CHAPTER FOUR

The Water Market

More than a billion people lack access to clean drinking water. Many more must struggle to meet their daily needs for water—or to pay the high costs for this essential commodity. The reasons for these challenges? Urban water networks are aging. Rapid urbanization is increasing demand faster than networks can expand. Many people live in water-stressed regions and water sources are being polluted by industrialization, agricultural runoff, and lack of sanitation services.

People obtain water in many ways. Some collect it at no "cost" (apart from the considerable cost of their labor) from streams or other surface sources or from wells or community standpipes. Others must pay for it. Payments to large urban water systems dominate recorded household spending on water. But households also purchase water from vendors and small-scale community water systems and pay for point-of-use services such as water purification.

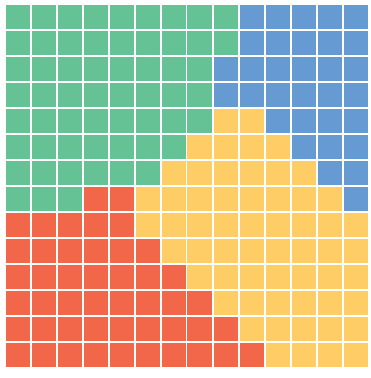
The private sector is often the provider of last resort. Small-scale water vendors are often the only option in peri-urban communities. Improved point-of-use systems being devised and marketed by the private sector also show promise for giving BOP households better options for water supply, especially in rural areas. New models of community engagement and public-private partnership are emerging.

How large is the market?

The measured BOP water market in Africa (11 countries), Asia (7), Eastern Europe (5), and Latin America and the Caribbean (7) is $11.3 billion. This represents the annual household water spending of 2.0 billion people in 30 low- and middle-income countries. The total BOP water market in these four regions, including all surveyed countries, is estimated to be $20 billion, accounting for the spending of 3.96 billion people (see box 1.5 in chapter 1 for the estimation method).

Latin America has the largest measured BOP water market, at $3.8 billion for 262.5 million people. The region's total BOP water market is estimated to be $4.8 billion, accounting for the spending of 360 million people. In

BOP spending on water
$20.1 billion

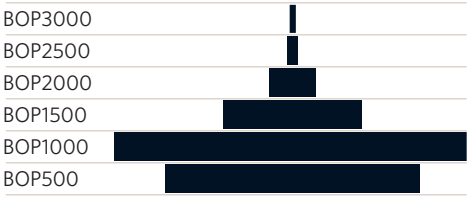


	$ billions (PPP)
Africa	5.7
Asia	6.4
Eastern Europe	3.2
Latin America	4.8

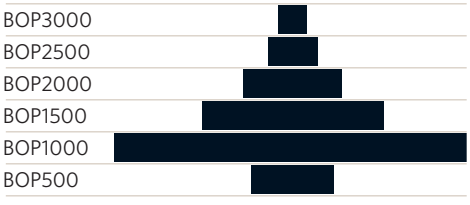
Each square represents approximately $100 million

BOP water markets tend to be predominately urban, even where most BOP households are rural. Growth has been particularly rapid in peri-urban areas, which often lie beyond municipal supply networks.

Nigeria
TOTAL WATER SPENDING BY INCOME SEGMENT



Pakistan
TOTAL WATER SPENDING BY INCOME SEGMENT



Asia the measured BOP water market is $3.2 billion (1.4 billion people), while the estimated total BOP water market in the region (including the Middle East) is $6.4 billion (2.9 billion people). In Africa the measured market is $2.5 billion (252.4 million people), and the estimated total market $5.7 billion (486 million people). Eastern Europe's measured market is $1.7 billion (138.9 million people), and its estimated total market $3.2 billion (254 million people).

The BOP share of total spending in measured markets ranges widely. Asia has the largest BOP share, at 68%. In Latin America and Eastern Europe the BOP share is 45%. In Africa the BOP share is 60% .

The regional averages mask large differences within regions. In Eastern Europe the BOP market share ranges from a low of 24% in FYR Macedonia to a high of 98% in Uzbekistan. Africa shows a similar spread: in Rwanda the BOP accounts for a mere 14% of household spending on water, while in Nigeria the BOP is effectively the entire market, accounting for more than 99%. In Latin America, among countries with larger populations, only Peru has a BOP market share of well over half, at 71%. In Asia only Thailand and Nepal have BOP market shares hovering around 50%; other countries have much larger BOP market shares.

