

COMMUNITY SAFE WATER SOLUTIONS: INDIA SECTOR REVIEW

AUGUST 2014



KNOWLEDGE PARTNERS:



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ABOUT THE REPORT



Safe drinking water remains inaccessible for more than 80 percent of India's rural population despite determined efforts by public, private, and nonprofit organizations to meet this need in rural communities. The priority of the government is wider piped water access. Multilateral organizations provide support through reform initiatives in the areas of institutional capacity building, social education, and developing public-private partnership models. Social entrepreneurs have adopted varying approaches to treatment, distribution, financing, and community engagement. Although these approaches have significant potential, there has been little cohesion among them, making it challenging to achieve the degree of coordination required to deploy them effectively at scale.

This report is a critical step in “tying it all together.” It identifies the need for community safe water solutions (CSWSs) in rural India and reviews the models employed by key sector players to address this need. It provides a platform for assessing and understanding the market for CSWSs by exploring the current economic and operating models, operating challenges, and funding scenarios for ensuring sustainability and scale-up. The report presents recommendations and next steps toward a coordinated agenda to drive sustainable provision of safe drinking water in rural India. It also incorporates key insights from Safe Water Network's Fifth International Forum, “Beyond the Pipe: Sustainable Community Safe Water Solutions,” held October 31, 2013 in New Delhi.

The report is intended for implementers, facilitators, and funding organizations, including nongovernmental organizations (NGOs), technology providers, financial institutions, and foundations. The findings can be useful to government, at the national, state, and local levels, in reviewing policies and planning for budget allocations. Finally, they can be useful for consultants and academicians with an interest in sustainable development models for the rural poor.



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The views expressed herein do not necessarily reflect the views of the reviewed sector organizations.

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The enormity of the drinking water crisis in India requires innovation and collaboration on a massive scale—not only from the government, but also from not-for-profits and the private sector as well.

FOREWORD

The inadequate availability of safe drinking water in rural India has become an urgent threat to the physical and economic health of the country. The government has allocated significant resources to address this challenge; however, sustainable delivery remains elusive due to the high cost of coverage and high failure rates, particularly in rural areas. The enormity of the crisis requires innovation and collaboration on a massive scale—not only from the government, but also from not-for-profits and the private sector as well.

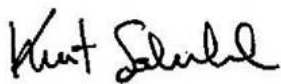
The last 10 years have seen the rapid emergence of locally owned and managed community safe water solutions (CSWSs) as a response to the challenge. Many of these initiatives have made serious strides and have experienced significant success at the local level, exhibiting promise for these solutions to play a role in addressing the issue. To further advance as a sector, however, requires greater coordination, knowledge sharing, and a shift toward “piloting at scale.” This includes clarifying the roles of national and global stakeholders, including government, multilaterals, and the private sector.

To accomplish these goals, it is critical to better understand the current state of these solutions—their successes, failures, challenges, and potential—as well as the circumstances under which these solutions are most appropriate. With this knowledge, we can better define and strengthen the case for scaling the most effective models to meet the needs of the poor across India.

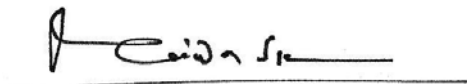
This report—the first in our series—reviews this evolving landscape and its emerging trends. It profiles potential funding sources and other key stakeholders and presents the opportunities and challenges that implementers face as they seek to sustain and scale their operations. Based on these insights, the report provides a series of recommendations to move the sector forward.

We hope this report—developed with the support of our knowledge partners Accenture and Tata Strategic Management Group—provides a useful resource for those who seek to understand the current state of CSWSs and craft solutions that can deliver maximum benefit to rural consumers. We welcome your input and feedback so we can continually improve the report to ensure future versions are useful to all sector stakeholders.

We look forward to working together to realize the promise of CSWSs.



Kurt Soderlund
Chief Executive Officer



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Managing Trustee

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LIST OF ABBREVIATIONS

ADD Acute Diarrheal Disease	NEERI National Environmental Engineering Research Institute
ADB Asian Development Bank	NGO Non-Governmental Organization
ARWSP Accelerated Rural Water Supply Program	NPO Nonprofit Organization
BESU Bengal Engineering and Science University	NRDWP National Rural Drinking Water Program
BoP Bottom of Pyramid	O&M Operation & Maintenance
BOT Build, Operate, and Transfer	OPEX Operating Expenditure
BIS Bureau of Indian Standards	PPP Public-Private Partnership
CAPEX Capital Expenditure	RFID Radio Frequency Identification
CBM Community-Based Management	RMS Remote Monitoring System
CCDU Community and Capacity Development Unit	RO Reverse Osmosis
CO Community Organizers	SHG Self-Help Group
CSR Corporate Social Responsibility	TA Technical Assistance
CSWSs Community Safe Water Solutions	TDS Total Dissolved Solids
CWC Community Water Center	TO Territory Officer
DJB Delhi Jal Board	UF Ultrafiltration
GoI Government of India	UV Ultra-Violet Disinfection
GP Gram Panchayat	VWSC Village Water and Sanitation Committee
HH Household	WASH Water, Sanitation and Hygiene
IEC Information, Education, and Communication	WCA Water Center Assistant
IIT Indian Institute of Technology	WHC WaterHealth Center
IMRB Indian Market Research Bureau	WHI WaterHealth International
KRC Key Resource Centre	WIPL WaterHealth India Private Limited
LPH Liters per Hour	WHO World Health Organization
MARI Modern Architects for Rural India	WQSM Water Quality Surveillance and Monitoring
MDWS Ministry of Drinking Water and Sanitation	WSE Water Service Entity
MoU Memorandum of Understanding	WSP Water Safety Plan
NABARD National Bank for Agriculture and Rural Development	WTP Willingness To Pay



Together we can address affordable, safe water access, identify opportunities to advance these solutions and foster best practices.

EXECUTIVE SUMMARY

This report is organized in two parts: Part 1 presents an overview of the current scenario of drinking water in rural India as a backdrop to understanding the context within which community safe water solutions (CSWSs) are operating; Part 2 presents a preliminary summary of the state of the market for CSWSs, which have emerged in rural Indian communities to address the issue of safe drinking water access. To demonstrate strategies employed and challenges faced by CSWS operators, we include a review of 10 selected organizations committed to implementing CSWSs that serve populations most in need.

Access to safe drinking water is inadequate and inconsistent in rural India. This is particularly important because, despite trends of migration from rural to urban areas, the absolute rural population continues to increase steadily. Government investment in rural water supply tends to focus on piped water solutions while sustainable, community-level solutions are sought only for quality-affected habitations. Even in communities that achieve coverage, slippage rates are high. Such factors suggest that there is a significant gap and a serious need that CSWSs have emerged to fill.

Community Safe Water Solutions (CSWSs)

Over the last 20 years, various CSWSs have developed to meet the need for safe drinking water among rural communities in India. Currently, there are an estimated 7,000–12,000 systems across India.

As we look at 10 reviewed organizations operating CSWSs under different economic models in India, we explore the characteristics of each organization and the challenges it faces. Those highlighted are: Bala Vikasa, Healthpoint Services India, Naandi Foundation, Rite Water Solutions, Safe Water Network, Sarvajal, Spring Health, Water For People, WaterHealth International, and Waterlife.

These organizations fall broadly into three basic categories of economic models: public-private partnerships, in which the venture is funded and operated through a collaboration between the government and a private sector company; community-managed systems, in which the community is an equal stakeholder; and private models, in which a private company or entrepreneur funds and owns a CSWS. These models offer solutions centered on communities, each with its own set of advantages and disadvantages. There is some blurring of the lines between these categories, with some models cutting across more than one category. For example, some private social entrepreneurs seek grants through their nonprofit entities to cover their losses.

Social entrepreneurs and NGOs pioneering CSWS strategies have emphasized creating frameworks that ensure reliability, affordability, sustainability, and social inclusion for underserved rural Indian communities. The reviewed organizations pursue solutions to help recover local operating expenses (OPEX) and build up surplus reserves for maintenance and repairs. A few have attempted to recover capital expenses (CAPEX), though this has proven to be challenging while maintaining affordability for the poor. As a result, some organizations are experimenting with service offerings in urban communities to cross-subsidize the rural operations, with varying degrees of success.

To appropriately gauge the situation of CSWSs in rural India, a fuller appraisal of the state of several market-related factors—such as the size and the composition of target communities, feasibility of CAPEX and OPEX recovery, the sources and uses of funds, and a broader review of all current CSWS players and solutions—is needed. Nonetheless, this first report provides sufficient basis to identify several key challenges that must be addressed to enable these CSWSs to sustainably thrive and grow.

These challenges cut across a range of areas, including economic, consumer, operational, technical, environmental, and policy, and are displayed in Figure 1.

Figure 1: Key challenges to scaling up CSWSs

<p>Economic</p> <ul style="list-style-type: none"> • OPEX and maintenance reserve coverage remains elusive; CAPEX recovery has yet to be achieved, making the sector unattractive for private investment • High priority for piped access limits government budget allocation for CSWSs • High cost and low margins for maintenance and repairs 	<p>Consumer</p> <ul style="list-style-type: none"> • Lack of understanding of correlation between safe water and health • Ability/willingness to pay • Frequent interventions/campaigns needed to sustain demand 	<p>Operational</p> <ul style="list-style-type: none"> • Insufficient skilled labor • Various ownership structures, each with advantages and disadvantages • Poor power quality and lack of service infrastructure poses threat to longevity • Minimal readiness for existing or emerging contaminants
<p>Technical</p> <ul style="list-style-type: none"> • Lack of properly trained managers and operators • Government training programs focus on community educators, leaving the need for technical training unaddressed 	<p>Environmental</p> <ul style="list-style-type: none"> • Groundwater depletion due to conjunctive uses such as agriculture, livestock, industry, etc. • Safe disposal or reuse of reject water can be complicated and costly 	<p>Policy</p> <ul style="list-style-type: none"> • Cost recovery from consumers not uniform as it varies per state • Prevailing tendering process favors lowest bidder and has insufficient provisions to ensure sustainability or reduce life cycle costs • Local governing bodies lack technical skills and bandwidth to supervise operations

Path to Sustainability

Addressing Challenges

CSWSs must achieve sustainability across multiple critical fronts. Key players address the challenges identified above in various ways:

- **Economic:** Key challenges include the elusiveness of OPEX and maintenance coverage and the extremely challenging CAPEX recovery, which makes the sector unattractive for private sector investment, as well as the low margins and high costs of maintenance and repairs. Most of the reviewed organizations seek to cover OPEX, and about half also seek to recover CAPEX. The feasibility of OPEX and CAPEX recovery is a function of many factors, including price, consumer demand, community population size, and willingness to pay. The number of 20-liter (20L) jerry cans that need to be sold daily to recover OPEX varies greatly (ranging from 70-200/day) among reviewed organizations due to these many variables. The same is true for the CAPEX breakeven period (which ranges from a few to 15–20 years). Of six reviewed organizations willing to share financial data, five recovered OPEX, though none recovered other overhead costs that hinder sustainability and ability to scale up.
- **Consumer:** Activating consumer demand is integral for economic success of a CSWS. Pricing, awareness, and ability to pay must first be understood, and then influenced through awareness and education campaigns. Additionally, increasing convenience through distribution networks has the potential to improve economic performance of a CSWS and enhance access.

- **Operational:** Operational sustainability requires effective governance and a system for regular maintenance and repair. Key players use a variety of governance and ownership structures to incorporate stakeholders. In addition, CSWSs face the challenge of balancing cost and type of technology needed to address specific contaminants, as certain technologies have high cost implications and power and maintenance requirements.
- **Technical:** A key component of technical sustainability of a CSWS is the presence of properly trained operators and managers. The government conducts communication programs to sensitize communities on the importance of safe water, but does not invest in training operators and managers or managing technology. Training programs run by CSWSs themselves and educational institutions, such as local industrial training institutes (ITIs) or diploma institutes, cover a variety of topics and skills, but have yet to focus on CSWS management. In addition to training, robust monitoring and evaluation capabilities are critical to technical sustainability. Costs for these requirements are generally not covered by the CSWS' economic proposition.
- **Environmental:** The majority of CSWSs relies on groundwater for source water and in a few cases face the threat of depletion of resources by large consumers of water, such as agriculture and industry. Rainwater harvesting and shallow open wells are employed by some key players to recharge the source water.
- **Policy:** The current tendering process for government contracts tends to prioritize low cost over sustainability. There is a growing effort to push for a tendering process that favors sustainability over the lowest-cost bidder in hopes that this will create an enabling policy environment for CSWSs.

Catalyzing Investment

In addition to the challenges mentioned above, the most critical of the challenges is catalyzing investment, both directly and through the reallocation of funds, to enable the most promising of these solutions to scale. Current and prospective funders that support CSWSs include:

- **Government:** Funding from the Government of India (GoI) is allocated by the Ministry of Drinking Water and Sanitation (MDWS) and the National Rural Drinking Water Program (NRDWP). Additionally, the World Bank and the Asia Development Bank provide funding. A key challenge in securing government funding is that the tendering process favors the lowest bidder as opposed to provider quality or solution durability, making it difficult to convincingly present CSWSs as a viable, competitive option.
- **Commercial:** The absence of economically viable CSWS models operating at scale limits the ability of the sector to attract commercial funding. Some reviewed organizations have secured funding from banks (in the form of micro-, small-, and medium-enterprise loans) and impact investors (usually patient capital provided as debt or equity).
- **Corporate Social Responsibility:** In addition, there is an emerging opportunity to fund CSWSs through corporate social responsibility (CSR). CSR funding for drinking water projects has historically been negligible. Notably, the 2013 Companies Bill requires Indian companies exceeding specified financial thresholds to commit two percent of their profit after tax to CSR initiatives, which includes drinking water, presenting an opportunity for increased CSR funding of CSWSs.

The challenge of catalyzing investment raises the following questions:

- How could a new model of a public-private partnership (PPP) be employed to leverage the contribution and participation of various stakeholders?
- How much incremental funding will in reality be available, given that many companies already allocate CSR funds to other priority initiatives?
- As a sector, how can we best organize to present a stronger case for the economics of CSWSs to governments and financial institutions?

To address these challenges requires support and action from each of the major stakeholders—government, corporates, CSWS implementers, and communities—and would need collaboration, partnerships, and idea sharing among them. Some ideas for how each of these stakeholders could contribute have been compiled below:

Government

- Create an enabling environment by providing viability gap funding to bolster promising CSWSs that fall short of financial viability, and implementing government-led consumer campaigns and mass education programs.
- Enhance the quality of PPPs by mandating pre-bid qualifications and standardizing the time for the contract process, plant setup, and delivery.
- Create a provision to provide initial start-up funding to support CSWS providers, which can act as a guarantee to attract commercial funding.
- Develop policies to regulate quality, reliability, affordability, sustainability, and inclusion in the CSWS market.

Corporates

- Allocate portions of CSR funding to safe drinking water projects, R&D around CSWSs, and environmental sustainability.
- Apply expertise toward improving managerial and technical functions within a CSWS.
- Provide support for organizing large-scale marketing campaigns and consumer awareness programs about the need for safe drinking water, leveraging brand association and corporate marketing campaigns.

CSWS Implementers

- Adopt a framework that enables coordination with other initiatives in the field and promotes transparency. Incorporate the basic principles of quality, reliability, affordability, sustainability, and inclusion.
- Demonstrate to state governments and other influential authorities how CSWSs are effective tools for focusing on water quality and improving the Management Devolution Index (MDI) through increased local participation.
- Develop a sector-wide association of players to enhance the effectiveness of CSWS operations.
- Support public authorities in drafting and implementing related policies pertaining to drinking water.
- Share knowledge across the sector on optimal financial, operating, and pricing models, and successes and failures of innovation in the field.
- Collaborate with universities and other technical institutions to develop new ways to mitigate environmental risks and ensure supply security, reliability, and quality.

Communities

- Enhance the sense of ownership and responsibility among community members to sustain operations.
- Encourage members to be more proactive about obtaining infrastructural support in terms of land, building, raw water source, etc. to help set up CSWSs.
- Form groups to implement various services such as mobilizing local contribution, initiating local infrastructure needs, and managing the installed units.
- Increase inclusion to ensure that all community sections benefit from the CSWS.

Safe Water Network is committed to establishing a growing engagement with the sector through the “Beyond the Pipe” forum series and other events, and to developing and sharing knowledge through periodic sector reviews. This report and the recommended actions represent a step toward improving our understanding of the potential for CSWSs to succeed and achieve scale in the Indian rural milieu. The report aims to supplement the continuing efforts of various stakeholders, including the government, corporates, CSWS implementers, and communities, and encourage deeper collaboration among them to find ways to work together toward a unified agenda for advancing CSWSs in India.





It is estimated that only 17.9 percent out of a total rural population of 833 m Indians have access to treated water. By comparison, 41 percent of the rural population, or 346 m people, own mobile phones.⁹

PART 1. CURRENT SCENARIO OF DRINKING WATER IN RURAL INDIA

Rural India faces uneven and inadequate household access to safe drinking water. Lack of access to safe water takes a considerable toll on the health and economic wellbeing of India's population, and disproportionately affects those in rural areas. About 38 m people are affected by waterborne disease in India each year, and about 400,000 deaths can be attributed to contaminated water annually.¹ Only about one-third of rural households are reached by piped water supplies, and more than half of these deliver untreated water.² Even "improved" water sources may be contaminated by fluoride, nitrate, arsenic, and iron. The 2011 census estimates that 138 m rural households, or about 685–690 m people, lack access to safe drinking water.³ India ranked a low 120th out of 122 nations for its water quality and 133rd out of 180 nations for its water availability.⁴

Despite a trend of migration from rural to urban areas, India's absolute rural population increased by 12 percent between 2001 and 2011.⁵ The central and state governments dedicated ~INR 24,000 crores (US\$4 b⁶) to water and sanitation in 2013–14. Only a small portion of this, however, was invested in CSWSs. While a number of technology providers and manufacturers currently operate in the rural drinking water sector, there is a significant unmet need for community-level solutions that provide safe water to rural communities.

In addition to the issue of access, rural communities in India face high rates of slippage, defined as the percentage of fully covered habitations that slip back to partial or nil coverage. The Department of Drinking Water and Sanitation's "Strategic Plan 2011–2022" found that in 2010, out of 1.66 m habitations in India, 30 percent (0.49 m) had slipped back to partial coverage and a further 9 percent (0.14 m) saw their water quality affected negatively.⁷ This slippage is mainly attributed to lack of sustainable source water and inadequate expenditure on O&M.⁸

CSWSs hold promise for addressing gaps in coverage in contexts in which large infrastructure is not appropriate or in which slippage is an issue. Market penetration is low, indicating that the market is in its initial stage and there is significant potential for growth. This presents a unique opportunity for technology providers and manufacturers to address the unmet need for CSWSs to provide safe drinking water for rural communities in India.

¹ World Health Organization. (2012). Retrieved from http://www.who.int/gho/publications/world_health_statistics/2012/en.

² Census 2011. *Main Sources of Drinking Water 2001–2011*. Retrieved from http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Drinking_Water.pdf.

³ Census 2011. *Main Sources of Drinking Water 2001–2011*. Retrieved from http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Drinking_Water.pdf.

⁴ UNESCO. (2003). http://www.unesco.org/bpi/wwdr/WWDR_chart2_eng.pdf.

⁵ Census 2011. *Main Sources of Drinking Water 2001–2011*. Retrieved from http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Drinking_Water.pdf.

⁶ Conversion rate of 60 INR to US\$1 used throughout.

