted in several African countries show that the budget process is top-down, with the Ministry of Finance rarely consulting line ministries while formulating the allocations. This means that budgets are not the result of forecasts of the investments needed to meet policy goals, but from competition between water and other infrastructure, military, and social sectors.

A second challenge is timing. Budgets are approved on an annual basis and unspent funds often cannot be used once the budget cycle is concluded. Lengthy procurement processes, bureaucratic budget approvals, and low capacity to implement budgets are also obstacles to timely budget execution (Van Ginneken et al. 2011).

Regardless of planned commitments, budgets themselves can fluctuate because they are generally a percentage of GDP, a value that, of course, varies with economic growth. Therefore, even if budgets were fully executed, the value of the funds transferred would change from year to year, making it difficult for local governments to plan for the future, especially in the case of capital investment. The impact of the financial crisis on GDP is expected to reduce the rate of access to water supply and sanitation infrastructure (see Box 1).

Larger government transfers, however, will not necessarily result in improved access to sustainable water services. The efficiency and effectiveness with which they are managed is a critical factor in whether or not services are sustainable. Countries must look at the incentives and potential bottlenecks in fiscal and public finance models. The discussion of subsidies that follows demonstrates how much of public expenditures on water supply and sanitation fall short of addressing market failures and should be re-targeted for different, more effective purposes.

## Subsidies

Public contributions can also be called subsidies and can be provided either to the service provider (service provider subsidies) or to the consumer (consumer subsidies). Utility subsidies include cash transfers, grants, and various types of credit and credit enhancement mechanisms. Consumer subsidies are essentially discounted tariff rates or connection fees provided to consumers. This section focuses on explicit capital and operating subsidies to utilities and consumers.

Global water subsidies are estimated at $200 to $300 billion per year (McKinsey and Company 2011) as stated in World Bank 2012).[13] While generally intended to promote affordability and equity across income groups, subsidies in developing countries have proved to be regressive, benefiting a relatively small, well-off group of consumers.

### *Service Provider Subsidies*

Capital subsidies are relatively common in developed countries. In the European Union, utilities receive generous capital grants to assist them in complying with stringent wastewater standards. In the United States, up to 75 percent of the value of much of the water and wastewater infrastructure built in the 1960s and 1970s was granted by the federal government under the Federal Construction Grants Program. Today, to the contrary, local governments generally pay 98 percent of total costs for building and running water and wastewater infrastructure, and most of the money comes from user fees (Anderson 2010). The remainder is covered by a small volume of capital grants through agencies like Housing and Urban Development, the Department of Commerce, and the Department of Agriculture, with most of the funds going to rural communities (Anderson 2010).

The evolution of the water supply and sanitation sector in the United States shows how capital subsidies can be transformational for meeting policy objectives. If phased out over time, they can free up government resources for other purposes, while making service provision more sustainable.[14]

Operating subsidies create severe distortions in both the production and consumption of water services. Operating subsidies should be used as a short-term stopgap measure to help with emergency cash flow concerns and should be tied to performance improvements. Otherwise, local authorities come to expect annual transfers irrespective of yearly performance, having little to no incentive for service improvements, and by extension, sustainable service delivery.

[13] This includes only direct cash payments to producers.
[14] There are, however, still grave concerns that current levels of service cannot be maintained without more subsidies to urban areas given that much of the infrastructure is now near the end of its useful life and new investments are needed (Anderson 2010).

Energy is a large part of operations costs for both irrigation and WSS services. Energy subsidies lower the cost of energy inputs for the producer to generate and distribute drinking water, pump and treat wastewater, or deliver water for irrigation. Governments offering electricity at below market prices can have an enormous impact on the operations and maintenance costs of treatment infrastructure and can motivate over-pumping of groundwater for irrigation. In India, for example, where agriculture is a mainstay of the economy and electricity makes up a large share of overall irrigation costs, the government is in favor of providing cheap electricity to farmers. Lee et al. (2001) estimate that in India subsidized electricity for irrigation pumps comprises $4 million of the total $800 million in subsidies that go to agricultural producers each year (as referenced in Ashley and Cashman 2006). The result can be over-abstraction of groundwater and inefficiency in pumping.

Operating subsidies will be of greater concern once developing countries start spending a larger portion of total sector funds on operations and maintenance. A sample of countries in sub-Saharan Africa have shown that recurrent expenditures make up just 12.7 percent of total sector spending, with the remainder going to the development of capital works (Van Ginneken et al. 2011). Moreover, half of the recurrent costs are salaries, meaning that just over 6 percent of all sector funds are spent on actual system operations and maintenance. This can lead to deferred maintenance, requiring more expensive system rehabilitation in the long run.