By many measures (not just size), the BOP water market is "depressed" compared with other BOP markets. BOP households generally represent a smaller share of the national water market than of other markets, including energy and transportation. Moreover, while the BOP accounts for 71% of the population in Latin America, it accounts for only 45% of recorded water spending—and a similar pattern holds in other regions.

How is the market segmented?

Bottom-heavy BOP water markets—in which more than 50% of recorded spending occurs in the bottom three BOP income segments—are apparent in 10 of the 30 measured countries. Eight are in Asia and Africa (Indonesia, Pakistan, Tajikistan, Burkina Faso, Côte d'Ivoire, Malawi, Nigeria, and Uganda). In these countries where the bottom three BOP income segments dominate the BOP market, they often also dominate the national market—representing more of the market than both the upper BOP income segments and the mid-market segment combined.

Some cases are even more extreme, with more than 50% of all recorded national water spending occurring in the lowest two BOP income

groups. Burkina Faso, Côte d'Ivoire, Nigeria, and Uganda all exhibit this pattern. In Nigeria the 22.3 million households in the BOP500 and BOP1000 segments account for 75% of the national water market—$444.6 million in annual spending.

Among Asian countries, a similar concentration occurs in Pakistan, where the BOP500 and BOP1000 groups account for 54% of the national water market, and in Tajikistan, where they account for 57%. In Indonesia, with the third largest measured water market in Asia, the lowest three BOP income groups dominate the market, accounting for 52% of total spending—$421.1 million across 125.6 million households.

Top-heavy BOP water markets, in which the top three BOP income segments account for more spending than the bottom three, predominate in Eastern Europe and Latin America—occurring in 10 of the 12 measured countries in these regions. These top-heavy BOP markets often coincide with a national market dominated by the mid-market segment. Paraguay represents an extreme case. In that country the mid-market segment represents 78% of recorded national water spending—but only 36% of the national population. In contrast, the bottom three BOP groups represent only 3% of the national water market—but 36% of the population.

Where top-heavy BOP water markets occur in Asia and Africa, they rarely coincide with mid-market dominance. Bangladesh has a top-heavy BOP water market, for example, yet the mid-market segment accounts for only 15% of national spending.

Where is the market?

BOP water markets tend to be predominantly urban, even where most BOP households are rural. Among measured markets the only exceptions to this pattern are Thailand, Uganda, and Uzbekistan. Growth in BOP water markets has been particularly rapid in peri-urban areas, which often lie beyond municipal supply networks. Here, non-networked but relatively large water purification initiatives show promise (case study 4.1).

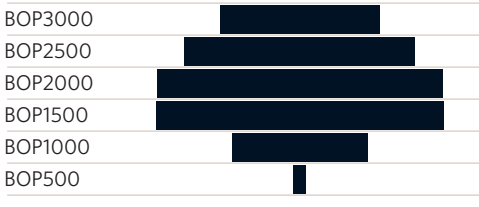
CASE STUDY 4.1 OUTSIDE THE NETWORK: WILLINGNESS TO PAY FOR CLEAN WATER

WaterHealth International, a private company operating in India with both public and private funding, has developed a range of products using an ultraviolet (UV) water disinfection system—from household units to scalable community water systems and franchised water stores. A pilot in Bomminampadu, in the Indian state of Andhra Pradesh, confirmed that low-income communities are willing to pay—both for treated water and for home delivery. Indeed, 80% of households signed up—in a village where before no one had paid a thing for water.

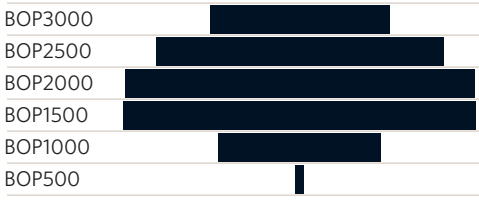
Elsewhere in Andhra Pradesh, Heritage Livelihood Services partners with the Hyderabad Metropolitan Water Supply and Sewerage Board to bring services to peri-urban areas of the city. The company's investments, which included water tanks and working capital to provide for bulk payments for water supplies, have enabled privately-owned water trucks sub-contracted by the government to provide clean water at rates well below those charged by alternative suppliers—though still high enough to cover costs. The company also engages local community organizations to educate people about the value of improved water delivery.