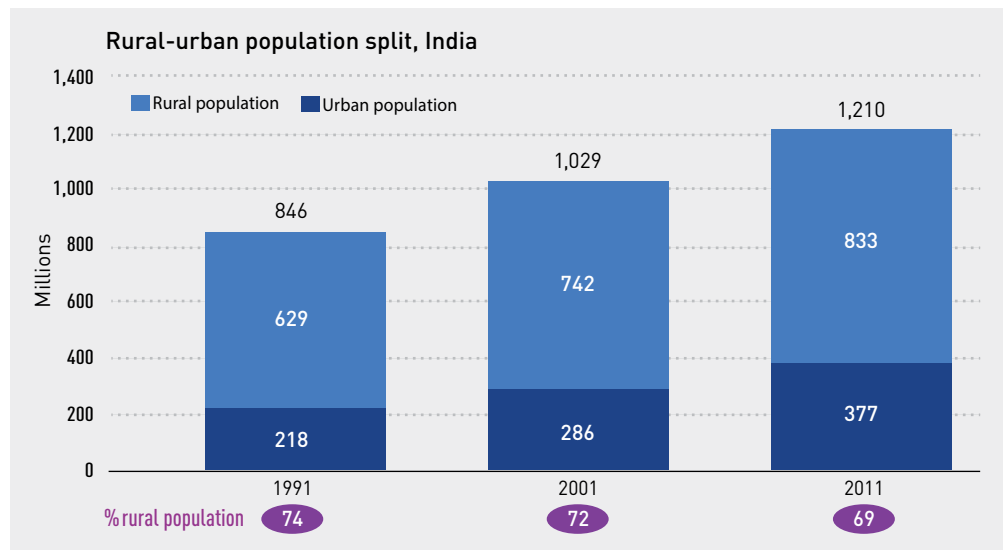
⁷ Strategic Plan 2011–2022. (211). *Ensuring Drinking Water Security in Rural India*. Department of Drinking Water and Sanitation, Ministry of Rural Development, Government of India.

⁸ Reddy, V., Rao, M. S., & Venkataswamy, M. (2010). *Slippage: The Bane of Rural Drinking Water Sector* by Center of Economic and Social Studies. WASHCost (India). Center for Economic and Social Studies. Working Paper No. 6.

⁹ Telecom Regulatory Authority of India [Author?] (2013). Highlights on Telecom Subscription Data as on 30 April 2013. *Telecom Regulatory Authority of India*, 48. Retrieved from <http://www.trai.gov.in/WriteReadData/PressRelease/Document/PR-TSD-03JULY2013.pdf>.

EXHIBIT 1

Despite large-scale migration from rural to urban areas over the past two decades, rural population has risen to 833 million, up 25 percent from 629 million.



Source: Census India

Stakeholders

People

While this report focuses on CSWSs operating in rural areas of India and serving rural households, the lessons could also guide safe water access in peri-urban or urban slums. Challenges of water supply are faced by both urban and rural sectors, but issues for rural areas are often more complex. While India is experiencing a migration from rural to urban areas, the absolute rural population is still increasing. As shown in Exhibit 1, the 2011 estimate of 833 m people is a 12 percent increase over 2001. There is an urgent need to address the issue of providing this growing rural population with equitable access to safe water.

Government

The Ministry of Drinking Water and Sanitation (MDWS) is the nodal department responsible for all activities related to overall policy, planning, funding, and coordination of drinking water programs in the country.¹⁰ MDWS used to be a department under the Ministry of Rural Development. It was conferred “Ministry” status in 2011 to mark the government’s recognition of the growing importance of finding solutions to India’s rural water crisis.

In 2013–14, central and state government had together allocated ~INR 24,000 crores (~US\$4 b) for water and sanitation. CSWSs, however, are allocated funding only for quality-affected habitations. At a state level, some states like Punjab and Karnataka have taken a lead in setting up CSWSs.

Large-scale implementation of safe water solutions and their sustainability need government funding. We have covered this in greater detail in Part 2 of this report (page 28).

CSWS

The problem at hand and its scale leaves a critical gap in the delivery of safe drinking water in rural areas of India. Various small and large international players have emerged in the last two decades to fill this gap. The last decade has seen various established organizations moving into this sector, such as Naandi Foundation and WaterHealth International (WHI). It is now estimated that there are between 7,000–12,000 improved water systems across India. The next section describes the CSWS market in detail.

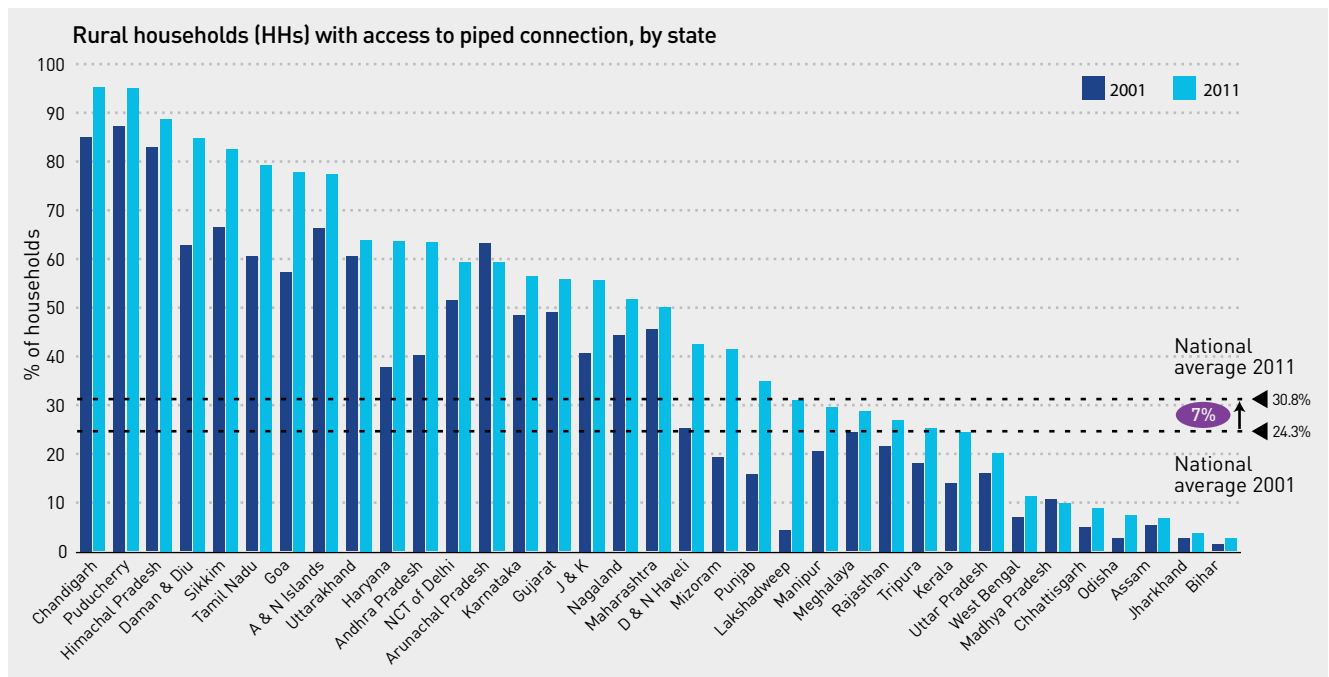
¹⁰ Gadkari, S. N. J., & Kushwaha, S. U. (2014). About US. Ministry of Drinking Water and Sanitation. Retrieved from http://mdws.gov.in/sites/upload_files/ddws/files/pdfs/AboutUs.pdf.

Water Quantity and Quality

Household access to piped water in rural India is patchy and insufficient and in many cases doesn't mean access to treated water. As shown in Exhibit 2, the percentage of households in rural areas served through piped systems has increased from 24.3 percent in 2001 to 30.8 percent in 2011, but two-thirds of rural Indian households are still living beyond the pipe.¹¹ In 2011, 13 out of 28 total states and seven union territories had a percentage of households with piped connection below the national average of 30.8 percent.

Exhibit 3 shows the breakdown of the 30.8 percent of rural households with access to piped water into those with and without access to treated water. Only 17.9 percent had access to treated water. The 12.9 percent of rural households (approximately 21.6 m people) served by untreated piped connections, constitutes a potential market for CSWSs along with the 69.2 percent of households (approximately 116 m people) that live beyond the pipe.

EXHIBIT 2 Rural households' access to piped water has increased since 2001; however, the coverage is still less than one-third.

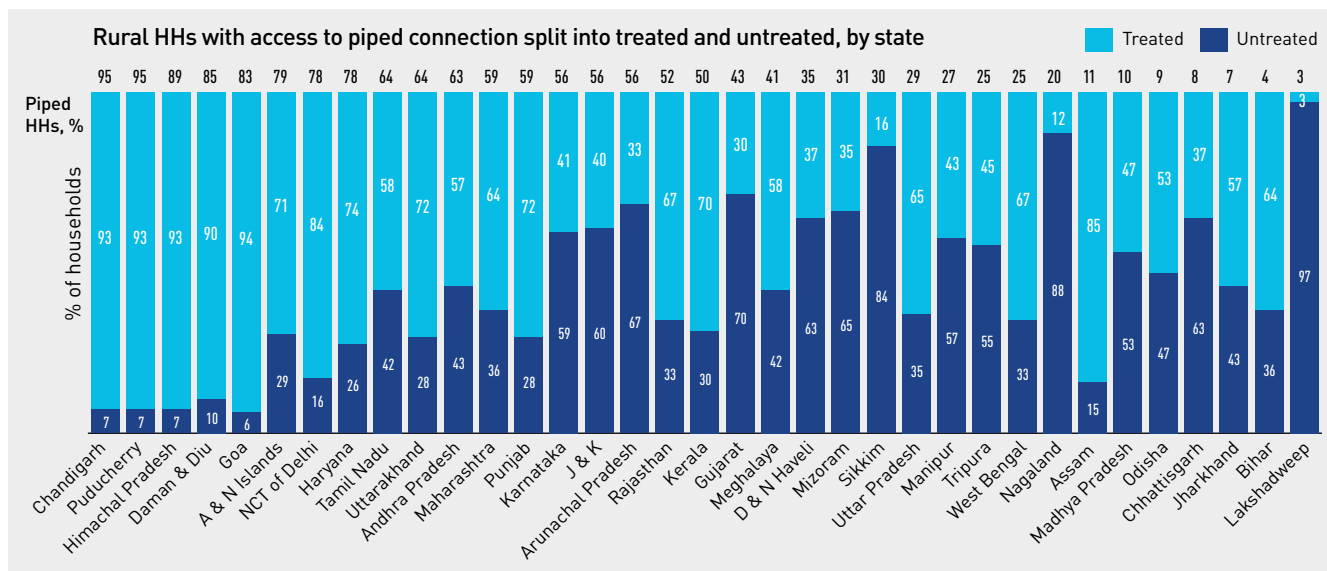


Source: Census India (2011).

¹¹ Census 2011. *Main Sources of Drinking Water 2001–2011*. Retrieved from http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Drinking_Water.pdf.

EXHIBIT 3

Out of the 30.8 percent of rural households with piped water, 42 percent have access to untreated water (i.e., 13 percent of all rural households).



Source: Census India (2011).

Of the 116 m rural households living “beyond the pipe,” the majority depends on hand pumps/tube wells, while the rest rely on well water or other unidentified water sources. These sources are collectively referred to as improved sources. Drinking water from hand pumps, tube wells, and bore wells is typically considered safe by the general public as it is extracted from underground sources. However, data recently submitted to the Parliament by the Ministry of Water Resources¹² show that groundwater sources in India are mainly contaminated by arsenic, fluoride, iron, nitrate, and salinity. The acceptable and permissible limits of these compounds in drinking water as per Bureau of Indian Standards IS: 10500, together with their impact on human health and the principal sources of contaminations, are illustrated in Exhibit 4.

EXHIBIT 4

Major contaminants with the acceptable and permissible limit as per BIS* health impacts and sources

Parameter	Limits		Health Impacts	Sources
	Acceptable (mg/L)	Permissible (mg/L)		
ARSENIC	0.01	0.05	<ul style="list-style-type: none"> Weight loss, lack of energy Depression Skin and nervous system toxicity Cancer upon prolonged exposure 	<ul style="list-style-type: none"> Geological settings Previously used pesticides in orchards Improper waste disposal or product storage of glass or electronics
FLUORIDE	1	1.5	<ul style="list-style-type: none"> Brownish discoloration of teeth Bone damage Fluorosis 	<ul style="list-style-type: none"> Geological settings Industrial waste
IRON	0.3	No relaxation	<ul style="list-style-type: none"> Imparts blackish color, rusty sediment, bitter or metallic taste, brown-green stains, iron bacteria to food and beverages 	<ul style="list-style-type: none"> Geological settings Leaching of cast iron pipes in water distribution systems
NITRATE	45	No relaxation	<ul style="list-style-type: none"> Methemoglobinemia or blue baby disease in infants 	<ul style="list-style-type: none"> Natural deposits, decaying plant deposits, livestock waste Septic systems, fertilizers and household waste water
TOTAL DISSOLVED SOLIDS (TDS)	500	2000	<ul style="list-style-type: none"> Objectionable saline taste to water, may affect osmotic flow and movement of fluids Could lead to kidney stones at very high levels 	<ul style="list-style-type: none"> Natural deposits, deep ground water Nature of soil and landfills

*Bureau of Indian Standards (BIS) Source: Bureau of Indian Standards IS 10500:2012 (second revision).

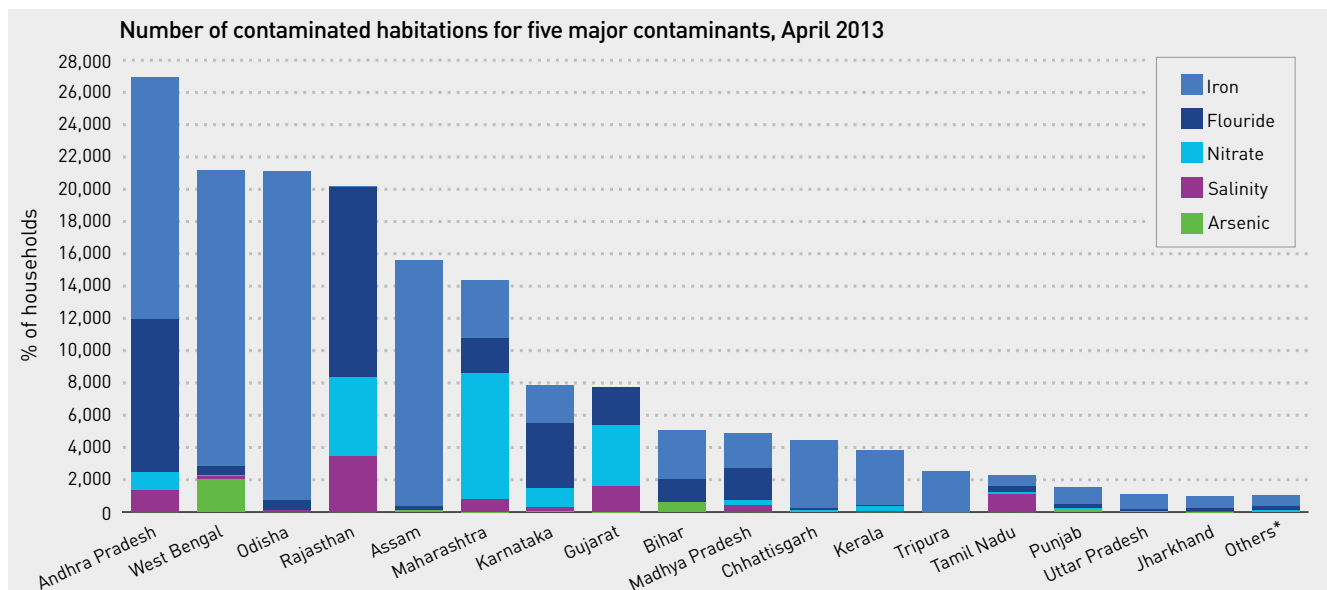
¹² Sethi, N. (2012). Poison in India's Groundwater Posing National Health Crisis. *The Times of India*. Retrieved from http://articles.timesofindia.indiatimes.com/2012-05-02/pollution/31537647_1_groundwater-nitrates-aquifers.

The IMIS report by NRDWP for 2013–14 shows that about 36,147 habitations in 23 states have fluoride contamination in their drinking water, with 7 states having more than 1,000 habitations with fluoride contamination.¹³ Fluoride may cause fluorosis, a disease that causes mottling of the teeth and, when severe, potential weakening of the skeletal system. Fluoride levels present in drinking water have been found to range from 0.2–8.32 mg/L in Bihar, 1.5–18 mg/L in Gujarat, and 0.4–29.0 mg/L in Andhra Pradesh, against the permissible limit of 1.5 mg/L.¹⁴

Though CSWSs do exist in some habitations contaminated by fluoride, they are outnumbered by communities with visible effects of fluorosis. A critical point to note is that these visible effects increase demand and awareness in the affected communities.

As shown in Exhibit 5, iron is the most common contaminant, present in 27 states and contaminating 94,343 habitations. Nitrate, found in 22 states, affects about 19,835 habitations. Salinity affects about 9,389 habitations in 19 states, and arsenic contaminates 2,868 habitations in 12 states.¹⁵

EXHIBIT 5 Indian water sources are typically contaminated by arsenic, fluoride, iron, nitrate and salinity, with iron being the most common.



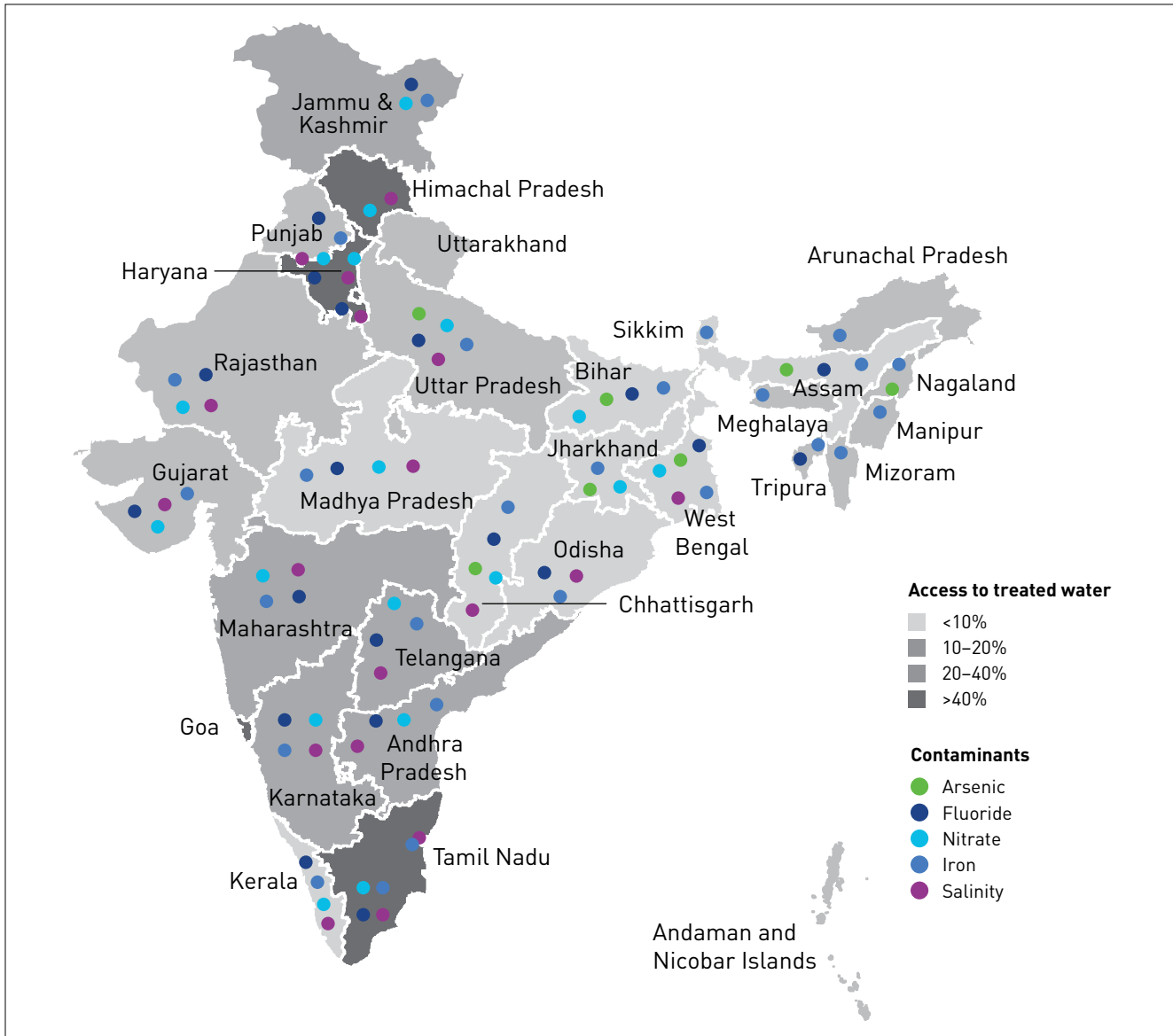
*Others include Haryana, Himachal Pradesh, Jammu and Kashmir, Manipur, Uttarakhand, Arunachal Pradesh, Meghalaya, Mizoram, Andamand and Nicobar. Source: Ministry of Drinking Water and Sanitation (MDWS).