### *Consumer Subsidies*

Consumer subsidies lower costs for the end user. In water supply and sewerage systems where coverage is far from universal, consumer subsidies benefit only those already connected to the piped system, who tend to be non-poor households. A 2007 evaluation of 32 water subsidy programs showed that quantity-based subsidies, the most common type of consumer subsidy, do not reach the poor customers they target (Komives et al. 2007). Subsidies that are geographically targeted have a better record of reaching the poor. The AICD confirms this trend by concluding that in Africa, around 90 percent of those with access to piped water are among the wealthiest 60 percent of the population. In such an environment, any subsidy to piped water services is largely captured by better-off households.

Connection subsidies, on the other hand, are often targeted to poor households who live close to an existing system. Evidence from a study in West Africa suggests that in terms of reaching the poor, subsidizing connections is better than subsidizing consumption. However, connection subsidies can have negative impacts on the volume of wastewater generated and the ability of some poor users to pay subsequent water bills. They also cannot necessarily be extended to the poorest households who have no land holdings (Debomy et al. 2005).

In summary, capital and operating subsidies each have their advantages and disadvantages, and can address different types of market failures. However, subsidy proliferation should be approached with caution, taking into account past performance and central and local government capacity to affect outcomes. When provided, subsidies should be transfered on a regular basis so that service providers and consumers can plan their future cash flow. The World Panel for Financing Water Infrastructure calls for greater assurance that resources for subsidies are budgeted in advance, as part of a trend towards more "sustainable cost recovery" (Winpenny, 2003). When large government subsidies are not provided directly and on a regular basis, water agencies tend to postpone maintenance, which shortens the expected life of assets, and means that infrastructure needs to be replaced more often.

## All Stakeholders: Develop Sound Sector Governance

Sound governance is part and parcel of the successful implementation of the reform cycle, and has a particularly important role in attracting private finance while protecting government interests. Governance has several dimensions, from political stability, rule of law, government effectiveness, and regulatory quality, to voice and accountability and control of corruption. To promote the reform of governance frameworks, donors can provide technical assistance on international best practices and governments can provide the political leadership needed to create a transparent and well-functioning governance structure.

Improving governance structures requires identifying the main actors and clarifying their exact mandate with regard to the key functions of: (i) policy formulation; (ii) asset management and infrastructure development; (iii) service provision; (iv) financing the sector and the development of water infrastructure; and (v) regulation of the service. Clarifying the contractual arrangement under which the parties interact with each other, and assessing the adequacy of the instruments used by the actors to fulfill their mandates are critical steps in developing successful governance frameworks. Official policies are often not fully carried out in countries that have weak governance regimes. It is critical to look at the de facto functioning of institutions, rather than just at the paper policy framework (Locussol and Van Ginneken 2010).

Separate roles should be created for regulators and service providers. In many countries the lines of responsibility are blurred and agencies have similar or identical functions. Policy setting and oversight should be conducted by the regulator, with water or sanitation delivery performed by the service provider. This helps to prevent major conflicts of interest that can lead to corruption and other inefficiencies. Because water is a public good, other rules, such as whether a service provider can raise capital in private markets or in foreign currency, are important for safeguarding the fiscal positions of local governments.

Good governance also limits corruption. Procurement policies for design, construction, and management contracts should be designed to enable competition among suppliers and ensure transparent and open bidding procedures. All too often entrenched political interests and local engineering and construction know-how limit the choices available for building and modernizing water infrastructure. Procurement policies

### Box 6: Changes in Management Structure Lead Uganda's Sector Reform

The National Water and Sanitation Corporation (NWSC) of Uganda, which supplies water and provides sewerage services in urban areas, enhanced its financial performance through a series of efficiency improvements. Top-down sector reforms enabled private sector participation in operations and fostered a more commercially-oriented environment at the public utility. In response, NWSC made internal changes to its management structure by providing supervisors with the autonomy they needed to staff positions and allocate other resources. Managers could earn bonus pay for increasing operating income and meeting other performance targets. The number of employees was subsequently reduced from 24 people per 1,000 connections to 10 people per 1,000 connections. NWSC expanded service by 33 percent and improved billing and collections ratios. Moreover, a new culture focused on customer relations improved customer complaint response times and connection speeds. As a result, revenues jumped from 23.7 billion Uganda shillings in 2000 to 40.9 billion just four years later.