WaterHealth, through its innovative efforts, illustrates a strategy of **focusing on the BOP**. Heritage Livelihood Services, in seeing the community as the customer, is employing a strategy of **localizing value creation**. Both show that private companies can implement BOP business strategies even when public entities are also involved.

Peru
TOTAL WATER SPENDING BY INCOME SEGMENT

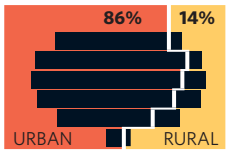


Kazakhstan
TOTAL WATER SPENDING BY INCOME SEGMENT



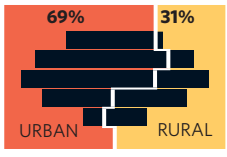
Urban BOP households spend significantly more on water than do rural BOP households.

South Africa

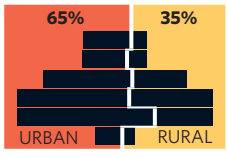


Total BOP water spending by income segment, urban and rural

India



Malawi



In Africa the most heavily urban BOP water markets are in Djibouti, Gabon, Rwanda, and Sierra Leone, where urban spending accounts for more than 90% of the total. In Gabon the urban BOP market is 32 times the size of the rural one. At the other end of the spectrum is Uganda, whose rural market is 6 times the size of its urban market.

Urban spending also drives BOP water markets in Asia. In Pakistan, for example, urban areas account for 84% of the BOP water market, but only 29% of BOP households. Eastern Europe and Latin America, where BOP households also are mostly urban, show similar or even stronger urban dominance. In Ukraine 87% of BOP water spending is urban; in Colombia, 93%.

Urban BOP households also spend significantly more on water than do rural BOP households. In Malawi total BOP spending is twice as much in urban as in rural areas, but spending on water 16 times as much. Nepal shows a similar pattern: the urban-rural ratio for total household spending is about 2:1, while that for water spending is 22:1. Similar but much less extreme differences show up in most countries of Eastern Europe and Latin America.

What does the BOP buy?

BOP households still meet much of their need for water by gathering it from "free" sources—surface water and wells. Some of these sources are safe and protected; others are subject to serious contamination and consequently pose health hazards. The variety of contaminants—waste, heavy metals, chemical and biological agents—requires a range of solutions (case study 4.2).

BOP households in Africa are the most likely to rely on surface water. In the measured African countries 17% of BOP households report surface water as their primary source (compared with only 1% in the mid-market segment). Use of surface water is consistently highest in the BOP500 group and declines as incomes rise. In Burkina Faso, for example, 81% of households in the BOP500 segment use surface water, compared with 69% in BOP1000 and 55% in BOP1500. In Sierra Leone the rates are 47%, 38%, and 27%. In Cameroon, 49%, 40%, and 20%.

In Latin America a smaller share of BOP households rely on surface water as a primary source. Moreover, reliance on surface water drops more quickly as incomes rise. In Peru, for example, 45% of households in the BOP500 segment rely on surface water, but only 32% in BOP1000 and 15% in BOP1500.

CASE STUDY 4.2 **CLEARING UP THE WATER: NEW TECHNOLOGIES SERVING AT-RISK POPULATIONS**

A range of enterprises are developing technologies—based on desalination, disinfection, and filtering methods—to provide affordable point-of-use treatment systems for the variety of contaminants faced by BOP households and communities.

Desalination: Perhaps the simplest method of desalination is evaporation of brackish or salty water and recapture of the salt-free water through condensation. The Watercone does exactly that. Measuring 60–80 centimeters in diameter at its base, the cone can yield more than a liter of water a day under the average solar irradiation in Casablanca. Made from a UV-resistant polycarbonate plastic, the Watercone is nontoxic and recyclable and has a life expectancy of five to seven years. A new product, it is expected to sell for around US$25.

Disinfection: In Madagascar a sustainable local enterprise, Sur'Eau (safe water), is producing a dilute bleach (sodium hypochlorite) water-sanitizing solution for the mass market. Through a social marketing system and a network of more than 10,000 community-based retailers, Sur'Eau has persuaded hundreds of thousands of consumers to purchase the solution—selling more than 500,000 bottles in 2004 alone. The cost to treat enough drinking water for a family for a day, around 20 liters, is less than a penny. Recently Sur'Eau began offering a more concentrated solution in a smaller, lighter bottle, easier to transport to remote locations (PSI 2006).