Improved water sources typically considered safe by the general public have been found to be chemically contaminated.

¹³ Ministry of Drinking Water and Sanitation. (2014). *National Rural Drinking Water Program*. Government of India. Retrieved from http://indiawater.gov.in/imisreports/Reports/Physical/rpt_RWS_NoOfQualityAffHabitations_S.aspx?Rep=0&RP=Y&APP=IMIS.
¹⁴ Susheela, A. K. (2013). *About Fluorosis: National Prevalence of Fluorosis*. Fluorosis Research & Rural Development Foundation. Retrieved from <http://www.fluorideandfluorosis.com/fluorosis/prevalence.html>.
¹⁵ The IMIS report does not give any limit of concentration values for salinity as total dissolved solids.

Exhibit 6 shows the states of India where the principal contaminants have been detected in water sources. Chemical contaminants are found all over the country, with iron being the common contaminant.

EXHIBIT 6 Principal chemical contaminants are found in water sources all over India.



Source: Central Ground Water Board, 2010.

The location of CSWSs, as of now, is not entirely governed by the presence of contaminants, as critical factors like infrastructure availability, willingness and ability of communities to pay, size and terrain of habitation, potential to set up viable operations, and maintenance support services have been given priority to sustain operations.

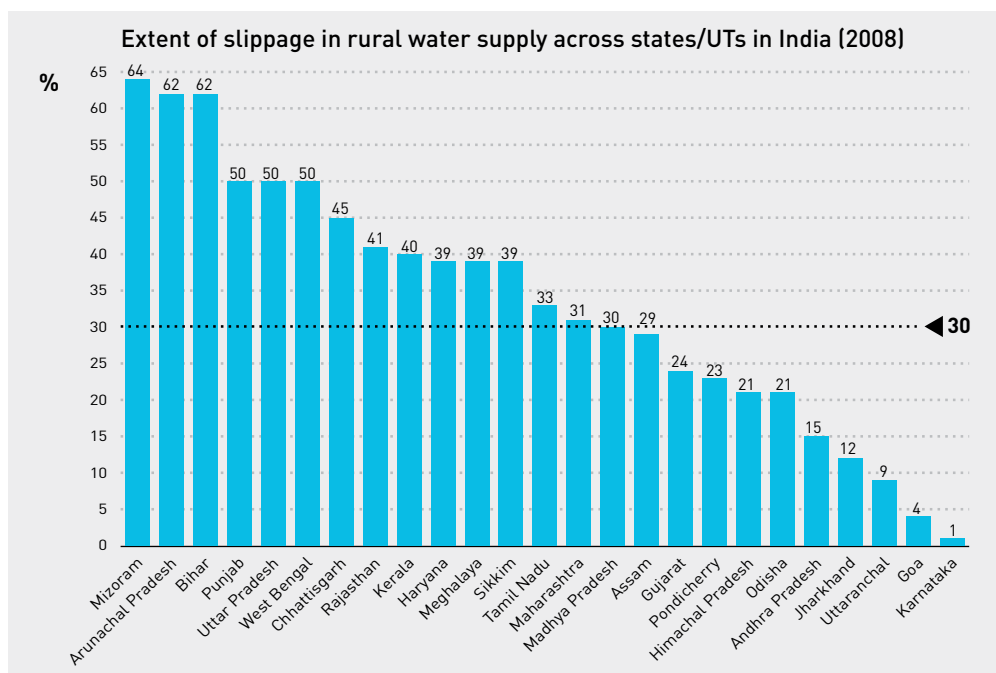
Estimation of Slippage

The status of household access to safe drinking water in rural India can be gauged accurately when slippage or the system life is taken into account. While reported data as of March 2014 show that India has achieved almost 91 percent coverage in terms of improved water sources (piped and un-piped),¹⁶ service delivery does not sustain over time. Slippage, defined as the percentage of fully covered habitations that slip back to partial or nil coverage, was more than 30 percent in 2008 at the national level (Exhibit 7). In 2008, 14 states recorded slippage at rates higher than the national average.¹⁷ Similarly, the Strategic Plan 2011–2022 by the Department of Drinking Water and Sanitation found that in 2010, out of 1.66 m habitations in India, 30 percent (0.49 m) had slipped back to partial coverage and a further 9 percent (0.14 m) saw their water quality affected negatively.¹⁸

The main reason identified for slippage is the lack of sustainability relating to the source of water and inadequate O&M expenditure.¹⁹ This slippage affects coverage and the potential market size meaningfully exceeds the estimated 690 m people in rural India who are not provided treated piped water as per the 2011 census. CSWSs have the potential to play a role in addressing these gaps caused by slippage.

EXHIBIT 7

In 2008, slippage* at the national level was estimated to be 30 percent.



*Slippage is defined as the percentage of fully covered habitations that slip back to partial or nil coverage. Source: Census India (2011).

¹⁶ Ministry of Drinking Water and Sanitation. (2014). *National Rural Drinking Water Program: State Statistics (2013–2014)*. Government of India. Retrieved from http://indiawater.gov.in/imisreports/Reports/Profile/rpt_StateProfile.aspx?Rep=0.

¹⁷ Reddy, V., Rao, M. S., & Venkataswamy, M. (2010). "Slippage": *The Bane of Rural Drinking Water Sector (A Study of Extent and Causes in Andhra Pradesh)*. WASHCost (India). Centre of Economic and Social Studies. Working Paper No. 87.

¹⁸ Ministry of Drinking Water and Sanitation. (2011). *Strategic Plan—2011—2022: Ensuring Drinking Water Security in Rural India*. Ministry of Rural Development, Government of India.

¹⁹ Reddy, V., Rao, M. S., & Venkataswamy, M. (2010). "Slippage": *The Bane of Rural Drinking Water Sector by Center of Economic and Social Studies*. WASHCost (India). Center for Economic and Social Studies. Working Paper No. 6.

Market Potential and Investment Required

The 2011 census estimates that 138 m rural households, or about 685–690 m people, lack access to safe drinking water. The Ministry of Drinking Water and Sanitation reports that there are around 84,000 quality-affected habitations across India.²⁰ During the 10th and 11th Five Year Plans, the government invested INR 601.08 b²¹ (US\$10 b) and INR 891 b²² (US\$15 b) respectively for rural piped water supply and sanitation. This investment increased the piped water access infrastructure in rural India from 24.3 percent to 30.8 percent, as reflected in the 2001 and 2011 censuses respectively.

In estimating the investment required for setting up safe water treatment systems that will provide safe drinking water, we exclude securing a sustainable source of water from our calculation. As described below, estimates of the investment required assume that a sustainable source of water supply is available and the safe water system is provided at an accessible location for the users. The value chain in providing safe drinking water to rural households (see graphic above) includes a sustainable source of water, a water treatment system to remove the biological and chemical contaminations, and infrastructure to deliver the water safely to the user. Access to a sustainable source of water is a critical issue for CSWS operation in India that is covered briefly in the “Path to Sustainability” section of this report (page 37).

The investment required can be determined by two methods; one is to look at how much is required to provide safe drinking water to 690 m people on a household level, and the other is to look at the number of habitations currently quality-affected or severely underserved with less than 25 percent of 55L per capita per day of water supply (Exhibit 8). Both of these approaches have merits and challenges; hence, a combination will give the right perspective about the investment required. The estimated investment required to provide 2L/day of safe water to all quality-affected habitations ranges from 6,000 crores (US\$1 b) to 12,000 crores (US\$2 b). In order to provide all households with 5L/day of safe water to cover drinking and cooking needs, an estimated 75,000 crores (US\$12.5 b) would be required.²³ The minimum investment considers low-cost interventions and centralized safe water systems. The maximum investment considers placing safe water systems closer to the habitations.



²⁰ Ministry of Drinking Water and Sanitation. *Format 1: Target & Achievement of Habitation (2014–2015)*. National Rural Drinking Water Programme. Retrieved from http://indiawater.gov.in/imisreports/Reports/Physical/rpt_RWS_TargetAchievement_S.aspx?Rep=0&RP=Y&APP=IMIS.

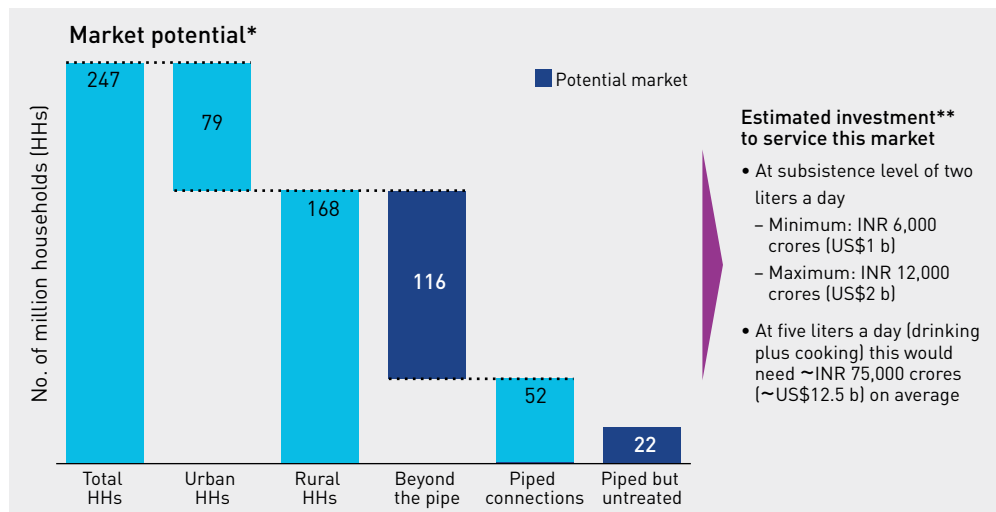
²¹ Planning Commission, Government of India. (2011). *Mid-Term Appraisal: Eleventh Five Year Plan, 2007–2012*. Planning Commission, Government of India. Retrieved from http://planningcommission.nic.in/plans/mta/11th_mta/chapterwise/Comp_mta11th.pdf.

²² Ministry of Drinking Water and Sanitation. (2011). *Twelfth Five Year Plan—2012–2017: Report of the Working Group on Rural Domestic Water and Sanitation*. Government of India. Retrieved from http://planningcommission.gov.in/aboutus/committee/wrgrp12/wr/wg_indus_rural.pdf.

²³ Estimates include the following assumptions: 1. Every rural person without access to safe drinking water will be served by CSWS. 2. The number of people without access to safe drinking water is as per the 2011 census report. 3. For the OPEX and CAPEX calculations, any benefits arising out of economies of scale have not been considered. 4. Average costs of CSWS are considered, but may change considerably with the type of treatment and population served.

EXHIBIT 8

About 690 million people or ~140 million households is the potential market size for CSWSs.



*As per NRDWP data on 01/04/2013. **Includes capital cost and operating cost for one year.
Source: Census India (2011); NRDWP (2013-14).

However, the investment needed could be far higher if all the affected rural habitations having less than eight hours of electricity supply must be provided with requisite alternate energy sources (e.g., solar). Further investment may be required to provide a sustainable water source such as a watershed or water harvesting. The operations and maintenance cost beyond the first year will be in addition to the above.

Though the need for CSWSs is justified and the market potential is promising, there is some uncertainty regarding how much of the projected demand will transform into actual demand. This is a major issue in estimating the potential market size of CSWSs, especially for treating only microbial contamination, because such diseases peak during summer or monsoon season and the willingness to purchase purified water is low in other seasons, which is critical for a sustainable CSWS operation. Along with this, there is a need to catalyze consumers to convert this need into a feasible market.

Estimation of the Health and Economic Costs of Unsafe Drinking Water

The World Health Organization (WHO) reports that India accounts for 21 percent of the world's global burden of disease.²⁴ WHO estimates that, in India, about ~38 m people are affected by waterborne diseases every year, of which over 75 percent are children; 780,000 deaths are attributable to contaminated water and more than 400,000 are attributed to diarrhea alone. This also generates an economic cost for the country. This was last estimated at US\$600 m annually as almost 73 m working days are lost due to waterborne disease each year. Notably, India ranked a low 120th out of 122 nations for its water quality and 133rd out of 180 nations for its water availability.²⁵

The most common waterborne diseases in the country are diarrhea, enteric fever, and cholera.²⁶ Acute Diarrheal Disease (ADD) is the most common waterborne disease across India. Globally, diarrhea is the second leading cause of death in children under five years old with around 760,000 deaths attributed to it annually.²⁷ In 2009, there were around 12 m reported cases of ADD and about 1,800 deaths in India directly linked to ADD.²⁸ The rationale for CSWSs becomes even stronger when the health issues and their economic burden on rural households are considered. Rural consumers who understand the health benefits of safe water are usually willing to switch to safe water sooner to avoid health-related costs.

²⁴ World Health Organization. (2013). *Country Cooperation Strategy: India at a Glance*. World Health Organization. Retrieved from http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_ind_en.pdf.

²⁵ UNESCO, 2003. http://www.unesco.org/bpi/wwdr/WWDR_chart2_eng.pdf

²⁶ Kakoty, C. *Managing Water Borne Diseases*. Press Information Bureau, Guwahati. Retrieved from <http://pibguwahati.nic.in/feature5.asp>.

²⁷ UNICEF. (2009). *Diarrhoea: Why Children Are Still Dying and What Can Be Done*. UNICEF.

²⁸ National Health Profile 2010 (2010). *Health Status Indicators*. National Health Profile 2010, Ch.3, 64–67. Retrieved from <http://cbhidghs.nic.in/writereaddata/mainlinkfile/file1012.pdf>.

Water Treatment Technologies

Technologies range from simple water chlorination to several-stage treatment comprising media filtration, activated carbon filtration, reverse osmosis (RO), ultraviolet filtration (UV) and iron removal. Exhibit 9 shows a simple schematic illustrating relative cost and removal capability of the main technologies used by selected organizations.

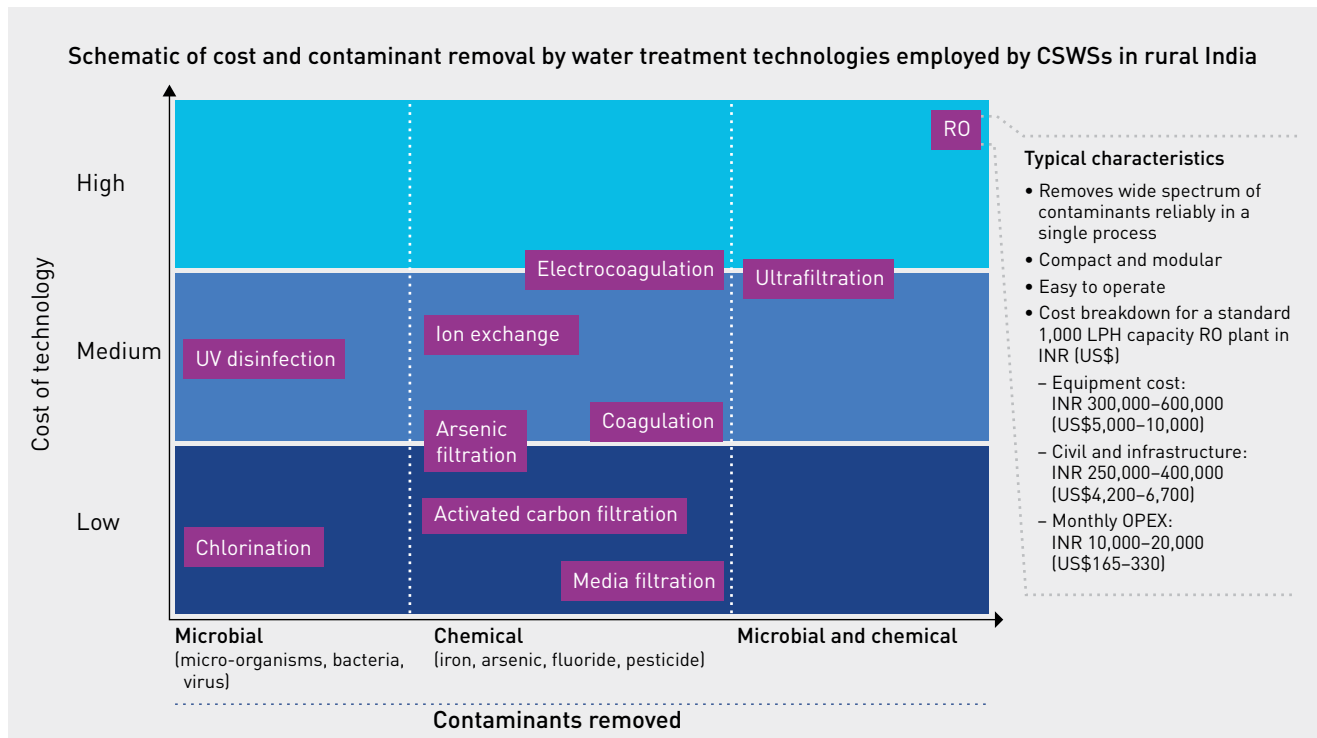
Some organizations specialize in a single technology, e.g., Water For People only installs filters for arsenic removal while others, like Rite Water, Healthpoint Services, and Waterlife, install different technologies according to the contaminants to be treated. While this representation is not exhaustive of all water treatment technologies employed in rural India, it shows the range of choices available to CSWSs.

The most common technology adopted by CSWSs in rural areas covered in this report is RO²⁹, followed by UV disinfection. RO technology pushes water under pressure through a semipermeable membrane to remove the bulk of contaminants, such as microorganisms, bacteria, viruses, particles, colloids, organics, and inorganic chemicals. It is one of the best available methods for treating brackish water, surface water, and groundwater. Exhibit 9 shows CAPEX and OPEX of a typical RO plant producing 1,000 LPH.