*Source:* USAID (2005).

have the power to foster the use of new technologies and management approaches; the innovation can lead to cost-effective solutions that can put countries on a path to greener growth. Procurement and other policies should be designed to suit the specific needs and long-term goals of the country, and should promote efficiency and equity in the provision of water services.

## Governments and Donors: Leverage Resources to Crowd in Private Investment

In the aftermath of the financial crisis, when all sources of infrastructure finance could potentially decline, governments and donors should focus their resources to build financially solvent utilities and sound governance structures. They should also work in concert to build local capacity to plan and execute donor and public budgets, which comprise the majority of utility cash flow in many developing countries.

These fundamental contributions build the foundation for the efficient and effective use of scarce resources and strong institutions will provide the oversight needed to protect investors and service providers. The reform steps taken will, over time, crowd in more private investment to help fill the financing gap.

There are several major contributions that donors and governments can make to help jump start private finance in water. These two stakeholders have the convening power to help bring utilities and private investors to the table. Through offering incentives for the public and private sectors to do business, donors and governments can have an enormous impact on improving water infrastructure finance. There are many tools that provide incentives by lowering risk, eliminating perceived risk, and reducing transaction costs. The following tools are covered in this section: subsidies provided via municipal bonds and concessional loans, brokering and offering guarantees, and managing pooled and revolving funds.

### *Municipal Bonds*

Service providers, whether in developed or developing countries, often lack the creditworthiness to borrow from commercial banks. To address this issue, countries have created institutions to intermediate between local governments and private sector investors. These institutions, often called Municipal Development Funds, facilitate borrowing on the private market by pooling the borrowing capacity and needs of several local governments and sharing risk. Using the combined collateral of several local governments the intermediary can then float a bond to raise private capital. In doing so, the intermediary takes on some of the risk.

Municipal bonds are a mechanism for local governments to access capital from private sources. Furthermore, they can be tax-exempt, providing an implicit subsidy to the local government. In the United States, municipal revenue bonds are the most common financing mechanism for water and wastewater infrastructure in towns with a population over 30,000. The interest paid on these municipal bonds is tax-free, providing an implicit subsidy from the Treasury Department, which for 2006 was estimated at $2.1 billion, or 0.02 percent of GDP (Anderson 2010).

Outside of developed countries, municipal bonds used to finance water sector infrastructure and operations are rare because they generally require a sovereign guarantee, which is uncommon in the water sector. Two exceptions include the city of Johannesburg in South Africa, and the municipality of Tlalnepantla de Baz in Mexico.

In 2004 the city of Johannesburg issued a $150 million 12-year bond for infrastructure projects, with a guarantee provided by the World Bank and the International Finance Corporation's (IFC) Municipal Fund and the South African Development Bank (World Bank 2004b). The 40

percent partial credit guarantee helped increase the municipal bond rating from A– to AA–. The bond matures in 2016 and will pay 11.9 percent interest to creditors.

In 2000, a new law in Mexico enabled subnational governments to borrow in capital markets but only in peso denominated debt. The utility in Tlalnepantla de Baz, a municipality near Mexico City, needed financing for a new wastewater treatment plant. The utility had historically covered around 54 percent of its costs with revenues, but was reliant on the federal government for the remainder. The new law allowed the municipality to issue a $9.6 million municipal bond, which it did using a partial credit guarantee from the IFC and a letter of credit from Dexia Bank. The National Water Commission also provided incentives for improvement, which helped strengthen the utility's balance sheet (USAID 2005).

These examples demonstrate the value of municipal bonds in reducing costs and pooling risk to introduce private investment in local water service delivery. The instrument, however, requires long-term planning through coordination of all sector stakeholders, and guarantees on repayment, which can be difficult to acquire especially in developing countries where few utilities are creditworthy.

### *Concessional Loans*

Concessional loans comprise a large portion of overseas development assistance to the sector. Donors offer these loans to developing countries to meet explicit policy objectives and provide an implicit subsidy. Rather than saving money through a tax exemption on interest as with a municipal bond, concessional loans are provided to central governments at a discounted interest rate, higher grace periods, and longer repayment terms than those available on the private market. The funds are then on-lent to local governments. This preferential treatment translates into an implicit subsidy, the value of which is difficult to measure. Central governments can also take on the foreign exchange risk by borrowing in foreign currency and lending in local currency, which provides another implicit subsidy to the local government.