The consumer products giant Procter & Gamble (P&G), working in collaboration with the U.S. Centers for Disease Control and Prevention, has also produced a dilute bleach product, marketed under the name PuR. P&G is working to make the product fully commercially viable, but it is already being sold in Bangladesh, Botswana, Chad, Haiti, Iran, Malawi, and other developing countries. The white powder comes in a small packet, sold for about US$0.10, that purifies about 2.5 gallons of water. After the tsunami in Southeast Asia in December 2004, PuR was used throughout the region to treat the contaminated water that the disaster left in its wake.

Filtering: Filtering devices have been developed for a range of water contaminants. One device, designed to rid water of bacteria, was developed in 1981 in Guatemala and has been promoted and used across the developing Another device targets arsenic contamination, widespread in much of Bangladesh—where early development initiatives led to the drilling of hundreds of thousands of bore wells, many tapping naturally arsenic-laced groundwater—and in parts of India and Nepal. Working with a Bangladeshi chemist, International Development Enterprises has developed the Shapla Arsenic Filter, based on a ferrous sulfate solution bonded to crushed brick. Incorporated into a vessel, the filter can provide 25–32 liters of arsenic-free water a day. A system sells for US$7, with replacement filters costing less than US$12 a year.

Yet another solution addresses excessive fluoride, also a problem in some parts of South Asia. Mytry, a filter technology developed at IIT-Kanpur, in India, is being sold through a local distribution network targeting a market of nearly 70 million Indians who are at risk. The business strategy calls for selling a quarter million filter units in three years (Meehan and Zaidman 2005).

Two big companies are marketing competing filter technologies in India. Hindustan Lever Limited (HLL), a division of consumer products giant Unilever, produces Pureit, which delivers six liters of purified water for a rupee. Eureka Forbes has the Acquagard line of products, representing a large share of the high-end water filter market. Both HLL and Eureka Forbes are moving steadily down-market to compete for the large BOP segment, engaging large direct sales networks. But price and consumer education remain significant barriers.

U.S. high-tech manufacturer KX Industries is developing a carbon nanofiber filter, the KX World Filter, in a gravity-flow home system, aimed at bringing the most advanced technology within reach of the BOP market. The KX system can deliver water free of dirt, chemical pollutants, and bacterial and viral contamination at US$0.008 a gallon, or US$0.03 a day for a family. The company is also developing a scaled-up village system that can deliver 2,000 gallons a day, reducing the cost to US$0.001 a gallon, with an initial capital cost of around US$150.

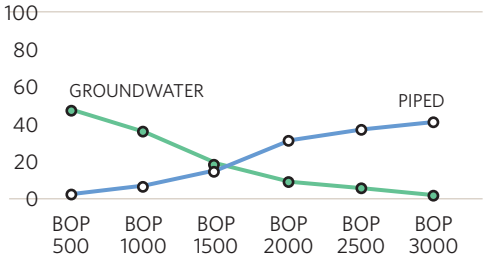
At the other end of the spectrum is a personal filter device, the LifeStraw, combining three technologies: a halogen-based resin that kills bacteria on contact, textile prefilters to remove particles (as small as 15 microns), and active carbon to remove parasites. Each device can purify 700 liters of water—at 2 liters a day, enough for a year. The device does not remove arsenic or excess fluoride, and constant use with saline water reduces its effective life by about half. Not yet a sustainable business endeavor, LifeStraw is promoted primarily through charitable channels.

All these initiatives, aimed at designing solutions for the unique needs of the BOP, exemplify a strategy of **focusing on the BOP.**

While BOP households are more likely to use surface water and less likely to have access to piped water, a third alternative, especially in peri-urban areas, is to buy from mobile water vendors.

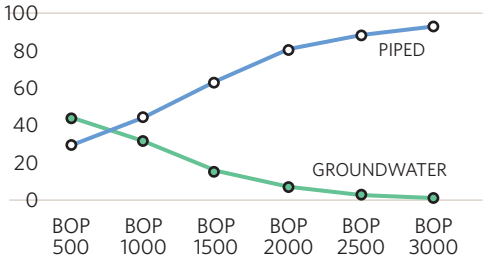
Cameroon

PERCENT OF HOUSEHOLDS BY WATER SOURCE



Peru

PERCENT OF HOUSEHOLDS BY WATER SOURCE



Use of unprotected wells by BOP households, where present in Asia, Eastern Europe, and Latin America, also drops off quickly as incomes rise through the lower BOP income segments. Paraguay is the lone exception, with use of unprotected wells remaining consistently high across all BOP income groups.