RO is an energy-intensive treatment due to the pressure required to push the water through the membrane. Mechanical and/or chemical pretreatment is necessary for an RO system to reduce fouling (membrane clogging) and scaling of inorganic compounds on the membrane, causing membrane failure in the long term. Fouling and scaling require chemical cleaning of the membrane, increasing the use of chemicals, hence the operational costs and the potential impacts on the environment if the chemicals are not properly disposed of.

EXHIBIT 9
NON-EXHAUSTIVE

Despite high costs, RO technology has vast acceptance among Indian CSWSs due to ease of operation and “one stop” nature of solution.



Source: Expert interviews; team analysis.

²⁹ Tenth Five Year Plan, 2002–07: Rural Water Supply and Sanitation. Sectoral Policies and Programs, Ch. 5.5., Vol. 2.

RO is a complex technology, with multiple points of failure and requirement of specialized technical support for maintenance. Furthermore, RO produces a reject (usually 30–60 percent of the source water) that has a higher concentration of contaminants than the source water and must be properly managed. Despite these drawbacks, RO is the preferred technology for CSWSs in India because it is compact, modular, and relatively easy to operate, in addition to having the ability to remove a wide spectrum of contaminants reliably in a single process.

Technology Providers and Manufacturers

The sector players involved in the CSWS market employ technology providers and manufacturers for setting up the CSWS. Some of the principal technology providers and manufacturers in India are illustrated in Exhibit 10.

EXHIBIT 10
NON-EXHAUSTIVE

While technology providers and manufacturers of various scale operate in India, large players like Pentair, Tata Projects, and Ion Exchange dominate the market.

Competition Tier	Characteristics	Indicative list of key players
<p>Large</p>	<ul style="list-style-type: none"> Nationally recognized brand Established sales and after-sales service network 	<ul style="list-style-type: none"> Fontus Pentair Ion Exchange Thermax Tata Projects General Electric Doshion Eureka Forbes
<p>Medium</p>	<ul style="list-style-type: none"> Regionally recognized brand Limited promotional expenditure Restricted reach and sales support network 	<ul style="list-style-type: none"> Rite Water Waterlife WaTech
<p>Small</p>	<ul style="list-style-type: none"> Low credible products Limited promotional expenditure Local-level providers with limited reach and sales support 	<p>Various small local players</p>

Source: Expert interviews; team analysis.

Based on the size of activities, the technology providers and manufacturers can be divided into:

- Small players:** A large number of small, regional providers of treatment equipment are present across the entire value chain. While some players simply assemble water treatment equipment (usually for a local entrepreneur), others bid for government contracts or approach villagers to set up and operate a plant.
- Medium-size players:** Some of the regional equipment providers have recognized the opportunity in the rural sector and provide a broad range of offerings, including providing equipment, setting up and operating the plant, providing service and maintenance support, and distributing the water. These players generally employ the PPP model.
- Large providers:** Various national and international water treatment equipment providers are present in India. However, the market is dominated by a few players such as Tata Projects, Pentair Water, and Ion Exchange. Most of these players primarily focus on the industrial, municipal, and urban residential market and have limited interest in the rural community drinking water space due to the following challenges:

- Small and immature market – Low demand and scarce consumer awareness of the health risks of unsafe drinking water result in a small number of installations.
- Lack of economies of scale – Although social enterprises and NGOs are trying to create clusters of CSWSs, the number of plants employing the same technology is still too low to create economies of scale, especially for creating a service support structure.
- Limited ability of rural consumers to pay – Systems need to be designed or modified to have low capital cost and be cost-efficient.
- Geographically disperse and remote nature of CSWSs – Many CSWSs are located in remote areas, making the management of the distribution channels and the provision of after-sales support difficult and expensive.
- Inability to compete with small, unorganized players – Small players are able to provide equipment at much lower prices and win government contracts as the lowest bidders.
- Large players do not wish to enter this market due to the above-mentioned reasons, overhead costs, and reluctance to enter into a long-term contract in a region where they may exert little control.

The potential size of the market described in the previous section offers a unique opportunity for technology providers and manufacturers. Very low penetration indicates that the market is at its initial stage and there is significant growth potential.





Although CSWS implementers have been present in India for many years, the challenges associated with providing sustainable services and scale-up of operations have also persisted.

PART 2. COMMUNITY SAFE WATER SOLUTIONS (CSWSs) SECTOR OVERVIEW

The need for safe drinking water in rural areas of India, stemming from insufficient quality and quantity of safe drinking water and the associated economic impact of unsafe water on communities, provides a strong rationale for the role of CSWSs. Various players have emerged in the last two decades; the actual count on the number of CSWSs currently operating in India is unknown, but it is estimated that there are between 7,000–12,000 units across India. The last decade has seen various established organizations moving into this sector, such as Naandi Foundation and WaterHealth International (WHI). Most CSWS players focus on a range of water-quality challenges using various treatment technologies. Although CSWS implementers have been present in India for quite some time, the challenges associated with providing sustainable services and with scale-up of operations have also persisted.

The following pages discuss the characteristics of 10 reviewed organizations, namely Bala Vikasa Social Service Society, Healthpoint Services India, Naandi Foundation³⁰, Rite Water Solutions, Safe Water Network, Sarvajal, Spring Health Limited, Water For People, WaterHealth International, and Waterlife. The main characteristics of these reviewed organizations have been compared in Exhibit 11. Though this list is not exhaustive of all the social enterprises and NGOs operating in the rural sector in India, the selected organizations offer a good panorama of the CSWS market. Apart from the information available for each single organization on the web, various interviews and discussions were held with these selected key players by Safe Water Network to understand and compare their operating and economic models. The WHI case study is based primarily on secondary data sources.³¹

Some organizations have been operating in India for nearly 20 years, like Water For People, established in 1996, while others are more recent, like Rite Water and Waterlife, which both started in 2009. The operating footprints vary greatly, from 44 water supply units for Safe Water Network to over 500 for WHI, but none have yet found a flawless formula for scale-up on a sustainable basis. The capacity of the installed plants ranges from 250–2,000L per hour (LPH). Depending on the community size and the power availability, the majority of plants installed are 1,000 LPH or 500 LPH. The 500 LPH plants are generally installed in states where daily power availability exceeds 20 hours. This installed capacity is the minimal viable capacity needed for sustainable operations.

³⁰ Since 2010, Naandi Foundation has become a private company called Naandi Community Water Services.

³¹ Sources include WHI website, WHI presentations, and WHI case study by International Financial Corporation. Accessed 10 January 2014.

Ownership

Various ownership and operating models are being deployed. A focus on full community ownership and operation is adopted by three of the reviewed organizations (Safe Water Network, Water For People, and Bala Vikasa Social Service Society). Naandi and WHI own the water kiosks for an initial period of 5–15 years, during which they employ community members to operate them, and then transfer the ownership and operation to the community after completion of the stipulated period. The government owns CSWSs set up by Rite Water for the first three to five years, during which Rite Water operates them, and then both ownership and operation are transferred to the community. Waterlife directly operates its water stations, which are owned by the government. Healthpoint and Spring Health own and operate their kiosks, with Spring Health employing local entrepreneurs for sale and revenue collection only. Sarvajal relies on the franchise model, where it owns the equipment and shares an agreed proportion of the collections.

Capital and Operating Expenses

The average capital expenditure (CAPEX) for setting up the water treatment units ranges from INR 30,000 (US\$500) for chlorination plants to INR 1,500,000 (US\$25,000) for the most expensive reverse osmosis (RO) and UV treatment. The average monthly operating expenditure (OPEX) for a plant ranges from INR 1,500 (US\$25) for chlorination plants to INR 20,000 (US\$333) for RO and UV plants. OPEX usually includes operator salary, technical support, power, chemicals, consumables, spares, and general maintenance costs. The operator salary, representing an average of INR 3,000–5,000 (US\$50–83) per month, constitutes around 30 percent of OPEX for four of the organizations (Naandi, Healthpoint, Sarvajal, and Safe Water Network) that employ complex treatment technologies (i.e., RO, UV, ion exchange) and increases to about 70 percent of OPEX for two reviewed organizations employing chlorination and arsenic filters technologies—Spring Health and Water For People.

Pricing

CSWSs generally charge between INR 0.1 (US\$0.002) to INR 0.5 (US\$0.008) per liter. Only one organization, Water For People, is able to charge considerably less, INR 0.02–0.04 (US\$0.0003–0.0007) per liter by using an arsenic-removal technology that does not require an operator. Seven out of ten key players price the treated water for consumers for 10–20L jerry cans; two ask for an additional subscription fee that covers part of the cost of standard water cans. In this sector, the term “user fee” is invariably used to denote the pricing toward water treatment. The other three reviewed organizations (Healthpoint Services, Naandi Foundation, and Water For People) charge fixed monthly fees that allow withdrawal of 20L/day. Rite Water is the only organization that does not charge fees from its consumers, as OPEX is covered by government contracts, grants, and donations. For distribution, the water price is generally doubled by the distributor to cover fuel costs, drivers’ salaries, and vehicle depreciation.

Organization Summaries

Note: Additional information on each organization is provided in the Appendix.

Bala Vikasa Social Service Society is a not-for-profit, non-governmental organization providing a range of community development services (including safe drinking water) in Warangal and Telangana. The organization's objective is to provide capacity-building programs to improve the lives of the poor. The approach is based on consumer demand and local ownership, with plants operated and managed by village water committees. To date, Bala Vikasa has established more than 520 reverse osmosis water systems, providing access for roughly 190,000 people. As a majority of capital costs are provided as grants, each water system is only required to generate revenue sufficient to meet its ongoing OPEX. This enables Bala Vikasa to set a lower price for water (INR 2, or US\$0.03, per 20L) than other CSWSs that seek capital recovery.

Healthpoint Services India is a for-profit social enterprise established to provide a broad basket of healthcare-related benefits to rural communities. Offerings initially included not only safe water, but also a range of technology-enabled primary healthcare services (telemedicine, pharmacy, and basic diagnostic services). The health-related services were subsequently spun off into a separate NGO. Healthpoint Services currently operates in 140 villages in Punjab and 30 villages in Andhra Pradesh, and charges INR 80 (US\$1.30) per household per month for safe water provision. Healthpoint Services now plans to expand its reach in the states of Haryana, Himachal Pradesh, Uttar Pradesh, and Karnataka.

Naandi Foundation is a nonprofit organization that has established a public-private partnership model for the installation and management of water plants. In 2008, it launched Naandi Community Water Services, a private entity, to focus on access to safe drinking water through the provision of inexpensive services. They currently provide safe water access for nearly 400,000 households across the states of Andhra Pradesh, Telangana, Karnataka, Haryana, and Punjab through 405 Community Safe Water Centers. Naandi deploys one of two technologies (reverse osmosis or ultraviolet purification), depending on the local water challenge. Some 30 m liters of water are distributed each month at a price of INR 3–4 (US\$0.05–0.06) per 20L. Naandi seeks to build acceptance of the idea of paying for water by clearly positioning itself as a provider of water purification services rather than as a provider of water. Going forward, the organization's priorities include streamlining the staff training process and identifying suitable technology for real-time tracking of water quality and operational data.

Rite Water Solutions is a private company that manufactures and supplies water treatment solutions for domestic and industrial use. The company bids for government contracts to install and operate community water systems for a defined period, typically three to five years, and targeting “micro-villages” of fewer than 1,000 people. Rite Water currently manages 125 such water systems across Maharashtra, Chhattisgarh, and Madhya Pradesh, providing water free of charge in exchange for government funding. Recently, Rite Water established its first solar-powered electrolytic de-fluoridation system, and is now developing a remote monitoring system.

Safe Water Network develops market-based solutions that provide safe, affordable water to rural communities. Its field implementation initiatives form the basis for research and innovation to systematically address the challenges to local sustainability. In India, Safe Water Network has 44 “iJal Stations” in the states of Telangana and Uttar Pradesh that provide reverse osmosis-treated water to fluoride-affected communities at a price of INR 4 (US\$0.06) per 20L, and include a remote monitoring system that uploads key operational and sales metrics to an online database every 15 minutes. Stations cover community-level OPEX and in many cases have accumulated reserves to support maintenance and capital replacement costs. Over the next three to five years, Safe Water Network's objective is to establish a knowledge hub to capture lessons from the sector and demonstrate a viable model for technical servicing through an independent, for-profit Field Services Entity.

Sarvajal is a social enterprise brand established by Piramal Water Ltd. with the objective of developing market-based models for safe drinking water. It operates on a franchise model, with water treatment systems operated by a local entrepreneur or cooperative society. Sarvajal has installed 165 water systems in Gujarat, Rajasthan, Maharashtra, Madhya Pradesh, and Delhi, and has also installed automatic payment and dispensing systems at some of the sites. Treatment technologies vary based on local water challenges, but most employ reverse osmosis to address fluoride contamination in groundwater. Purified water is available at INR 6 (US\$0.10) per 20L. Sarvajal has also launched an experimental pilot in Jaipur to develop a viable model for providing safe water to municipal schoolchildren.

Spring Health is a for-profit subsidiary of Windhorse International, a U.S.-based company that develops innovations targeted at the base of the pyramid (BoP). The company has developed a low-cost model for providing clean drinking water in small communities (200–500 households) suffering from microbial contamination. Spring Health's technical solution identifies local retailers who act as franchisees, managing small kiosks that sell water treated with chlorine. As of October 2013, Spring Health had 106 operational kiosks in the state of Odisha. Water is sold in 10L containers for INR 3 (US\$0.05), with most consumers (95 percent) paying an additional rupee to have the water delivered to their homes.

Water For People is an international nonprofit organization whose goal is to improve lives through locally sustainable drinking water resources, sanitation facilities, and health education. Water For People began its India initiatives in 1996 with a pilot project in West Bengal to help eliminate naturally occurring arsenic in water supplies. A monthly user fee of INR 20 (US\$0.33) enables a family to purchase 20L of water per day or about INR 0.7/20L can (US\$0.01/20L); the purchase frequency could not be determined. To date, Water For People has installed 156 plants in West Bengal. The organization uses an activated alumina-based resin technology that they designed and developed in collaboration with Bengal Engineering and Science University. They also partnered with Akvo to develop an in-house, mobile phone-powered monitoring mechanism called Field-Level Operations Watch (FLOW). Water For People is now developing a lifecycle cost tool that is flexible and easily applicable to a variety of contexts.

WaterHealth International (WHI) is a for-profit company with offices in India, Bangladesh, Ghana, Nigeria, Liberia, and the Philippines. Its objective is to establish a lasting solution for underserved communities by providing water treated to WHO standards. The Indian affiliate, WaterHealth India, has established approximately 500 water treatment plants across the states of Gujarat, Andhra Pradesh, and Karnataka using a build-operate-transfer model, under which WHI owns the plant for the first 10–15 years of operation before transferring ownership to the community. Each plant uses a proprietary reverse osmosis and/or ultraviolet treatment system (UV Waterworks™) to address a range of mineral and microbial contaminants. Consumers buy water in 20L containers for INR 6 (US\$0.10). WHI has also launched a packaged water brand, Dr. Water, available for INR 35–40 (US\$0.6)/20L at outlets in Secunderabad, to cross-subsidize their business in proven communities. Going forward, WHI is prioritizing expansion into urban slums.

Waterlife is a for-profit company whose founders sought to establish a socially relevant enterprise with a rigorous business approach. The company bids on government contracts to establish water purification systems in villages of 2,000–25,000 people across 12 states in India. Waterlife has established about 450 reverse osmosis plants and 400 resin-based plants. The balance of systems installed are hand pump attachments. Waterlife has also deployed arsenic and fluoride removal units. As per the government contract, Waterlife sets up the treatment system and operates it for a predefined period (usually 5–15 years). It charges the local community for water at a fixed rate (prescribed in the contract) to cover operational and maintenance costs.

EXHIBIT 11
Selected CSWSs: comparison across key features
NON-EXHAUSTIVE

	Bala Vikasa	Healthpoint Services	Naandi Foundation	Rite Water	Safe Water Network	Sarvajal	Spring Health	Water For People	Waterlife	WHI
Year established	1997	2009	1998	2009	2009	2008	NA	1991	2009	1996
Number of existing supply units*	520	170	405 (+35 handed over to community)	125	44	165	105	156	NA	500 (2012)
Location	Andhra Pradesh Telangana	Punjab, Andhra Pradesh	Andhra Pradesh, Telangana, Karnataka, Haryana and Punjab	Maharashtra, Chhattisgarh, Madhya Pradesh	Telangana, Uttar Pradesh	Gujarat, Rajasthan, Maharashtra, Madhya Pradesh, New Delhi	Odisha	West Bengal	Uttar Pradesh, Maharashtra, Tamil Nadu, Karnataka, Bihar, West Bengal	Andhra Pradesh, Telangana, Gujarat, Karnataka, Tamil Nadu, Punjab, Maharashtra
Economic model** (PPP/CMS/private)	CMS	Private	PPP	PPP	CMS	CMS	Private	CMS	PPP	PPP
Ownership of kiosks	Community	Self	Self for 5-10 years, then transfer to community	Government for 3-5 years, then transfer to community	Community/local entrepreneur	Self (community local entrepreneur lease the plant)	Self	Community	Government	Self for 10-5 years, then transfer to community
Management of operations	Community	Self	Self for 5-10 years, then transferred to community	Self for 3-5 years, then transferred to community	Local community/entrepreneur	Community/local entrepreneur	Treatment and quality testing by self; entrepreneur collects sales and revenue	Community	Self (first 5-15 years, according to contract)	Self for 10-5 years, then transfer to community
Capacity (LPH ³)	250-2,000	N/A	1,000	-	1,000	500	3,00L water tank per day	600-720	N/A	1,000-2,000
Capacity (people served)	800-3,200	1,600-2,400	-	<1,000	5,000-8,000, depending upon power availability	-	-	-	2,000-25,000	-
Principal technology	RO	Contaminant-specific: RO (mainly), ultrafiltration and UV, de-flouridation, iron removal	RO and UV	Contaminant-specific: RO, electro-coagulation, UV, electro chlorination, ultrafiltration, ion exchange	Six-stage treatment, w/ sand filter, activated carbon filter, micron filter, RO, UV and residual chlorine	Six-stage filtration, including RO, UV, iron removal	Chlorination	Arsenic removal filters	Contaminant specific; RO (60% plants), adsorption, media filtration, arsenic/fluoride removal	RO and patented UV technology
Average CAPEX, INR (US\$)	450,000 (7,500)	500,000-800,000 (8,400-13,400)	500,000-1,000,000 (8,400-17,000)	500,000-1,000,000 (8,400-17,000)	500,000-700,000 (8,400-17,700)	300,000-600,000 (5,000-10,000)	30,000 (500)	125,000-150,000 (2,000-2,500)	100,000-1,500,000 (8,400-25,000)	1,000,000-1,500,000 (17,000-25,000)
Average monthly OPEX, INR (US\$)	6,000-(10,000) (100-170)	20,000 (350)	10,000 (165)	10,000-12,000 (165-200)	12,000-15,000 (200-250)	Not disclosed	500-1,800 (25-30)	16,500-18,500 (275-375)	7,000-9,000 (120-150)	Not disclosed
Price of water per liter, INR (US\$)	0.1 (0.002)	0.25 (0.004)	0.15 (0.0025) charged monthly	No charges	0.2-0.25 (0.003-0.004)	0.3-0.5 (0.005-0.008)	0.4-0.5 (0.003-0.005)	0.02-0.04 (0.0003-0.0007)	0.25-0.4 (0.004-0.007)	0.3 (0.005)
Price of subscription	-	80 (1.3) per month (20L/day limit)	60 (1) per month (20L/day limit)	-	Smart card flexible top-up	Smart card flexible top-up	120 (2) for 30 cans (10L)	10 -25 (0.2-0.4) per month (20L/day limit)	-	-
Product brand name	-	E-Health Point	iPure	Rite Water	iJal	Sarvajal	Sring Health	AMAL	Waterlife	Dr. Water
Distribution (pick-up/P; door-to-door/D2D)	P	-	P	P+D2D	P (70% users) P+D2D	P+D2D	P+D2D (90%)	P (60%-70% of users)+D2D	P+D2D	P+D2D