Kingdom et al. (2012) quantifies one such subsidy in Vietnam. Compared to a commercial loan of similar size, a concessional loan at 4 percent interest with a 20-year repayment period and a 5-year grace period provides an implicit subsidy that is 72 percent of the total value of the loan. When the subsidy value of a loan is not quantified and discussed, stakeholders do not get a clear picture of their contributions to the sector and, therefore, what they should expect in return (whether it is in units of improved service delivery, greater crop yields, poverty reduction, pollution control, etc.).

Kingdom et al. argue that concessional loans are not perfectly efficient in meeting central government policy targets. In the case of Vietnam, the policy was to expand water infrastructure in smaller cities, but with the central government taking the reins in on-lending to local governments, smaller cities received about 12 percent larger subsidies, and fewer of the subsidies went to those cities that were in the government's initial plan.

Thus, during the transfer from central to local government, the instrument can lose part of its intended impact. This inefficiency, coupled with the high cost of providing the implicit subsidy, make concessional loans expensive and difficult to measure against results. Kingdom et al. argue that where government capacity is adequate, an initial capital subsidy can be used with a parallel commercial loan instead of a concessional loan. These subsidies can also be output-based to provide incentives for achieving more long-term outcomes, and the financing arrangement can work to gradually attract more and more private investment.

Service providers with low capacity to manage project implementation and loan repayment should continue to use concessional loans.

However, the implicit subsidy on these loans should be quantified and made explicit so that the real value is known and the resulting benefits can be measured against the real costs.

### *Guarantees*

As in the South Africa case presented above, IFIs provided a guarantee to the City of Johannesburg for repayment of a municipal bond, making a contribution to the credit rating of the bond and, therefore, the city's ability to access private finance. The World Bank Group's Multilateral Investment Guarantee Agency (MIGA) provides similar guarantees on a project basis in the form of political risk insurance, with water and wastewater projects limited to a few middle-income countries, in addition to a handful of irrigation and hydropower projects.

USAID's Development Credit Authority (DCA) also provides partial credit guarantees for water finance. The Philippines Water Revolving Fund (PWRF) (see Box 7) provides a good example of coupling a guarantee with a concessional loan to offer below market rates to creditworthy utilities, and giving private creditors access to new markets. The PWRF received support from USAID through a $37.5 million development credit that re-guarantees loans from the Local Government Unit Guarantee Corporation.

Governments can also provide loan and credit guarantees to local water authorities. In this way, central governments boost the capacity of local providers to borrow in private capital markets by reducing part of the risk (political, regulatory, foreign exchange) associated with sector investments. However, as the impact of the financial crisis on central governments spreads, sovereign guarantees will be more difficult to obtain. In the case of a currency devaluation, where the debt repayment in foreign currency equivalent becomes much higher than what was initially borrowed, it can become more difficult to repay debt.

### *Pooled and Revolving Funds*

Developed and developing countries alike create institutions that manage sector investment in the long run. These pooled or revolving funds help share risk and borrowing needs across groups of service providers, such as at the state or even at the country level. Unlike government transfers, these institutions provide resources without any annual limitations. When service providers repay their debt to the fund, the money becomes available for investment in other providers. The stability and tenure of these funds help attract investment and make efficient use of a variety of funding sources. In the Philippines and India, the funds have also been instrumental in building local capacity to design and implement projects.

The US Clean Water State Revolving Fund and Drinking Water State Revolving Fund provide capital grants to states, which are then on-lent to local governments for water and wastewater infrastructure. These state revolving funds mostly fund rural community infrastructure rather than large systems in cities. These funds can also serve to back state-issued bonds to raise more money for similar works (Anderson 2010).

In India, USAID provided DCA municipal bond guarantees to the Tamil Nadu Urban Development Fund in 2002. The guarantee covers up to 50 percent ($6.4 million) of bonds issued by the Water and Sanitation Pooled Fund for upgrading service in poor areas. The development fund is now an autonomous financial intermediary managing 500 projects in 90 municipalities, and its partial government ownership is expected to be phased out to yield full private management (USAID 2005).

### *Private Sector Participation*

Over the last 20 years, many developing countries have turned to the private sector to bridge gaps in financing, expertise, and management as a way to improve the performance of public utilities. These objectives can be achieved under

### Box 7: The Philippines Water Revolving Fund: The Reform Cycle in Action

Much of the water supply in the Philippines is delivered by more than 6,000 small utilities, each with their own financial and operational challenges. The country is currently undergoing major water sector reform to include operational, financial, and regulatory changes toward meeting the MDGs for water supply and sanitation. The cornerstone of the process is the Philippine Water Revolving Fund (PWRF), created in response to a 2004 executive order whereby water utilities were mandated to move from government to market-based financing.