In Africa use of unprotected wells similarly remains high across BOP income groups in Malawi, Rwanda, Sierra Leone, and Uganda. In Malawi 26% of BOP households—and in Rwanda, 45%—report relying on unprotected wells as their primary water source.

Is there evidence of a BOP penalty?

There is a widely held view that the BOP suffers a significant penalty in access to safe drinking water—and household survey data confirm this view. Consider access to the most reliable and affordable source, piped water in the home. In 9 of the 29 countries for which sufficient data exist for a comparison, the ratio of mid-market households to BOP households with access to piped water is 6:1 or higher. Data on access to public standpipes show a similar pattern—significantly lower access in the BOP than in the mid market.

While BOP households are more likely to use surface water and less likely to have access to piped water, a third alternative, especially in peri-urban areas, is to buy from mobile water vendors. But this option typically involves a significant price penalty. One study showed that in eight major cities water vendors charge prices 8–16 times those charged by public utilities (UNDP 2006). Another study, covering 47 countries, found that mobile distributors such as tanker trucks charge unit prices up 10 times the price of piped water (Kariuki and Schwartz 2005).

Where BOP communities lack access to municipal water supply networks, point-of-use water purification and small-scale community-based water purification and waste treatment can be useful solutions. The community-based approach underlies an innovative program in Orangi, an informal settlement area in Karachi that is home to 1.2 million people. Community-managed services—latrines, neighborhood collector sewers—link to a municipal system of trunk sewers and treatment plants. Local residents provide labor and financing, and external sources provide

CASE STUDY 4.3 **THE POWER OF PARTNERSHIP: PUBLIC-PRIVATE INITIATIVES TO IMPROVE SERVICE**

Two examples—one involving a cooperative in Bolivia, the other a local government in Honduras—show that innovative approaches can make progress.

Cosmol, a cooperative providing water and sewerage service to 90,000 customers in Montero, a town in the Bolivian tropical lowlands, faced serious discontent in 2000. Members were fed up with bad service, arbitrary rules, a closed-door management, and serious financial disarray. Newly installed management renounced the old culture, promising full transparency and throwing open all records to scrutiny by members.

To secure loans to finance repair and expansion of the water and sewer network, the cooperative agreed to seek new revenues from members. Broad consultation with the community led to a conclusion that customers wanted community health insurance as well as better water supply and sanitation. A US$2 monthly surcharge—enormous in a region where the average monthly wage is only US$70—was imposed, with community approval. After each family had contributed US$150 to the water and sewer fund, the surcharge would drop to US$0.50 a month, enough to continue the health insurance program. The Cosmol experience is evidence of the value of engaging the community in the solution (Constance 2005).

In Puerto Cortés, Honduras, the hurricane of 1993 destroyed much of the already crumbling and failed infrastructure. The local government, headed by then-mayor Marlon Lara, concluded that full cost recovery would be essential for effective service provision. Lara embarked on an extensive public education campaign—and a lobbying effort to gain local control of water and sanitation. A hotly-contested election campaign turned on the question of better water and sewerage service, with higher prices and comprehensive metering of all homes, businesses, and public institutions as central issues.

It took several years, but Lara wrested control of the water and sewer authority from the national government. A new, independent public-private company was established, built on the foundations of the previously public agency, with the local government controlling the underlying assets and a private contractor managing operations under a contract setting performance goals. The company, insulated from political interference, set rates sufficient to fund proper construction and maintenance of the water and sewer system.

Marlon Lara has moved on to a national post, and the city has seen backsliding on rates and expansion of services. But the path to success—depoliticization, citizen consultation, and operational independence—has been made clear (Constance and Cortés 2004; Satterthwaite, McGranahan, and Mitlin 2005).

These examples show that the BOP business strategies of **unconventional partnering** and **localizing value creation** are available to the public as well as the private sector.

technical assistance and materials. Against all expectations and under extremely difficult conditions, the Orangi project has managed to combine cost recovery with high quality.

Similar community-based efforts are gaining traction in Bolivia. The government is finding that engaging communities early and consistently—including by educating people about fees and involving them in construction and continuing oversight—bears fruit throughout the life of a project (case study 4.3).