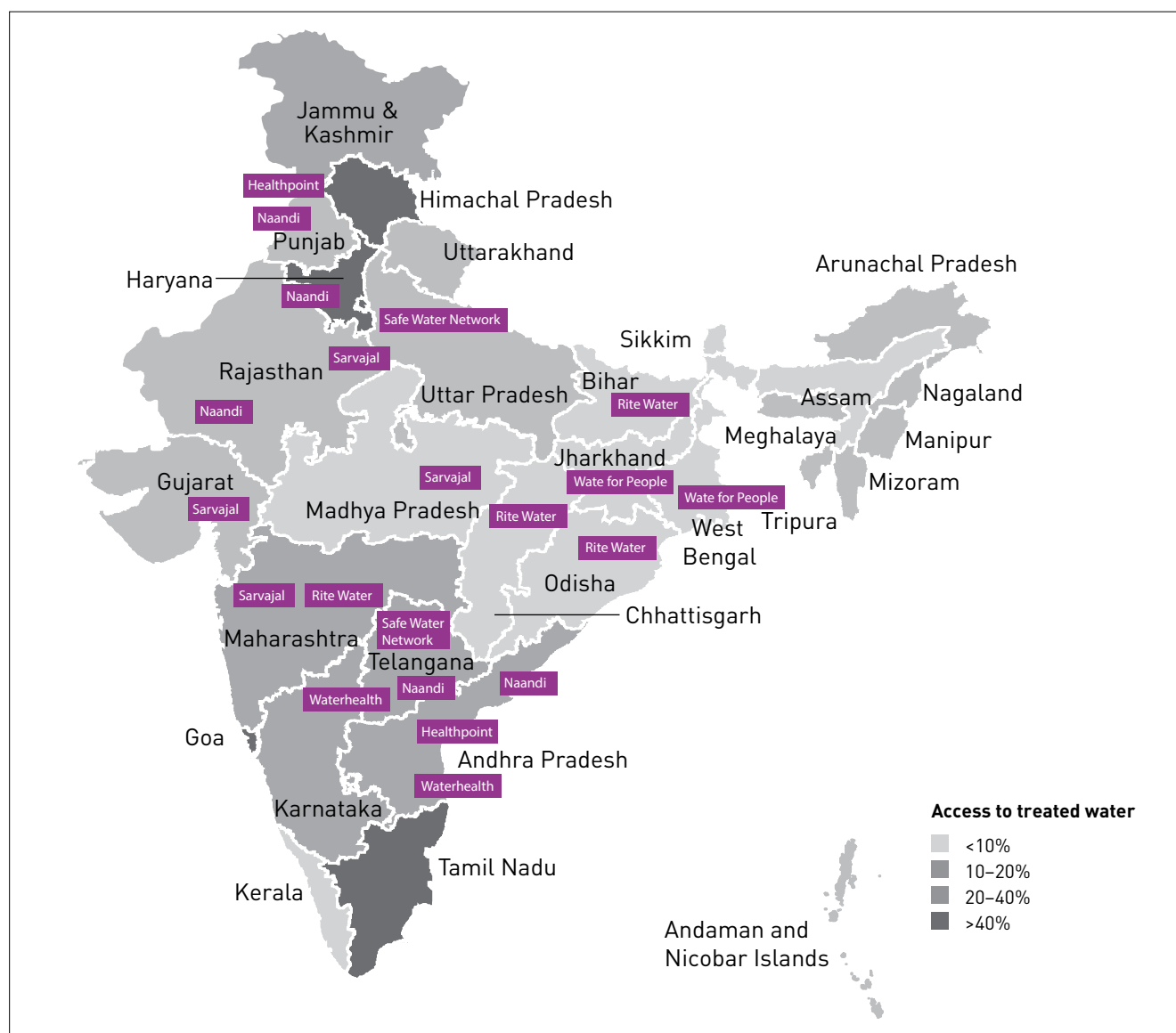
*Self reported. ** PPP-Public Private Partnership, CMS-Community Managed Solution † LPH-liters per hour
 Source: CSWS interviews; organization reports.

Presence of CSWSs

Most of the CSWS providers are located in Andhra Pradesh, where 36.4 percent of the rural population has access to treated water. In Bihar, only 1.6 percent (second lowest) of the rural population has access to treated water. Only one CSWS provider included in this report—Water For People—operates in Bihar, a state with the highest number of habitations with iron contamination. As is evident in Exhibit 12, the location of CSWSs is not necessarily directly related to the pervasiveness of contaminants and often involves other factors such as infrastructure availability, willingness, and ability of communities to pay, size of habitation, etc. Northeastern states of India have the least presence of CSWSs, although the contamination is fairly spread out in this region, for reasons including smaller, scattered habitations and undulating terrain that pose difficulties in setting up viable operations and maintenance support services.

EXHIBIT 12
NON-EXHAUSTIVE

CSWSs’ footprint is not strongly aligned with regions in dire need; instead, presence is linked to viability-ensuring factors e.g., infrastructure, willingness to pay, state government support.



Source: Central Ground Water Board, 2010.

Economic Models Practiced by CSWSs in India

Three models are being broadly employed by reviewed organizations, and based on the structure of funding and operations, they can be classified as public-private partnerships (PPPs), community-managed systems (CMSs), and the private model. In some cases, two models converge or organizations employ more than one model.

Public-Private Partnership (PPP)

A PPP is a business venture funded and operated through a partnership between the government and one or more private sector companies. Unlike traditional PPP models, this functions as a contract-based model: The government acts as the owner and the selected private player as the contractor. The Eleventh Five Year Plan (2007–2012) of India has stated its preference for PPPs for social sector and livelihood support programs, including water supply and sanitation.

Some PPPs take the form of construction and management contracts, such as:

- **Build-Operate-Transfer (BOT):** The private sector entity builds infrastructure matching tendered specifications by the state government, and operates these assets for a specified period of three to seven years. The treated water is made available to the users at a predetermined tariff of INR 2–3/20L (\$0.03–0.05/20L). Upon completion of the stipulated term, an operating plant is handed over to the local Gram Panchayat. Ownership always lies with the public sector entity funding the project. Naandi, Rite Water, and Waterlife are examples of this model.
- **Build-Own-Operate-Transfer (BOOT):** Similar to the BOT model, with the exception that the assets are owned by the concessionaire (private entity) to factor depreciation costs into water tariffs, thereby encouraging private investments. However, only WHI operates in this space as it has brought in private investments from IFC, etc.

In India, PPP projects are generally implemented based on a competitive bidding process. The lowest-cost qualified bidder is selected as the private operator to develop and maintain the CSWS at the selected location. Many state governments contract out operation and maintenance of water infrastructure to local contractors. However, such contractors do not promote awareness on safe WASH practices. In some states, a local self-employed mechanic receives INR 1,000–1,500 (\$15–25) per month to maintain water infrastructure on a part-time basis.

The availability of a large pool of government funding is the biggest advantage of this model, which sometimes includes OPEX, along with government facilitation, in enabling the system. A challenge associated with this model might be the lack of clarity on the provision of long-term services due to fixed-term contracts between the government and the private organization. Moreover, the tendering process favors the lowest bidder and not necessarily the highest water quality or best service provider. Payment terms of government contracts are released upon completion of major milestones in the plant setup, potentially causing cash flow issues for the organizations.

Waterlife, Naandi Foundation, and Rite Water have used this model. The former two organizations use the PPP model for funding the capital costs of setting up the CSWS. While OPEX costs for Waterlife and Naandi Foundation are paid for by the sale of treated water, Rite Water uses PPP for funding both CAPEX and OPEX. Some manifestations of this model are discussed below:

- Waterlife works on a BOT model by bidding for government tenders, operating the plant for the first 5–15 years (according to the government contract) and transferring operations to the community. Waterlife charges consumers a government-prescribed price. The government owns the CSWS and usually provides viability-gap funding if the revenue is less than the OPEX. Waterlife gives some shares of the revenue to the government if the revenue is more than the OPEX and an established profit margin.
- Naandi Foundation operates with a BOOT model in which plant ownership and operation are transferred from Naandi Foundation to the community at the end of the government contract. Naandi Foundation bids for funding from the government and seeks funding from multiple private donors.

- Rite Water does not charge any fees for the drinking water provided and seeks contribution from the government for operating costs also in the initial period of plant operation (three to five years), during which CSWS ownership is with the government and operation is with Rite Water. After the initial period, ownership and operations are transferred to the Gram Panchayat and financial support for OPEX is sought from donors, corporates, or government agencies.

When working with a public entity, players are bound by government policy in pricing, ownership, geography, etc., which may inhibit flexibility of the plant operator to enhance the program's viability and effectiveness.

Community-Managed Systems (CMSs)

A CMS is a business venture in which the local community is the majority stakeholder and plays an active part in financing, installing, and operating the system. Communities, civil society organizations (CSOs), technology providers, and NGOs are the main stakeholders of this model. Capital funding is generally provided by the NGO, with the community contributing some percentage. The technology partner provides assistance in system setup and training the community to perform O&M. The model's advantages include higher participation by end users and better transparency and accountability. The challenges include providing incentives for ongoing plant management, building local capacity, creating and maintaining community interest and participation, and identifying and training technical service support in the local community. An approach taken by Safe Water Network is to implement local ownership from inception to enhance a sense of ownership and responsibility to recover community-level OPEX.

Safe Water Network, Water For People, and Bala Vikasa have adopted this CMS model. In this model, the local community contributes toward part of the CAPEX, the responsibility of ownership and operation rests with the community or their representatives, and OPEX is recovered by charging a nominal price from consumers. Some manifestations of this model are discussed below:

- Safe Water Network seeks a partial contribution from the local community toward CAPEX; initial capital expenditure is also provided through corporate foundations and other philanthropic organizations to be recovered for its sustenance, reinvestment, and expansion. Community contribution encourages both local community ownership and local entrepreneur ownership with the Gram Panchayat's endorsement.
- Water For People funds 60–70 percent of infrastructure costs, and the rest is provided by the community (10 percent) and the government (20–30 percent).
- Bala Vikasa provides 80 percent of CAPEX through grants from charity organizations and government funding agencies, while the community funds the remaining 20 percent from people's contributions and Gram Panchayat.

Private Model

A private model is a business venture in which a private company or an entrepreneur fully funds and owns a venture, and is responsible for providing the services associated with it. In this model, all activities across the value chain, such as funding, installing, operating, and maintaining the system, are carried out by a private player or an entrepreneur. The advantages associated with this model include clarity of ownership with a clear profit motive, which promotes efficient and sustainable service, and control of the entire value chain by a single entity, which can simplify operations. Some challenges include profit pressures and a lack of external oversight, which could eventually lead to unaffordable prices and unreliable quality. Moreover, private companies or entrepreneurs might struggle to access funding for plant setup. Full cost recovery is also one of the major challenges, as they do not have government or community aid.

Some organizations using this model include Healthpoint Services, Naandi Community Water Services, Sarvajal, Spring Health, and WHI. Even though these organizations are private entities, they fall under the social entrepreneur category as their objectives are clearly beyond a profit motive. Some manifestations of this model are discussed below:

- Healthpoint Services owns and operates the CSWSs and provides all the funding for the CAPEX or sources it through government or private institutions.

- Sarvajal operates a franchise model where it owns CSWS equipment and leases it to a local entrepreneur (the franchisee), who will operate it. Sarvajal invests in equipment, testing, education, and maintenance services, while the local entrepreneur typically pays INR 50,000 (US\$800) as initial charges. The revenues are shared 60:40 between the entrepreneur and Sarvajal. Sarvajal is experimenting with a new funding model where Sarvajal's share of CAPEX is provided through bank loans.
- Spring Health owns the CSWS and selects a local entrepreneur shortlisted by community elders to operate as their local partner. This entrepreneur, usually a local retailer, pays a one-time joining fee of INR 5,000 (US\$80), which is one-fifth of the CAPEX for chlorination equipment, while the rest is financed by Spring Health.
- WHI owns and operates the CSWSs for the first 10–15 years and then transfers ownership and operation to the communities. WHI funds CAPEX employing a debt: equity model (60:40) with equity share from private investors and the debt component from IFMR, ICICI, and IFC. Once ownership and operation is transferred to the community, the WHI water kiosks follow a CMS model.

The private model also includes informal models in which local entrepreneurs provide water to other residents, especially in times of shortages. Some have invested in their own water plants, installing tanks and chilling plants to enhance their ability to treat water and supply cold water, especially in summer.

Exhibit 13 broadly summarizes the three economic models. Further details on the challenges are also described in “Path to Sustainability.” (page 37)

EXHIBIT 13
NON-EXHAUSTIVE

Broadly, CSWS providers fall into the ownership and management models below, with some combining of two models.

	Public-private partnership (PPP)	Community-managed services (CMS)	Private model
Advantages	<ul style="list-style-type: none"> • Availability of a large pool of funding • Government facilitation and endorsement 	<ul style="list-style-type: none"> • Higher user participation • Transparency and accountability • Achieve local participation in O&M 	<ul style="list-style-type: none"> • Clear ownership structure • Clear profit motive • Control of the value chain by a single entity
Limitations	<ul style="list-style-type: none"> • Tendering process favors the lowest bidder—not necessarily the best service provider • Release of payment post milestones’ achievement leads to cash flow issues • Government chooses community/habitation, which may not be of appropriate size for sustenance • Lack of community participation and clarity of role • Integrating social inclusion and consumer awareness is not a priority when the focus of the private entity is on execution within award value • Difficult to cover viability gap 	<ul style="list-style-type: none"> • Lack of access to large-scale finance • Weak incentives are provided for ongoing management of the plant, especially in community-owned systems • Limited resources for local capacity-building • Finding and training technical service support and establishing payment mechanism • Total dependence on continued community interest and participation 	<ul style="list-style-type: none"> • Hard to balance profit pressure and cost recovery with affordability • Lack of viable bankable models for financing

Source: CSWS interviews; organization reports.

Path to Sustainability

A CSWS is economically sustainable if the costs for operation, maintenance, and administration are covered at the local level with limited but feasible external support.³² The system should also deliver an appropriate level of benefits, i.e., quality, quantity, convenience, and reliability to consumers throughout its design life.³³ A CSWS has to be sustainable on many fronts to ensure reliable operations for a long period of time. In this section, we discuss such critical fronts: economic, consumer, operational, technical, and environmental. We also highlight the importance of demand activation and funding for this sector.

Economic Sustainability

A viable economic proposition is needed for CSWS providers to scale up their operations and provide effective services to their customers. Spring Health, Healthpoint Services, Waterlife, Rite Water, and WHI focus on recovering their full CAPEX and OPEX while Naandi, Sarvajal, and Water For People are interested in recovering only their OPEX to sustain operations. Safe Water Network is seeking to recover CAPEX partially where feasible, and in all cases, recover community-level OPEX.³⁴

To attract investors and be financially viable, the CSWS must be able to recover its OPEX and generate sufficient surplus operating profit to ensure sustainability of operations, including needed maintenance and repairs. In order to recover OPEX in an ideal scenario with adequate penetration, the number of 20L cans that need to be sold on a daily basis ranges from 70 for Healthpoint Services to 200 for Sarvajal at some locations. In the same ideal scenario, the CAPEX breakeven period ranges from a few years to 15, and probably longer for WHI as they desire concession for a period of 10–20 years. A benchmark analysis was performed on six CSWS providers willing to share the necessary data. Five operators were able to recover their community-level OPEX. However, these players do not recover other associated costs such as field support, marketing, and overhead costs. This has hindered their sustainability and ability to scale up.

Consumer Sustainability

An important issue impacting the economic success of a CSWS is activating consumer demand. Understanding customer demand and social behavior is key to identifying approaches to increase adoption. A major challenge for a CSWS is when communities are unwilling to or unable to pay for water, particularly when free water is readily available from alternate sources. Activating demand is dependent on various factors such as pricing, awareness, and ability to pay.

Pricing, Awareness, and Ability to Pay

A history of free water provision in rural India has created significant challenges in both the willingness and the ability to pay for safe water at a level sufficient to cover costs. Urban India widely accepts the concept of packaged drinking water. Major institutions like the World Bank promote the pricing of water as a means for public water utilities to manage existing supply systems more efficiently.³⁵ The same principle applies to CSWSs in rural areas, where pricing of water ensures sustainability. The regulations under the Framework for Implementation 2009–2012 by the MDWS states that private foundations should provide drinking water at affordable prices. However, the regulations do not define the term “affordable price.” Water pricing should be linked to willingness to pay (WTP) and affordability. WTP is defined as “the maximum price an individual is willing to pay for a good or a service.”³⁶

³² Brikké, F. (2002). *Operation and Maintenance of Rural Water Supply and Sanitation Systems: A Training Package for Managers and Planners*. World Health Organization. Geneva.

³³ Sara, J., & Katz, T. (1998). *Making Rural Water Supply Sustainable: Report on the Impact of Project Rules*. UNDP—World Bank Water and Sanitation Program.

³⁴ Bala Vikasa, the 10th implementing organization discussed above, uses a philanthropic model that does not track OPEX

³⁵ Diner, A., & Subramanian, A. (eds). (1997). *Water Pricing Experiences, An International Perspective*. (World Bank Technical Paper No. 386). Washington D.C., USA: The International Bank for Reconstruction and Development: The World Bank.

³⁶ Wedgwood, A., & Sansom, K. (2003). *Willingness to Pay Surveys—A Streamlined Approach*. WEDC Loughborough University, Leicestershire, UK: Water, Engineering, and Development Centre.

The World Bank conducted a study in 2008 to understand WTP for improved water supply to rural households in India (Table 1).³⁷ WTP varied between INR 40–70 (US\$0.67–1.17) for improved private connections across the states; Maharashtra and Punjab showed the highest WTP, and Uttar Pradesh and Uttarakhand the lowest. Moreover, the study conveys an overall picture that affordability is not a major issue except for the poorest of poor, i.e., rural households belonging to the Bottom of Pyramid (BoP).

TABLE 1

Willingness to pay per month by rural households in India

Connection	Willingness to pay/month/household
Private connections	INR 40–70 (US\$0.67–1.17)
Stand posts	INR 20 (US\$0.33)
Hand pump schemes	INR 6 (US\$0.10)

Source: World Bank

In the CSWS markets, only those who understand the value of safe water are willing to pay the usage fee. Moreover, most households purchase safe water at a frequency of once in two or three days. This usage results in a monthly outlay of INR 60–90 (US\$1.00–1.50), which is similar to the monthly outlay for private connections.

Given the impact of drinking water on human health and the focus of many CSWSs on providing safe drinking water, CSWSs must conduct studies on the WTP for safe water specific to each community where operations are ongoing or planned. At present, rural CSWSs charge prices for water independent of the state in which they are located or the type of treatment they provide. The costs of such provision vary between INR 0.1 (US\$0.002) to INR 0.5 (US\$0.008) per liter.