The PWRF works from both sides of the challenge, helping potential investors understand water utility business models and assess risk, and helping local governments gain access to private capital. The PWRF acts as a financial intermediary through which private creditors lend 25–50 percent of a loan, and public and ODA contributions make up the remainder. The creditor applies for a guarantee from a private domestic corporation. The funds are on-lent to local utilities through the Development Bank of the Philippines, usually with a 20-year repayment period.

In addition to financial brokering, the country's water reform encompasses a host of institutional, regulatory, and technical strengthening measures. For example, utility managers receive training in investment planning and market forecasting to produce viable business plans that can be proposed to private lenders. The reform has also included assistance to develop bankable projects for water supply and septage management projects, starting with feasibility studies.

*Source:* Paul (2011).

various contractual schemes. Governments and donors can work together to ensure that the comparative advantages of the private and public sector are leveraged, but this requires a strong governance structure and proper incentives for both sides. Private entities can be brought in at any stage of the reform cycle depending on the capacity of local institutions and the investment climate. Most private contributions are classified under management, lease or concession contracts.

Management contracts and lease contracts can incorporate incentives for performance improvement and take advantage of international best practices while leaving asset management to the public service provider. Lease contracts offer even greater incentives for performance improvements because the private company has the authority to set tariffs and collect bills (USAID 2010). Management contracts can be used to outsource any portion of a utility's operations, from meter reading to billing and collections.

In Burkina Faso, private sector management contracts have helped the autonomous water board, ONEA, gain efficiencies in water coverage, water loss reduction, collections, metering and cost recovery. Moreover, experience with private contractors can help build the capacity of water institutions to develop and manage similar performance-based contracts with public entities. Since 1993, ONEA has itself entered into three-year performance contracts (contract plans) with the government. Technical, financial, and commercial targets are set by means of 34 indicators that are monitored on a regular basis by a committee whose members include staff, government officials, and consumers (Agrawal 2009). These types of contracts can bolster the financial solvency of utilities, helping to prepare them to become creditworthy entities that can attract private finance on their own.

Concession contracts, on the other hand, require more commercial risk because the private party is responsible for making capital investments. This can result in non-fulfillment of

contract terms. Evidence has shown that concessions in the water sector have been less successful than other forms of private sector participation. Between 1991 and 2010, half of all cancelled contracts in the PPI database were concession contracts (Perard 2012). Requiring private contractors to post performance bonds as a guarantee for specific capital investments can help mitigate government risk.

Marin (2009) analyzed more than 65 urban water projects with public-private partnerships (PPPs) in developing countries over a 15-year period. Results suggest that though some projects performed better than others, the overall performance of water PPPs has been satisfactory. The urban population serviced by private operators in the developing countries rose steadily, from 94 million in 2000 to more than 160 million by the end of 2007 (Marin 2009). PPP projects have provided access to piped water to more than 24 million people in developing countries since 1990. Some of the major findings of the study include:

- *The largest contribution of private operators was through improved service quality and operational efficiency.* Improvements achieved through operational efficiency and quality service depends on the allocation of responsibilities and risks, which is based on multiple factors such as the incentive structure and the nature of the arrangement.
- *Efficient private operators have a positive, although mostly indirect, financial contribution.* They do this by improving the creditworthiness of the utility and allowing it to secure investment funding for investment more easily and at better terms. A better service increases customers' willingness to pay and this improves collection ratios and provides less resistance to raising tariffs. Experiences from Cote d'Ivoire and Gabon show that operating efficiently enabled investments to be funded for more than a decade through cash flows, without needing to incur new debt.
- *Successful water PPPs have to be implemented within a well-conceived, broader sector reform.* Successful experiences in countries such as Colombia, Cote d'Ivoire, and Morocco show that introducing PPPs was part of a wider reform to establish a sector framework that supported financial viability and accountability for performance. These countries also had clear policies in place to move to cost recovery tariffs in a sustainable and socially acceptable manner.
- *Establishing a good partnership that achieves tangible results takes time.* It took a decade to achieve good results in Senegal. The outcome of a PPP depends heavily on solid collaboration. Government officials need to move away from old habits of interfering in the operations of water utilities, toward an arm's length relationship based on contractual rules.
- *Traditional classification of PPP projects as management contracts, lease-affermages, and concessions have become obsolete.* The most sustainable projects observed in the study did not fit into any of these traditional categories.

The study is the most comprehensive analysis to date in the sector and its recommendations are instrumental in ensuring the proper design of the next generation of PPP arrangements, particularly given the fact that local private operators are entering the market more and more.

Section 4

# Tools for the Way Forward

This section suggests the use of two tools that can help sector stakeholders enter into the reform cycle. The first is Public Expenditure Reviews (PERs), a sector-level analysis that has proven instrumental in showing governments where their money ends up and the bottlenecks that need to be removed to improve efficiency and effectiveness in spending. Evidence from recent PERs in the water sector has shown that annual budgets are rarely part of long-term sector strategies and, thus, do not reflect policy objectives. This creates a "disconnect between expenditure and outputs" (Van Ginneken et al. 2011). The second tool, the incorporation of results-based financing in water investments, seeks to address this challenge. This instrument can be used by donors to provide incentives for achieving project outcomes, or by governments to ensure long-run sustainability of outputs in contracting with public or private operators.

## Public Expenditure Reviews (PERs)

Public Expenditure Reviews (PERs) help a country compare how the flow and use of public funds to the water sector stacks up against budgets. A PER is concerned with public-based (not always government) revenues and expenditures as expressions of public policy and public involvement in the economy (World Bank 2009). It entails a careful examination and analysis at the country level of the fundamental drivers of public finance. The recommendations provide guidance to governments on critical reform processes that can be taken to ensure efficiency, efficacy, and transparency in the use of public monies flowing to the water sector.

Pradhan (1996) provides a summary of the main elements of a PER, which include discussion and analysis of aggregate public spending in the sector and its allocation; whether public expenditure complements or substitutes for private activities; the impacts that public programs have had on the poor; allocations for capital and recurrent expenditure; and budgetary institutions and processes, and their role in promoting fiscal discipline, allocative and technical efficiency, and equity.

Since 2003, the World Bank has funded 42 PERs in which the water sector featured in some capacity. A quick assessment of some of the water supply and sanitation PERs suggests that the efficiency and effectiveness of how governments allocate, disburse, and use resources in the sector can be improved. A number of countries that have undertaken these exercises have adopted comprehensive budget legislation, reduced waste in public expenditure, given greater budget autonomy to local governments, and attempted to open budgets to public scrutiny (Deolalikar 2008).

Benin is a good case in point. In 2001, Benin moved to decentralize service delivery. Analytical work, including a water PER, helped uncover bottlenecks in the budget execution chain, forming the basis for improvements in public financial management, especially geared to rural water supply. Unlike other African countries, Benin now produces annual budgets at the sector level, which are then incorporated into the national budget. Budget execution software enables tracking of donor financed and public expenditures. Line ministries have the authority to spend public money and are accountable to the Ministry of Finance through performance-based contracts at the subprogram level. The increased transparency and better budget execution rate have crowded in more donor commitments to Benin, which is on track to meet its MDG for rural water supply (Van Ginneken et al. 2011).

## Lessons Learned from PERs

As some PERs have shown, sector-specific issues at the country level play a major role in explaining sector performance. Efficiency can be enhanced in three ways: (i) improve sector and investment planning; (ii) improve the capacity to procure, disburse, audit, and monitor sector resources; and (iii) maintain a sharper focus on incentives in the allocation of funds.

First, sector and investment planning in water require collaboration across line ministries and between central and local agencies. Climate change, along with food and energy security concerns, call for even more integrated planning in the future than has been practiced in the past. Cost-benefit analysis can be a useful tool in prioritizing needed infrastructure, and when done at the river basin level can provide fundamental analysis for water allocation across sectors. Water variability should be a key concern for long-term planning in both developed and developing countries. Sensitivity and risk analysis can help to determine how robust investments are to changes in circumstances. Sector planning should be combined with multiyear budgeting to ensure that short-, medium-, and long-term investments can be implemented properly.

Second, governments must improve disbursement functions, which are often a major source of the inefficiencies that cause higher procurement costs. For example, late release of funds results in low budget execution, which may have implications for future access to funds. Many developing countries have inefficient mechanisms to transfer resources from central, to regional, and then to local authorities. Similarly, it is along this chain that a portion of the face value of subsidies is lost. Yearly budget cycles often mean that capital works must be contracted and completed within the cycle. Lack of capacity in procurement curtails and delays investments in the sector.