In India, reportedly around 829 m (68.7 percent) of the population earn less than INR 125 (US\$2)/day.³⁸ The same report indicates that 32.7 percent of Indians fell below the international poverty line of \$1.25 per day in 2010. The water fees charged by the CSWS can be paid only by a portion of the poor population. Many households belonging to the BoP cannot afford them, even if they desire access to safe drinking water.



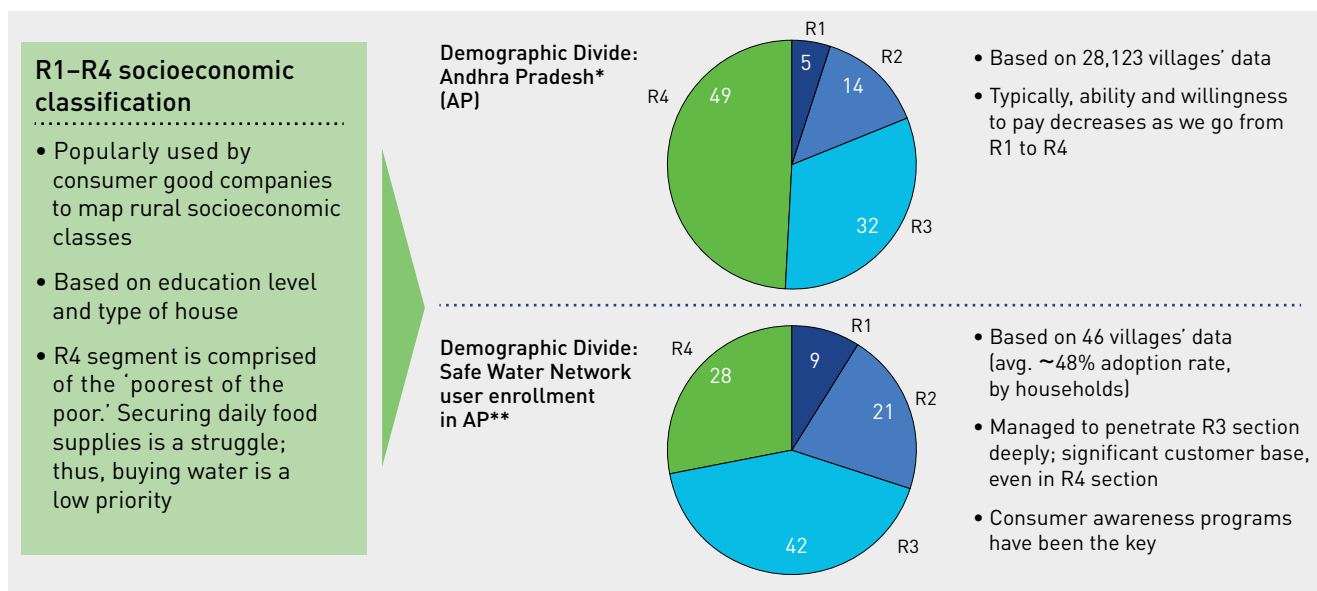
Change in consumers' mindset is critical to overcome hurdles to CSWSs' financial sustainability.

³⁷ World Bank. (2008). *Willingness of Households to Pay for Improved Services and Affordability*. Review of Effectiveness of Rural Water Supply Schemes in India.

³⁸ World Bank. (2010). *Poverty and Equity Data*. Retrieved October 30, 2013 from <http://povertydata.worldbank.org/poverty/country/IND>.

EXHIBIT 14

With targeted consumer awareness programs, CSWSs can activate demand from even the most disadvantaged socioeconomic classes.



*Data not yet available from Telangana. **Formerly AP, now Telangana. Source: Indian Readership Survey 2013; Safe Water Network data.

In Exhibit 14, a socioeconomic classification (R1–R4) has been used, which is based on education profile and house type, to map penetration in rural areas. This is widely used by consumer goods companies. Typically, R3 and R4 are tough segments to penetrate, but targeted awareness campaigns have proven successful.

CHALLENGES

- Limited understanding of benefits of safe drinking water limits adoption
- Alternate cheaper/cost-free sources of water may be preferred (e.g., hand pump or local pond), even if water is unsafe
- Limited ability/willingness to pay, so consequently low price
- Lower consumption when agri-laborers are working in fields as they do not carry safe water that they paid for, to avoid sharing; this prevents them from using the water for drinking/cooking purposes

KEY RECOMMENDATIONS

- Involve community stakeholders while reviewing pricing
- Facilitate community participation in making pricing decisions to ensure economic feasibility, while maintaining affordability and inclusion
- Determine communities' willingness/ability to pay before committing to installing a CSWS
- Set up distribution channels to increase reach to smaller hamlets and augment revenues
- Explore options to attract poor household participation in partnership with government or corporations
- Evaluate high-margin, value-added products and services such as delivery to homes and nearby hamlets, chilled water, etc. to address consumer needs and activate further usage
- Enhance WTP and adoption rates through marketing strategies, awareness-building, packaging, and branding
- Offer different subscription models for bulk purchasers to increase frequency and predictability of volumes
- As far as possible, avoid sales on credit

Awareness Campaigns and Education

Community awareness and education campaigns promoting the tangible health benefits of safe water appear to be more effective in the community after a plant or facility has been set up. In rural India, the government and CSWSs have mainly implemented these campaigns.

In order to disseminate the basic information and educate people on health and hygiene at the state level, the government has developed Information, Education, and Communication (IEC) interventions under NRDWP. The IEC strategy highlights four major areas—awareness, transparency, participation, and accountability and responsibility.³⁹ Awareness campaigns focus on several themes, including clean and safe drinking water use, protection of drinking water sources, sustainability of water sources, water quality and testing, and O&M of water systems. Mass media, print media, outdoor publicities, activities at school level, mobile messages, communication kits (posters, banners, booklets, audio-visual CDs, documentary films, etc.), and celebration of national and international days like World Water Day are possible channels for awareness-building.

A study conducted by the Planning Commission in five states (Karnataka, Himachal Pradesh, Rajasthan, Assam, and West Bengal) indicates that 71 percent of the Gram Panchayats had been part of various water awareness campaigns.⁴⁰ It is important that the benefits of these awareness programs percolate down to every rural household to ensure full involvement of the local communities.

All the organizations considered in this study have implemented community awareness programs with special emphasis on developing willingness to pay. WHI deploys a team solely responsible for reaching out to communities. They use a training toolkit consisting of a training manual with handouts and user guide notes developed for the trainers and the field coordinators to educate community members on safe water consumption and basic hygiene for healthy living. Safe Water Network has audio-visual consumer activation programs in local languages on tablets to activate key opinion leaders and consumers.

CHALLENGES

- *Opposition to the commodification of water exists, especially where water has conventionally been provided free of charge*
- *Lack of awareness on norms for drinking water quality prevents adoption; the common misconception that clear water is safe is prevalent*
- *Unwillingness of consumers to adopt, despite knowledge of tangible benefits of safe water*

KEY RECOMMENDATIONS

- *Focus promotions on sampling and trials to help win initial customer base*
- *Incentivize and train operators in effective consumer engagement*
- *Identify key opinion leaders in the community and use their influence to mobilize communities to adopt safe water*
- *Explain the health hazards associated with different contaminants found in water*
- *Use modern marketing tools and channels such as tablets/smart phones, etc. for consistent messaging targeted at specific influencers*
- *Measure cost-effectiveness of each consumer intervention to understand the cost/benefit of these programs*

 Community awareness and education campaigns increased the safe water adoption rate by 15 percent over three months in four villages where Safe Water Network operates.

³⁹ Government of India. (2010). *IEC Guidelines for Rural Drinking Water*. National Rural Drinking Water Program.

⁴⁰ Program Evaluation Organization Planning Commission, Government of India. (2010). *Evaluation Study on Rajiv Gandhi Drinking Water Mission*. PEO Report No. 223.

Distribution Model

Safe drinking water can be availed directly at the local unit, possibly through a retailer or distributed door-to-door. The key players considered in this report have adopted both distribution models. Distribution can be done by the CSWS itself or in partnership with other third-party vendors. The door-to-door delivery model increases the final cost of water, as the service provider must recover the cost of transportation in addition to earning a profit. On the other hand, door-to-door delivery can ensure a higher reach, especially to customers who cannot travel to the water station. The price generally doubles due to additional costs of vehicle, fuel, driver, loader, retailer margins, and float cans required to facilitate distribution.

CHALLENGES

- *Water is usually provided in bulk, making it too heavy for the elderly and infirm to carry*
- *Uneven demand could make a distribution route unviable*
- *High cost of distributed water may put off both existing and potential consumers, especially if distribution doubles the original price, as in some cases*
- *Seasonal variations could affect volumes significantly*

KEY RECOMMENDATIONS

- *Analyze the potential distribution market size and value to determine what model for distribution would be economically viable*
- *Evaluate various distribution models to identify the optimal one based on the consumers' location, vehicle type, and other logistics such as fuel costs and time for filling up and delivery*
- *Select vehicles based on a balance between cargo capacity, condition of bad roads, and cost of acquisition and operation*
- *Involve local retailers in expanding reach*

Operational Sustainability

Technology

Chemical costs, replacement costs, and electricity usage are the biggest costs that vary by technology, while the operator cost might also differ depending on the requisite skillset. Therefore, the technology selected plays a key role in determining the financial viability of a plant. Reverse osmosis is the most widely used technology among the sector players.

CSWS implementers, including Rite Water and Safe Water Network, use a technology matrix to select the appropriate technology, which is primarily based on parameters such as the type of contaminants (including TDS, salinity, chemical contamination, volatile organic compounds, and other organic compounds) that need to be treated, along with capital and operational cost considerations.

CHALLENGES

- *Unsustainable cost implications of certain technologies*
- *High maintenance requirements of sophisticated technologies*
- *Inadequate availability of power*

KEY RECOMMENDATIONS

- *Use standardized and modular plants sized to appropriately recover OPEX*
- *Establish bulk system purchasing agreements for manufacturers*
- *Establish contracts with technology providers based on quality standards of raw and treated water*
- *Explore technologies requiring low energy (UF/UV/disinfection/slow sand filters) where the contamination is predominantly microbial; evaluate using solar energy as an alternative*

Governance

Sustainable governance of a CSWS requires a tailored structure for management, operation, and maintenance. An effective governance structure should emphasize affordability, inclusiveness, and prudent waste disposal as well as quality monitoring and assurance, and is crucial to making a business economically viable. A governance structure involving all stakeholders demonstrates a business's ability to consider and minimize potential risks and shortcomings, evolve its scope of responsibilities, and ensure sustainable operations.⁴¹

In a PPP model, selected members of all financing bodies, both public and private, constitute the governance structure. In the case of a CMS, the governance structure is comprised primarily of community stakeholders, along with local NGOs and/or implementing organizations. In the private model, companies will extend their existing governing structure to the CSWS. Entrepreneurs who operate informally could align with larger training organizations or NGOs to benefit from brand association and governance structure. Although the concept of self-governance is not yet well established among key players, it should be considered as a primary factor to achieve credibility and sustainability.

Ownership

Ownership of the water system is another key factor critical in determining if a CSWS can be successful, as discussed in the previous section. The ownership models could be government-owned, private player-owned, or community-owned. Community ownership has been shown to ensure higher sustainability of services.⁴² It instills a sense of accountability and responsibility among users to manage and maintain water facilities. Among the organizations presented in this report, this model is adopted by Bala Vikasa, Naandi, Safe Water Network, Sarvajal, Water For People, and WHI. Waterlife and Rite Water have adopted the government ownership model while Spring Health and Healthpoint Services have adopted the private ownership model.

Maintenance and Repair

The importance of an effective maintenance program cannot be overlooked; it plays a crucial role in the effectiveness of operations. Regular maintenance costs are significantly less than the cost of repairing a major breakdown during which operations have ceased. The main purpose of regular maintenance is to ensure that all equipment required for treatment is operating at capacity with minimal breakdowns at all times, ensuring sustainability of operations. Through short daily inspections, cleaning, timely backwash, lubricating, and making minor adjustments, minor problems can be detected and corrected before they worsen and shut down operations. Service teams contractually agree to deliver service standards and provide required guarantees on repairs, ensuring compliance and quality standards.

⁴¹ Economic Sustainability—Operate Our Business in an Economically Sustainable Manner. (2013). *Good Business Register*. Retrieved on October 9, 2013 from http://www.goodbusinessregister.com.au/fact_sheets/GBR_Tips_for_SMEs_sheet.pdf.

⁴² Fielmua, N. (2011). The Role of Community Ownership and Management Strategy Toward Sustainable Access to Water in Ghana [A case of Nawdoli district]. *Journal of Sustainable Development*, 4(3).

Most of the reviewed organizations have dedicated service teams usually consisting of technicians, electricians, water experts, and technology experts. Technicians can serve 10–40 plants, with the majority of the key players dedicating the technical team to 20–25 plants to reduce the impact of their costs on the plant OPEX (an average technician's monthly salary is INR 8,000–15,000 (US\$133–250)). It is therefore critical to float a local field service entity that provides affordable yet quality service to rural water installations in a large-enough cluster by training local youth and partnering with local ITIs to open regional employment opportunities.

CHALLENGES

- *Low margin to perform adequate maintenance and repair on the system*
- *Lack of trained personnel readily available*
- *Inadequate performance by third-party maintenance contractors*
- *Lack of access to a quality market for spares; no reserves maintained of high-value spares*
- *Unreliable operations and increased downtime affect adoption*
- *High cost of travel to remote rural plants while transporting parts and personnel*

KEY RECOMMENDATIONS

- *Deploy water systems in contiguous geographic clusters having similar water quality/availability problems*
- *Train local technicians to ensure servicing and reduce costs*
- *Incentivize the maintenance of continual high-quality service provision*
- *Share technical resources with other players based on geography and technology*
- *Train operators in basic maintenance*
- *Create a critical spare pool in each cluster*
- *Provide for protection against voltage fluctuations at design stage*
- *Provide remote monitoring, if possible*

Technical Sustainability

Sustainable maintenance and operation of CSWSs can only be ensured if operators and managers of the water kiosks have sufficient skills to understand plant O&M, manage the overall plant activities, and ensure profitability. In rural areas of India, the technical expertise and management skills required to manage the rural water supply are seldom present and appropriate training at each level across the value chain of the water supply sector is needed. This training is critical to ensure optimization of current operations and to capture potential markets.

A lack of trained operators and managers might lead to inadequate understanding of water solution operations and difficulties in proper maintenance and repair, compromising the reliability and quality of the water supply and increasing operational costs.


Central Government Programs

Government programs are more focused on building health and hygiene awareness in rural communities; few programs are aimed at directly training operators and managers of the CSWSs. Community and Capacity Development Units (CCDUs) have been set up by state governments with financial support from the Ministry of Drinking Water and Sanitation (MDWS), under the Government of India (GoI), to develop state-specific education in water and sanitation.⁴³ This program is aimed at Panchayat Raj Institutions (PRIs) and at district-level officers of NGOs and states. Purely focused on educating communities about the benefits of safe water, neither program offers training to operators and managers to manage the plants, nor do they educate communities about the merits of paying for safe, treated water. As described below in “Institutional programs,” the government funds a number of institutions to provide training in the water and sanitation field; however, none of these training initiatives focus on operators, managers, or water centers.

⁴³ Government of Kerala. Retrieved from http://www.mdws.gov.in/hindi/sites/upload_files/ddwshindi/files/pdf/CCDU%20Broucher%20final%20final-3.pdf.

Training Programs Managed by CSWSs

In a majority of CSWSs, technical and managerial training of the operation and management team mainly consists of a practical demonstration by skilled individuals brought from outside the community. Additionally, CSWSs may also produce training kits and operating manuals that explain the processes involved in maintaining the plants. Some CSWSs offer somewhat more structured training to their operators. Safe Water Network has four layered, extensive training programs to train its organization personnel, network partners, managers/entrepreneurs, and operators. The installation and commissioning of Safe Water Stations, O&M, consumer activation, distribution, quality assurance, monitoring and evaluation, and financial management are the focus of their training.

 In the absence of government-driven programs for skill development of operators, CSWSs have devised their own toolkits and training programs.

Healthpoint Services India has a program for training and certifying its technicians on water-related technologies. WHI trains operators responsible for O&M and other related activities at each water station. The training of local community members by CSWSs can also generate additional social benefits in terms of employment. Water For People, in partnership with Bengal Engineering and Science University (BESU), has trained a few young members of the local rural community as caretakers, or “Jalbandhus,” of their well head filter units for arsenic removal in six districts of West Bengal. These Jalbandhus are responsible for maintaining and cleaning the filters and distributing the water to the local community. Some were able to find work elsewhere with other organizations in hand pump maintenance.⁴⁴

Institutional Programs

Institutions such as the National Environmental Engineering Research Institute (NEERI, Nagpur), The Energy Resource Institute (TERI), Centre for Science and Environment, Plan India, and Indian Institute of Technology (IIT, Kanpur) impart specialized training programs in the water and sanitation field, with 100 percent grant support from the GoI. These institutions are identified as key resource centres (KRCs) under the central government’s National Rural Drinking Water Programme (NRDWP). There are about 56 KRCs offering training in the water and sanitation field.⁴⁵

KRCs run training programs for public health engineers, district officials, panchayat members, village water and sanitation committee (VWSC), Pani Samiti (water committees) functionaries, motivators, schoolteachers, Anganwadi (state government-run rural kindergartens) workers, health workers, and other support organizations. However, there is no provision for training of operators and managers of water centres.

Monitoring and Evaluation

Monitoring a community installation is a critical, but difficult, process. It has been a weak link in the chain for the majority of the key players. The monitoring of CSWS performance in terms of water quality and quantity and evaluation of system performance are separate practices important for the stakeholders who need to assess, improve, and measure the success of the CSWS. As such, a strong monitoring and evaluation plan is of vital importance to the sustainability of a CSWS.

Monitoring is a systematic and ongoing process that gathers information regarding the operation of a water treatment system. Advancements in technology have resulted in the development of remote monitoring systems (RMS) that transmit data from the units to a central location to monitor key operational metrics. A few of the organizations employ remote monitoring systems.

⁴⁴ OneWorld Foundation India. (2011). *Best Practice Documentation*. Water For People.

⁴⁵ Government of India. (2013). *Outcome Budget of Ministry of Drinking Water and Sanitation*, 26.

Retrieved on September 29, 2013 from <http://www.performance.gov.in/sites/default/files/departments/drinking-water/OB-2013-14.pdf>

Sarvajal was the first to deploy an RMS, where its filtration units are fitted with monitoring devices called “Soochak” (a cloud-connected two-way device that transmits real-time information) to monitor water quality data at various locations; the data are then sent to a central Sarvajal location. The water dispensing units, or water ATMs (automatic teller machines that dispense water anytime with prepaid cards), are also connected through the phone network. Customers use prepaid cards, which can be recharged using mobile phones, for purchasing water. Through this Soochak system, Sarvajal can collect data on both water quality and water consumption from a central location.

Safe Water Network has RMS installed at each Safe Water Station, which tracks key operational and usage metrics and provides the information to the central team in real time. The system transmits the water quality and operation-related data every 15 minutes. This enables tracking the performance of the water station, identifying problems at an early stage, and providing timely repair and maintenance to ensure minimal downtime of a plant due to technical breakdowns, all the while providing real-time protection against power fluctuations as well as alarms. Prepaid RFID cards are used to track consumer-purchasing practices and facilitate ease of payment. Naandi’s system is based on SMS/text, which reports daily volume and revenue. It monitors percentage compliance and reconciles sales with bank receipts.