Third, when allocating funds, governments should ensure that their policies align with incentives to improve performance, encourage efficiency, and reduce costs. Inflexible procurement regulations that narrow the playing field for new technologies and designs can encourage higher than necessary capital and operating costs that impede sustainable service delivery in the long run. Public funds should foster the use of lower

cost technologies where possible. Likewise, subsidies currently channeled to non-poor consumers could be used in much more efficient ways to meet poverty, health, and economic growth objectives. Doing so would eliminate perverse incentives to over-consume. Finally, through contracts with public and private services providers and donors, governments can focus on results rather than inputs.

## Results-Based Financing (RBF)

Results-based financing (RBF) encompasses a range of mechanisms designed to enhance the delivery of infrastructure and social services through the use of performance-based incentives, rewards, and subsidies. A funding entity (typically a government or sub-governmental agency) provides a financial incentive, on the condition that the recipient undertakes a set of pre-determined actions or achieves particular outputs. Resources are disbursed not against individual expenditures or contracts on the input side (as is traditionally done), but against demonstrated and independently verified results that are largely within the control of the recipient.

RBF mechanisms can be structured in several ways depending on the objectives and goals set by the government. There are several types of RBF mechanisms, including carbon finance, conditional cash transfers, output-based disbursements, and advance market commitments. The application of such standard forms of RBFs in the water sector is quite limited, but there are a few examples of performance-based contracts between public entities that are based on the same characteristics. The cases of NWSC in Uganda (see Box 6) and ONEA in Burkina Faso, as discussed earlier, provide two examples.

The World Bank has piloted the use of one RBF instrument in water using subsidies to cover access by the poor. The Global Partnership on Output-Based Aid (GPOBA), a donor trust-fund managed by the World Bank, provides output-based aid (OBA) to service providers in exchange for connecting poor customers to water supply or sanitation networks. OBA subsidies can either buy down the capital cost or cover the difference between an affordable user fee and a cost recovery user fee.

GPOBA has approved close to $4 billion in grants. Of these, $137 million are for WSS. There are currently 22 projects with World Bank participation that have approximately $140 million allocated to subsidies: fifteen are water supply schemes, three are sanitation schemes, and four provide both water and sanitation (Kumar and Mugabi 2010). Many of these projects are already showing promising results. In less than a year, 6,700 connections were made in Cameroon (project target is 40,000); and in India, 77,000 connections were made in rural communities in Andhra Pradesh. There are, however, criticisms of OBA, including high costs and low leverage of commercial funds. Kumar and Mugabi (2010) argue that countries with sound regulatory frameworks, good capacity for implementing programs, and experience with private sector provision have more success than others.

The use of RBF mechanisms in development lending is expected to increase. The World Bank's new Program for Results (PforR), for example, is an instrument introduced in 2012 that ties financing to achievement of results. PforR investments will support government and government-led programs and have a large institutional capacity building component to strengthen in-country governance and transparency. This lending will use disbursement-linked indicators whereby payment is only made after indicator targets have been met and verified. Funding through PforR will be limited for the first few years but could become an important source of finance for the next generation of development finance.

# Conclusions and Recommendations

Additional and improved water supply, sanitation, and irrigation infrastructure will be needed for countries to achieve their development goals, from human health to food security, to energy security and climate resilience. While data on current water infrastructure stocks and sector financing is sparse, estimates of needed investment for developing countries are around $100 million per year. To pay for this infrastructure, developing countries will face serious obstacles, including low levels of government support and an inability to attract private finance. The recent financial crisis has made financing the gap in global water infrastructure even more difficult.

All water sector stakeholders can contribute to reforms that help close this gap. Service providers can improve performance and maintain accountability to customers. Governments and donors can stretch their dollars and collaborate to reduce risks for potential private sector investors. The water reform strategy in the Philippines provides an example of how each stakeholder can make its contribution to the reform process, helping to bridge the space between what the public needs and what private investors can provide.

## Service Providers

All stakeholders should focus on helping service providers achieve financial sustainability by improving cost recovery and public expenditure. Cost recovery that enables private investment is the optimal strategy for service providers to pay for current and future water infrastructure. However, it is politically difficult to implement even in developed countries, like the United States. Recovering the full cost of delivering water services is complex. Reconciling the economic and financial objectives of cost recovery is hard enough, and this is exacerbated by considerations of environmental sustainability and social affordability. The mechanisms and instruments designed to manage these different objectives determine the role that tariffs and user charges can play, which will differ from water service to water service.

Service providers can partially close the gap by lowering costs and making efficiency gains. Such efficiencies, even in the absence of full cost recovery, will improve the ability of utilities to adapt to

future risk, and will make them less dependent on external funding. Efficiencies will also translate into improved service, which can start the positive cycle of increasing revenues (for farms) or productivity (for people), prompting a higher ability and willingness to pay for services.

Tariffs that reflect the cost of inflation can assist in maintaining the trend toward lower per capita consumption, while those that account for environmental externalities can go one step further by addressing water scarcity and supporting a green economy. Each and every case faces different challenges requiring a different solution.

Colombia and Uganda approached cost recovery goals from different sides of the equation. While tariffs were increased in Colombia to cut water demand and reduce the need for new investments, NWSC in Uganda made efficiency improvements to lower its costs so that tariffs could remain affordable for consumers. With revenues the most predictable source of finance for the sector, providers must continue to focus on the portion of funding that they can control, and make all necessary efficiency improvements possible. Private management contracts can play a key role in demonstrating efficiency improvements in the short run. In all cases, understanding the water market and making decisions and plans transparent and gradual can make successful reform possible.

Decisions about how to allocate the uncovered portion of costs depend on political preferences, but they also depend on the structure of the local water market. It is imperative that an explicit agreement is reached on who pays for what. Without such an arrangement, the real costs of water services may be deferred into the future, seriously hampering short-term and medium-term sustainability.

## Public Expenditure

When service providers are unable to recover their costs, a mix of public and private sources is needed to fill the financing gap. In developed countries, like the United States, large-scale water systems were built with capital grants and tax-exempt loans from the federal and state governments. Today, after decades of public support, many urban systems have been able to recover costs from users to sustain service delivery. Developing countries are experiencing a similar process, relying on the government and donors for about 75 percent of total investments in water. For these countries, however, public funding can be very volatile and local capacity is inadequate when it comes to using money efficiently.

Because the majority of funds in the sector are public monies, more attention should be paid to the efficiency and efficacy of public transfers and subsides. Service providers need better support from government institutions through improved subsidy targeting, more strategic planning, better budget execution, and guarantees and risk sharing that can help them access private funds. Any allocation of costs through stakeholders must take into consideration social equity and affordability. Subsidies play a critical social function in the distribution of equity and should be designed for predictability, transparency, and to be phased out over time. Implicit subsidies, including those that result from concessional loans and interest-free bonds, should also be made explicit to improve targeting. Public Expenditure Reviews are a promising tool for countries to identify weaknesses in planning, budgeting, and implementation of public funds.

Donor contributions also make up a significant share of total public expenditures,

especially in low-income countries. Technical assistance, guarantees, and concessional loans and grants are vital for maintaining current access levels in some countries. While water sector commitments have increased in recent years, overall donor funding has dropped. In the future, tying development aid more directly to country program results (through output-based aid and other results based financing mechanisms) could help countries achieve their long-term policy goals while using fewer resources.

## Private Contributions

Private finance has steered away from many low-income countries toward large urban centers in middle-income countries. It is also coming from more domestic, and fewer international, sources, and the size of the average project is smaller. To attract more private finance, stakeholders should work to eliminate information asymmetries and the perceived risks that they generate. However, it is in the interest of both the private sector and national governments to ensure that the appropriate governance structures and incentives are put in place before bringing in the private sector. Results-based financing is a mechanism for improving efficiencies in a resource-constrained, inefficient sector, but requires the institutional capacity to define and monitor outcomes.

Trade-offs will need to be made because financial sustainability is likely to be only one of several objectives (such as service coverage levels and environmental objectives) that form part of a government's agenda to improve the performance of the water sector. Making these trade-offs more explicit will improve accountability and transparency. They may also provide incentives for much-needed reform (such as strategies for a green economy and improved water and energy conservation). Green growth provides an opportunity to change infrastructure modalities, which can have significant impacts on the long-run cost of operations, help countries mitigate the impacts of climate change, and adapt to its consequences. In some cases, climate change could considerably add to the investment needs of some service providers, and sound forecasting and planning is needed to ensure that funds are used in the most cost-effective manner.

All sector stakeholders have a role to play in helping to bridge the gap between supply and demand for capital investments and system operation and maintenance. There is room for improvement at every turn in the financing chain. The reform cycle presented in this paper reiterates that water agencies can start at their own pace and capacity. Reform should be undertaken as pieces of a puzzle, with all stakeholders making improvements toward a common goal: sustainable water service delivery for all.

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