Water For People has developed an in-house tool for evaluation called Field-Level Operations Watch (FLOW), which works on an Android platform. FLOW provides a mechanism for collecting feedback from all the stakeholders on system performance. This tool also has a built-in GPS that tracks the location of the feedback for prompt response.


Evaluations will be performed to determine whether or not each of the above systems has reached its goals and delivered what was expected according to its original plan.

CHALLENGES

- *Lack of cost-effective mechanisms for monitoring operations and quality at periodic intervals*
- *At scale, data management and analytics pose a challenge to creating an appropriate framework of the most critical factors to be measured*
- *Reliable sensors are often expensive*

KEY RECOMMENDATIONS

- *Install RMS to track key operational metrics, enabling rapid response to problems and preventing failures*
- *Use data as a predictive tool to build central awareness of field operations, reduce cost of servicing, and target consumer programs*

 CSWSs have employed innovative measures such as remote monitoring systems for dynamic quality control and RFID cards for ease of payment and understanding purchasing practices.

Environmental Sustainability

Environmental sustainability is about making responsible decisions and incorporating practices to help prevent negative impacts on the environment. Measures that may help a CSWS address issues of environmental sustainability include protecting the water source and reducing the impact of any discharge.

Security of Supply

Groundwater is a major source of water in rural India and accounts for almost 85 percent of raw water sources used by CSWSs.⁴⁶ In the absence of a system that protects the aquifer against over-extraction and contamination, there are concerns that large consumers of water, such as agriculture and industry, will significantly deplete water resources, further depriving those whose needs for drinking water are unmet. CSWSs need a reliable water supply to satisfy demand and ensure a robust service to consumers. Safe Water Network, Spring Health, Waterlife, and Rite Water have constructed rainwater-harvesting systems in some communities to increase water storage and groundwater recharge. Spring Health has built shallow open wells for recharging areas in which it operates.

CSWSs must focus on adopting source sustainability measures such as constructing recharge structures to achieve environmental sustainability through synergy with ongoing watershed development programs under National Rainfed Authorities, MGNREGA, NABARD, etc. Engaging with farmers on crop selection and water budgeting by organizing training programs and introducing water-saving methods will improve overall water use for conjunctive purposes.

Reducing Impact of Discharge

If the technology selected has a discharge associated with it, the discharge should be managed such that it minimizes environmental impact. RO is the most commonly used technology by CSWSs. The reject from RO might contain higher concentrations of contaminants, both from the source water and the chemicals added (e.g., anti-scalant for membrane protection) during the treatment process. CSWSs should dispose of the reject in an appropriate way (generally in village sewers or drains in the absence of specific testing of reject water quality) to avoid contaminating water sources. Some CSWSs reuse reject water for sanitation in households. While the quantum of ion exchange process is far higher, the reject water is far lower in dissolved solids and contaminant concentration, requiring even more prudent handling.

CHALLENGES

- *Conjunctive uses of water, such as irrigation, straining groundwater resources*
- *Depletion of groundwater table*
- *Dearth of viable uses for waste water*
- *Priority given to environmental impact is usually low compared to other operational functions*

KEY RECOMMENDATIONS

- *Integrate environmental criteria into initial site selection through a Decision Support System*
- *Implement rainwater recharge systems to augment the aquifer and dilute the impact of reject water*
- *Train communities in prudent water resource management*

Water Safety Plans

A Water Safety Plan (WSP) is an instrument introduced by WHO in 2004 for managing water quality from catchment to the consumer; it has been increasingly adopted by water authorities and governments worldwide.⁴⁷ The implementation of a WSP can help achieve reliable water quality and sustainability of CSWSs in rural areas through a dedicated customer base. The Ministry of Drinking Water and Sanitation (MDWS) published a “Uniform Drinking Water Quality Protocol” in February 2013. Safe Water Network, with support from Underwriters Laboratories, also published a “Water Quality Monitoring Module,” a tool for village-level water-quality monitoring by operators at iJal stations.

⁴⁶ Mandal, K. (2008). *Drinking Water Supply Vis-à-vis Technological Interventions for Social Empowerment of Rural India*. Science and Technology for Rural India and Inclusive Growth.

⁴⁷ WHO. (2009). *Water Safety Plan Manual: Step-by-Step Risk Management for Drinking Water Supplies*.

The development and implementation of a WSP involves the identification of the entire supply system, from source to delivery, and the assessment of all possible water quality risks, followed by the development of control systems to manage the identified risks.⁴⁸ A WSP will help ensure selection of the most appropriate technology to mitigate and manage water quality risks. Implementation of a WSP at the CSWS level aids selection of the best control measure for contaminants to be treated, and helps ensure that other control measures, such as protection of the water source and the aquifer and personnel training are adequate. However, WSPs are mainly focused on water quality and continuous supply, with the social and economic aspects playing a secondary role.⁴⁹

Funding

The primary funding sources available for CSWS players are government and commercial. There is an emerging opportunity for funding from corporate social responsibility (CSR)—philanthropic or donor grants.

Government Funding

The Ministry of Drinking Water and Sanitation (MDWS, formerly known as Department of Drinking Water Supply in the Ministry of Rural Development) is primarily responsible for rural water supply and sanitation in India. MDWS allocates funding for rural water supply and sanitation under the Five Year Plan. In 2011, INR 99.92 b (US\$1.65 b) was invested and in 2012, INR 117 b (US\$1.95 b) was invested.⁵⁰ The funding is divided between water supply and sanitation and is distributed annually to the states. GoI, World Bank, and Asia Development Bank (ADB) contribute to this funding. Exhibit 15 reflects state and central government funding in 2013–2014.

National Rural Drinking Water Program (NRDWP, formerly known as Accelerated Rural Water Supply Program) is responsible for all water-related investments. NRDWP has subdivided the funding to be spent on various components such as coverage, quality, O&M, sustainability, monitoring, and support. The funds released by the GoI under the NRDWP are allocated both at the central level and at the state level. In the 11th Five Year Plan, NRDWP invested INR 394 b (US\$6.6 b) at the central level and INR 490 b (US\$8.2 b) at the state level.⁵¹ The central budget puts some focus on water quality, for which 5 percent of NRDWP allocation is earmarked.⁵² At the state level, 20 percent is allocated for water quality.⁵³ NE states and J&K have a funding pattern of 90:10, while the rest of the states have a 50:50 split.

At the beginning of every financial year, allocation of funds for the various components of NRDWP is communicated to the states, which then indicate the component under which they will avail the funding. The central and state governments together also spend an estimated INR 55 b (US\$1.1 b) per year on subsidies for the water sector, accounting for 4 percent of all government subsidies in India and 0.5 percent of GDP.⁵⁴ However, about 80 percent of these subsidies fail to reach the BoP. The average amount of subsidies received by the top percentile of the population is two to three times as high as the average subsidies received by the bottom percentile.⁵⁵

The percentage of this funding made available for decentralized safe water solutions is not clearly determined and hence ambiguity exists around how much can be availed by CSWS providers. Overall, the funding allocated by the GoI and the states is sufficient to fund considerable scale-up of CSWSs. The challenge lies in directing water quality funds toward CSWSs, which can target quality-affected habitations. There is an opportunity for CSWS players to develop viable sustainable business models and work together to influence the allocation by the government of water quality funds toward CSWSs.

⁴⁸ [2009]. *Water Safety Plan Manual*.

⁴⁹ [2010]. *Water Safety Plans for Rural Water Supply in India, Policy Issues, and Institutional Arrangements*. Water and Sanitation Program.

⁵⁰ Ministry of Drinking Water and Sanitation. [2013]. *India Budget*. Ministry of Drinking Water and Sanitation, 29. Retrieved from <http://indiabudget.nic.in/ub2013-14/eb/sbe29.pdf>.

⁵¹ Ministry of Drinking Water and Sanitation. [2011]. *Report of Working Group on Rural Domestic Water and Sanitation*. Government of India. Retrieved from http://planningcommission.gov.in/aboutus/committee/wrkgrp12/wr/wg_indus_rural.pdf.

⁵² [17.]

⁵³ [7.]

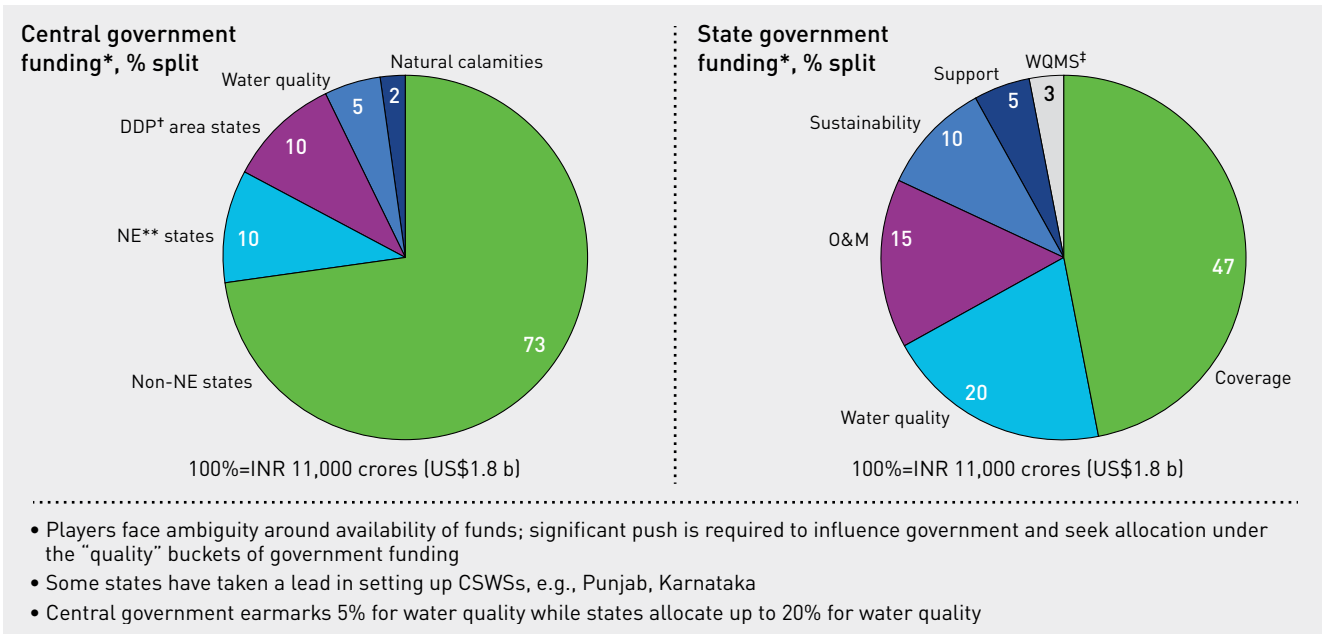
⁵⁴ Vivein, F. [2002]. *A Scorecard for India*. Water Tariffs and Subsidies in South Asia, Paper 2.

Retrieved from http://www.wsp.org/sites/wsp.org/files/publications/418200752957_scorecard.pdf.

⁵⁵ Vivein, F., Stalker, L., & Pattanayak, S. [2003]. *Do Current Water Subsidies Reach the Poor?* Water Tariffs and Subsidies in South Asia, Paper 4. Retrieved from <https://www.wsp.org/sites/wsp.org/files/publications/349610CurrentWaterTariffs.pdf>.

EXHIBIT 15

Central and state governments allocated ~INR 24,000 crores (~US\$4 b) in 2013-14 for rural drinking water; CSWSs were only funded in quality-affected habitations.



*Central govt. allocates funds to each state and states match that funding from their own sources; additionally ~INR 2000 crores (US\$0.3 b) were provided by Asian Development Bank through the central government). **Northeastern states include Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim and Tripura. †Desert development program. ‡Water quality monitoring and surveillance (WQMS).
Source: Outcome Budget (2013-14).

CHALLENGES

- Projecting CSWSs to the government as an attractive, viable option
- Tendering process favors the lowest bidder and not necessarily the best quality service provider or the longest-lasting solution
- Approval process for all steps involved from inception to completion of the plant could be slow and time-consuming

KEY RECOMMENDATIONS

- Develop and document business models that demonstrate the success and potential of CSWS in the rural sector to attract government funding
- Involve government as a key stakeholder early on in decision-making to facilitate future funding process
- Offer a platform to support initial CAPEX funding of CSWSs by devolving funds based on the Management Devolution Index (MDI) of the targeted state
- Allocate a fund for OPEX viability gaps, especially in impoverished and small community habitations

Commercial Funding

There are two types of commercial funding organizations—banks and impact investors. Banks offer traditional debt capital in the form of loans. Both public and private banks fall under this category, and they offer various products in the form of micro-, small-, and medium-enterprise loans (e.g., ICICI, NABARD, and SBI). Impact investors are usually venture capital firms that provide patient capital as debt or equity (e.g., Acumen Fund, Advantage Ventures, and Aavishkaar). Among the venture capital firms that were analyzed, only 5 out of 15 had provided funding to firms operating in the drinking water sector. Financial institutions such as IFC and IFMR Trust also represent additional potential sources of financing.

Some reviewed organizations have successfully accessed commercial funding. Acumen Fund has provided funding to Naandi, Spring Health, and WHI; Aavishkaar to Waterlife; Advantage Ventures to Sarvajal, WHI and Waterlife; Sail Capital Partners to WHI; and Matrix Partners to Waterlife. NABARD has provided funding to WHI and Waterlife. Other financial institutions, such as Small Industries Development Bank of India (SIDBI), help facilitate credit flow to CSWS through low interest rates and easier access to collateral-free loans. However, investments are limited to commercially viable projects that can provide a return on investment. Currently, none of the players have a financially viable model to attract this commercial funding at scale. Therefore, commercial funding as standalone funding is unlikely to work for the CSWS sector in the current framework. To enable commercial funding, it has to be augmented by the availability of government or donor funds to cover the initial infrastructure creation. This funding could make this sector more attractive for commercial investors and pave the way for CSWS players to create financially viable models.

CHALLENGES

- *Absence of economically viable CSWS models at scale*

KEY RECOMMENDATIONS

- *Create robust economic and financial models to track and demonstrate potential financial viability*
- *Develop clear and transparent mechanisms for tracking and reporting on financials*
- *Focus commercial funding only toward service and sustainability of existing infrastructure created by other funds*

Corporate Social Responsibility and Philanthropic Funds

Currently, only a minuscule portion of CSR funds is allocated toward drinking water projects. Investment by companies in CSWSs might be of particular interest to those whose businesses require heavy water usage. Donor organizations such as Tata Trusts, HSBC Foundation, etc. have also supported this sector. Some CSWS implementers, such as Naandi and WHI, have also been funded by bilateral or multilateral organizations.

CSR from Indian companies and public sector undertakings (PSUs) represent a growing funding opportunity for CSWS. According to the new Companies Bill 2013,⁵⁶ Indian companies with a net worth above INR 5 b (US\$80 m), a turnover above INR 10 b (US\$160 m), or a net profit above INR 50 m (US\$800,000) are required to devolve 2 percent of their profit after tax to CSR. Considering 900,000 active companies in India that can satisfy the requirements, the total market size of CSR in India can potentially be estimated between INR 114–144 b (US\$1.9–2.4 b) per year. While some of this may be new funding, many companies are already allocating funds to CSR, and so the size of incremental funding is still to be determined. Even a small increase in the percentage of funding allocated for drinking water will benefit CSWS providers.

CHALLENGES

- *CSR funding is generally allocated to education and health*
- *Allocation of funds is usually in line with a company's strategic objectives, with preference given to locations closer to their existing plants and facilities rather than based on greatest need*
- *Corporate setup of nonprofit entities to further their objectives and fund allocation to the CSWS sector is limited*

KEY RECOMMENDATIONS


- *Market CSWSs as an attractive investment to water-intensive companies*
- *Use leveraged funding to establish partnerships with the corporate sector to obtain CSR support*

⁵⁶ Malhotra, P.K. [2013]. *The Companies Act 2013*. Ministry of Law and Justice, Legislative Department, 18. Retrieved from <http://www.mca.gov.in/Ministry/pdf/CompaniesAct2013.pdf>

LOOKING FORWARD

We hope this report and the recommended actions provide a useful first step to understanding the current state of CSWSs, how these solutions can deliver maximum benefit to rural consumers, and what it will take to achieve scale. To overcome the challenges to sustainability and scale-up requires the engagement of all the major stakeholders—the government, corporates, CSWS implementers, and the community. We look forward to finding ways to work together toward a unified agenda for advancing CSWSs in India.



 CSWSs should actively establish partnerships with companies to leverage their CSR funds, which now have a potential of over US\$2 b per year.



While objectives of reviewed organizations are similar, ownership, operating models, expenses, and price vary among them.

Bala Vikasa

FIELD VISIT | September 20, 2013 | **S. Shoury Reddy, Executive Director**



Summary	Bala Vikasa Social Service Society is a not-for-profit NGO focused on community development. Drinking water initiatives are a part of its program to improve overall health and education in underserved rural communities.
Founded	1991 in Warangal, Andhra Pradesh.
Span of Operations	More than 520 water systems have been established, providing access for roughly 190,000 people. Focus is on areas with high incidence of fluoride and microbial contamination. Programs for capacity-building and skill development help enhance the ability of communities to plan, execute, monitor, and manage their projects.
Model	Local ownership, with treatment plants operated and managed by village water committees. Bala Vikasa provides support until one year after installation. It provides 80 percent of the plant cost to each community as a one-time grant; the remaining capital cost (covering building, water source, and electrical connection) is mobilized by the community and Gram Panchayat (GP).
Sources of Funding	Supported by grants from a range of international government and charitable organizations, including the Canadian High Commission-New Delhi, Canadian International Development Agency (CIDA), Cardinal Léger Foundation, Frank Water Projects, Kadoorie Charitable Foundation, Novara Center ONLUS, OneProsper, School for Children and Society for Partnerships.
Technology and WQSM	Reverse osmosis (RO) is the dominant technology. Plant capacity depends on the community's population: <ul style="list-style-type: none"> • Less than 200 households: 250L/hr • 200–400 households: 500L/hr • 400–800 households: 1,000L/hr • More than 800 households: 2,000L/hr Quality tests of raw water (annually) and treated water (monthly) are conducted at the centrally located laboratory at the Bala Vikasa office in Warangal.
Economics and M&E	Water systems are required only to generate sufficient revenue to meet their ongoing operating expenses, including the replacement of high-value consumables. Thus, they are able to set a comparatively lower price for water (INR 2–3, or US\$0.03–0.05, per 20L) than other CSWSs. Viability varies depending on the capability level of the managing village water committee. To sustain the quality of operations, monthly meetings are held with the village committee to review plant progress and address any operational issues.
Product Innovation	<ul style="list-style-type: none"> • Villages are graded on an annual basis, and top-performing committees receive a financial reward. • Federation of village water committees to form a state-level institution with representation from each village where a station is located. The federation's mandate will be to ensure services are available to plants and quality standards are maintained. • The Any Time Water (ATW) system, a battery-powered, automatic dispensing and payment system introduced in 2013. Users are issued radio-frequency identification (RFID) cards, which can be recharged monthly. This system helps Bala Vikasa track sales volumes, user information, and plant financials. • Computerized receipts reporting recharge amount to users. This system enables users to know their balance amount and improves the transparency of financial transactions.
Contributions	<p>Data from the village of Katriyala in Warangal District</p> <p>Safe Water Network analyzed financial data from one of Bala Vikasa's top performing villages, Katriyala, which were collected during a site visit on September 20, 2013. This village has 750 households, of which 483 families are currently members. In 2012, the committee in Katriyala received a reward of INR 20,000 (US\$333) for their successful maintenance of the system. Top-performing villages are asked to donate up to INR 5,000 (US\$83) per year back to the organization to carry forward its mission, which the Katriyala village committee is doing.</p> <p>GP</p> <ul style="list-style-type: none"> • Land, water source, and electricity connection • 483 members gave INR 350 (US\$5.83) each, and two individuals donated an additional INR 21,000 (US\$340) toward building construction <p>Community</p> <ul style="list-style-type: none"> • An additional INR 90,000 (US\$1,500) was contributed toward the plant (20 percent contribution to capital cost) • Installed automated dispenser ("Any Time Water") in 2012, paid from system revenues • 1,000/LPH reverse osmosis treatment plant—INR 155,000 (US\$2,583) <p>Bala Vikasa</p> <ul style="list-style-type: none"> • Community mobilization, operator training, monitoring • One-year warranty from plant supplier as maintenance support
Financials	Monthly operating expenditures average roughly INR 10,000 (US\$167), including operator salary, chemicals, and consumables. In an interview, the village water committee president reported average monthly savings of around INR 4,000 (US\$67). Since the launch of the system, the committee has accumulated a total of over INR 300,000 (US\$5,000).



Healthpoint Services India

FIELD VISIT | September 26, 2013 | Amit Jain, *President and CEO*

Summary	Healthpoint Services India is a social enterprise that establishes integrated, community-level drinking water interventions (E Health Points) in rural areas. Apart from safe water, these provide technology-enabled primary healthcare services (telemedicine, pharmacy, and basic diagnostic services). Its mission is to enhance human dignity, health, productivity, and savings through innovative, technology-enabled services.																				
Founded	Founded by Mr. Amit Jain and Dr. Allen Hammond in 2009.																				
Span of Operations	Currently operates in 140 villages in Punjab and 30 villages in Andhra Pradesh, where it is trying to address a range of water quality challenges, including fluoride and other minerals, as well as microbial contaminants.																				
Model	Villages are selected based on certain “techno-commercial” parameters—water quality, water sourcing practices, community size, disease prevalence, and availability of alternative drinking water sources. An operating team and a service team oversee E Health Points. Each E Health Point has at least one operator who is responsible for operations and day-to-day maintenance, and one or more promoters (typically one for every 500 HHs) during the first year of operations. Promoters engage in door-to-door promotion, and customer engagement and enrollment, organizing campaigns on the health benefits of treated water to drive consumer adoption. The service team is comprised of engineers and technicians who provide maintenance and breakdown support. Each technician services 30 plants. The NGO has also established a structured training and certification program for members of the service team, as well as a telephone support line and complaint redress system. Most E Health Points include a water distribution program.																				
Sources of Funding	<p>Village Council</p> <ul style="list-style-type: none"> • Access to water source and electricity connection • Land lease at a nominal cost <p>Community</p> <ul style="list-style-type: none"> • Water sold at INR 80 (US\$1.33)/month (20L/day) or at about Rs 3/20L (US\$ 0.05) <p>Healthpoint Services</p> <ul style="list-style-type: none"> • Salaries for operator, other field personnel, HQ staff • Capital investment for plant installation • Operation and maintenance of the plant 																				
Technology and WQSM	Healthpoint Services deploys a range of technologies depending on local water challenges, including RO, UF, UV, de-fluoridation, and iron removal plants. Currently, the technology mix is heavily skewed in favor of reverse osmosis due to the high prevalence of chemical contaminants where the company operates (Punjab and Andhra Pradesh). Their regular water quality tests include: <ul style="list-style-type: none"> • Periodic testing through independent accredited labs • On-site testing by using Mini-Test Kits • Online reports on plant parameters 																				
Economics and M&E	Land housing at each E Health Point is leased by Healthpoint Services from the village council for INR 200–300 (US\$3–5) per month. Total capital investment for an RO plant varies from INR 5–8 lakh (US\$8,333–13,333), with costs for other plants varying based on the purification technology.																				
Product Innovation	<ul style="list-style-type: none"> • Telemedicine: Doctors from urban areas provide consultation to villagers through a teleconferencing facility available at each E Health Point. Patients are charged INR 25 (US\$0.42) per consultation, and a doctor conducts 50–60 consultations per day. • Basic Diagnostic Service: Technicians are trained to provide 70 different diagnostic tests provided at a subsidized rate (costing on an average INR 75/US\$1.25 per batch test). • Pharmacy: Medicines are sourced directly from drug companies and are provided to communities. <p>Healthcare units are manned by 3–4 nurses and technicians, and doctors are engaged from urban areas (for up to INR 30,000/\$500 per month) to provide consultation via teleconference. Recently, Healthpoint Services entered into a partnership with Max Health, one of the top healthcare institutions in India, to provide higher-order care and treatment services to the low-income communities at highly subsidized rates.</p>																				
Economics	<p>Working in communities with 1,000–1,500 households, E Health Points have an average adoption rate of 30–40 percent. At INR 80 (US\$1.33) per household per month, a plant is able to generate enough revenues to cover its operating cost. Water kiosks have been known to break even within 12–18 months. Key economic parameters for a typical plant generating INR 31,500 (US\$525) in monthly average revenue:</p> <table border="1"> <thead> <tr> <th>Profit after</th> <th>Value (INR)</th> <th>Value (USD)</th> </tr> </thead> <tbody> <tr> <td>OPEX</td> <td>14,990</td> <td>250</td> </tr> <tr> <td>OPEX + Cash Reserve</td> <td>13,491</td> <td>225</td> </tr> <tr> <td>OPEX + Cash Reserve + Equipment Cost</td> <td>5,158</td> <td>86</td> </tr> <tr> <td>OPEX + Cash Reserve + Equipment + Civil</td> <td>3,491</td> <td>58</td> </tr> <tr> <td>OPEX + Cash Reserve + Equipment + Civil + Awareness</td> <td>1,825</td> <td>30</td> </tr> </tbody> </table>			Profit after	Value (INR)	Value (USD)	OPEX	14,990	250	OPEX + Cash Reserve	13,491	225	OPEX + Cash Reserve + Equipment Cost	5,158	86	OPEX + Cash Reserve + Equipment + Civil	3,491	58	OPEX + Cash Reserve + Equipment + Civil + Awareness	1,825	30
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Next Steps	Building on its success to date, Healthpoint Services plans to expand its reach in the states of Haryana, Himachal Pradesh, Uttar Pradesh, and Karnataka.																				

Naandi Community Water Services

FIELD VISIT | October 8, 2013 | **Anoop Ratnaker Rao**, *Chief Operating Officer*



Summary	Naandi Foundation has committed itself to bolstering the government's efforts in eradicating the problem of lack of access to safe drinking water. For a sustained, large-scale impact, Naandi and Danone Communities established Naandi Community Water Services Pvt. Ltd. (NCWS) as a mission-focused, for-profit services company. Naandi Foundation and NCWS have created an innovative service delivery platform for providing affordable drinking water to improve health and quality of life in rural India.
Founded	2005
Span of Operations	NCWS provides BIS-certified safe drinking water to more than 600,000 people across 400 villages in five states—Andhra Pradesh, Karnataka, Rajasthan, Haryana, and Punjab through 408 community water centers (CWCs). Close to 394 m liters of water were dispensed in the last financial year. Groundwater, the source of 80 percent of drinking water in these areas, is depleting and being contaminated at an alarming rate. They operate where there is microbial and chemical contamination. Pollution from increased fertilizer and pesticide use in agriculture and industry has worsened the situation. Awareness programs related to safe water storage practices, adopting appropriate sanitation practices, and how to avoid contaminating water resources are conducted. Pre-launch activities include school and community programs, film screenings, general information campaigns, village-mapping, mother-child bonding programs, wall paintings, and visual advertisements. Post-launch, the focus is on engagement with SHGs and schools, and door-to-door campaigns.
Model	Naandi operates under a community-centric model wherein each community operates the CWC for an agreed-upon period, usually 5–10 years, and provides the space, raw water source, and electricity connection to establish the CWC. NCWS manages O&M and the collection of money from water sold. These fees range between INR 3–4 (US\$ 0.05–0.067) for each 20L container. Each CWC has one Water Center Assistant (WCA) or two if average sales exceed 300 of 20L containers/day. The operator is responsible for plant operation, record-keeping, volume reporting, and revenue collection. Each territory, comprising 20–25 plants, is managed by a territory officer (TO), who manages the WCAs within his territory, and the community organizers (COs). COs are responsible for demand generation and community mobilization. Cluster heads identify expansion opportunities, and also manage the TOs within a cluster (each of which usually includes two or three territories). Each state has a head reporting to the CEO. One trained technical support technician, often with an ITI diploma, is responsible for routine maintenance, quality checks, chemical cleaning, and upkeep of facilities for 25–30 plants. For every four technicians, there is a breakdown expert responsible for addressing major system failures and training technicians and operators.
Sources of Funding	<p>Community (sellers)</p> <ul style="list-style-type: none"> • Land, water source, and electricity connection <p>Community (buyers)</p> <ul style="list-style-type: none"> • Service sold at INR 3 (US\$0.05) per 20L to cover operational costs • Facilitation of capital grant • Plant installation, and O&M and related expenses for the initial contract duration (5–10 years) <p>Naandi</p> <ul style="list-style-type: none"> • Technical support through a service team <p>Donors</p> <ul style="list-style-type: none"> • Initial capital costs to establish a CWC
Technology and WQSM	Based on the water source (ground or surface) and its quality, a choice is made between RO and UF to address chemical contaminants, and UV to address microbial contaminants.
Economics and M&E	Establishing a new CWC requires an investment of INR 10–14 lakh (US\$16,667–\$23,333). Once installed, consumers can register on-site and buy a 20L/12L container and monthly prepaid card entitling them to 30 cans over the course of 30 days. This is designed to incentivize users to purchase regularly, as unused supply days lapse after the 30-day period ends. Naandi reports that average penetration is roughly 28 percent with an average community size of 1,000 households.
Product Innovation	<ul style="list-style-type: none"> • Implemented W-365, which is an Enterprise Resource Planning solution designed and developed by ConceptWaves, combines mobile- and cloud-computing technologies to aggregate critical information daily from the widely distributed CWC network. W-365 is device-agnostic. • SMS (Short Message Service, or text message) reports are captured by the SMS gateway, and are processed and analyzed in the cloud through enterprise-grade Java servers with a MySQL database, which are accessible from anywhere in real time. The system's use of structured SMSs from authorized mobile numbers keeps the application device-agnostic and drives down costs. The application is implemented across the country to improve monitoring, preventive maintenance, and corrective actions.
Next Steps	Naandi's goal is to create the world's first sustainable, community-based safe drinking water solutions platform, and for this, the organization's priorities include: <ol style="list-style-type: none"> Increasing the number of CWCs to 967 in the next four years, bringing in economies of scale to spread fixed costs. Its target is to provide safe water access to 2 m people in the next five years. Increasing sales through well-defined "community connect" activities and innovative distribution models. Working with communities to adjust water pricing by demonstrating value and building awareness of the need to generate surpluses to ensure sustainability.



Rite Water Solutions

FIELD VISIT | September 12, 2013 | *Abhijeet Gaan, Chief Executive Officer*

Summary	Rite Water is a private company that manufactures and supplies water treatment solutions for domestic and industrial use. Rite Water realizes the critical lack of safe drinking in rural areas and has developed an operating model with the goal of deploying appropriate safe drinking water technologies at the community level. It has established partnerships with the Council of Scientific and Industrial Research (CSIR), Lehigh University, and Siemens Water Technology to continue to develop more effective treatment solutions.														
Founded	Established in 2009														
Span of Operation	The company targets “micro-villages” of fewer than 1,000 people. Rite Water currently manages 125 such water systems across Maharashtra, Chhattisgarh, and Madhya Pradesh. Currently, 80 percent of the plants set up by Rite Water address fluoride issues while the rest of the plants address nitrate and salinity issues.														
Model	Rite Water employs a BO (Build-Operate) model. The company bids for government tenders under the NRDWP. In the initial contract period, the water system is owned by the government, after which it may be transferred to the local GP. Whichever entity takes ownership (GP or government agency) is responsible for O&M. Even after the ownership is transferred to the GP, Rite Water continues to operate plants in many cases. Ongoing management is conducted by an operational team and a servicing and maintenance team. The core of the operational team is a system operator whom Rite Water identifies through a consultative process with the community. The operator is then trained in plant operations, monitoring, and basic maintenance. Rite Water also employs a servicing and maintenance team consisting of an electrical technician and a water technician. These technicians are typically diploma holders or graduates who are further trained by Rite Water to enable them to service multiple treatment technologies. Both are involved from the time the plant is installed, and typically service up to 10 water systems.														
Sources of Funding	<p>Government</p> <ul style="list-style-type: none"> • Capital cost of the plant • Operational expenditure during the initial contract period [3–5 years] <p>Donor/Corporate</p> <ul style="list-style-type: none"> • Operational expenditure after the expiry of initial contract period, including operator salary, power and consumables, maintenance, etc. 														
Technology and WQSM	<p>Technology to be adopted in each community is according to government analyses of water quality:</p> <table border="1"> <thead> <tr> <th>Contaminant</th> <th>Technology</th> </tr> </thead> <tbody> <tr> <td>Salinity (Hardness)</td> <td>RO</td> </tr> <tr> <td>Fluoride</td> <td>Electro-coagulation</td> </tr> <tr> <td>Microbes (Bacteria / Viruses)</td> <td>Electro-chlorination, UV, UF</td> </tr> <tr> <td>Nitrate</td> <td>Nitrate Exchange</td> </tr> <tr> <td>Arsenic</td> <td>Electro-coagulation, Ion Exchange</td> </tr> <tr> <td>Multiple</td> <td>RO</td> </tr> </tbody> </table> <p>Ongoing water quality monitoring activities include:</p> <ul style="list-style-type: none"> • Daily quality log maintained by the system operator • Remote monitoring system (RMS) for off-site monitoring of output quality and plant health • Monthly checkup by the service engineer who carries out preventive maintenance, checks plant performance, and tests water quality parameters such as fluoride, nitrates, TDS, iron, etc. 	Contaminant	Technology	Salinity (Hardness)	RO	Fluoride	Electro-coagulation	Microbes (Bacteria / Viruses)	Electro-chlorination, UV, UF	Nitrate	Nitrate Exchange	Arsenic	Electro-coagulation, Ion Exchange	Multiple	RO
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Economics and M&E	Capital cost to establish each water system is between INR 5–10 lakh ⁵⁷ (US\$8,333–16,667) and is paid by the government as a part of the initial contract. The user community does not make an ongoing contribution to the system through user fees, as the water is provided free of charge. Operators draw a salary of INR 4,500–6,000 (US\$75–100) per month. This salary is paid by Rite Water, with some financial support provided by the government or corporate partners. Technicians draw a monthly salary of INR 8,000–10,000 (US\$133–167). Estimated operating expenditure is some INR 12,300 (US\$205) per month. Rite Water has experimented with a water price option in a few areas; however, it managed to recover only 15–20 percent of the total operational cost. The company, therefore, generally continued to provide water at no cost to users. In several cases, Rite Water has succeeded in securing additional grants from government and corporations to continue operations beyond the initial concession period. It is estimated that remote monitoring increases total capital costs by INR 30,000–40,000 (US\$500–\$667) per system, but it is also expected to reduce maintenance needs and system downtime.														
Product Innovation	Solar-powered electrolytic de-fluoridation system: Designed with sufficient capacity to enable the needed amount of water to be purified during daylight hours, it could completely eliminate the need for a grid connection. Rite Water is also developing a RMS; however, the company has not yet deployed this technology.														
Next Steps	Rite Water intends to scale up across 12 water quality-affected states of India through the PPP model and deploy the community water solutions across 1,000 habitations in the coming three years.														

⁵⁷ Capital cost varies on already-available infrastructure, water source, etc.

Safe Water Network India

FIELD VISIT | January 2014 | Ravindra Sewak, *Managing Trustee*

Summary	Safe Water Network India is a not-for-profit trust registered in 2009, and is committed toward developing and expanding sustainable, market-driven solutions aimed at delivering safe, affordable drinking water to the underserved in rural India to improve their health.
Founded	Established in 2009 under the Indian Trusts Act 1882.
Span of Operations	To date, Safe Water Network India has commissioned 44 water kiosks (locally called “iJal Stations”) with local NGO partner MARI, providing nearly 200,000 people with reliable safe-water access in Telangana, Maharashtra, and Uttar Pradesh using a cluster approach. About 22 m liters of water were dispensed in the last calendar year. They have also introduced the microfinance-based Rainwater Harvesting Program in over 55 villages in Rajasthan with its partner Boruka Charitable Trust, providing access to over 16,000 people.
Model	The model involves seeking GP/local governance resolution to install these community-owned and -operated or entrepreneur-led water kiosks. Consumer activation programs are conducted in each project village to drive safe water demand and promote good health in the community. Its local NGO partner, MARI, plays a key role in consumer activation and enrollment drives with the Safe Water Network India team.
Sources of Funding	<p>Village</p> <ul style="list-style-type: none"> • Land, building, water source, and electricity connection <p>Community</p> <ul style="list-style-type: none"> • Contribution to capital expenses in community model toward civil works • iJal cans @ 200 rupees—subsidized in part considering affordability • Water is sold at iJal Stations at 4 rupees/can to cover operating costs and create reserves through a Sustainability and Reinvestment Fund <p>Safe Water Network</p> <ul style="list-style-type: none"> • Salaries for project site officers • Salaries of senior staff <p>Donors</p> <ul style="list-style-type: none"> • Water treatment plant equipped with a remote monitoring device • Local NGO support for community mobilization, consumer activation, and institution building • Operator training • Technical support • Monitoring and evaluation
Technology and WQSM	The iJal Stations consist of RO systems with a capacity of 1 KL/hour to treat water contamination. Regular water quality tests are conducted through accredited laboratories on both raw source water (every six months) and treated water (every three months). Station operators also track pH and TDS daily on-site to ensure that the treatment system is operating efficiently.
Economics and M&E	At INR 4 (US\$0.07)/20L can, a minimum daily sales volume of 87 cans is required to cover local operating costs (operator salary, electricity, consumables, annual maintenance charges). Since an average household purchases 20L of treated water every 2.5 days, a minimum of 240 households must be enrolled—48 percent penetration in a community of 500 households. The iJal Stations recovered their operating costs on an average of 127 cans sold per day; however, there is significant variation between sites. The weakest performing site in Wadlakonda, Telangana, sells an average of just 60 containers per day. The highest performing site, Parkal in Telangana, sold an average of 265 containers per day in 2013. Safe Water Network monitors and evaluates its project operations, with the objective of standardizing the approach for ease of replication at scale. Additionally, toolkits and manuals have been developed for conducting training programs for the plant operator to operate and manage the plant, water quality testing, maintaining books of accounts, and plant hygiene. The RMS installed at each station tracks the plant performance, water quality, and consumer tracking on 24/7 basis.
Product/Process Innovation	<ul style="list-style-type: none"> • Computer tablets, a cost-effective rural messaging mechanism, was developed to accelerate the adoption and utilization of safe water in partnership with Dialogue Factory to spread health and hygiene education using local language among the communities, implemented by IMRB with support from Merck Foundation (MSD in India). • RMS is used to increase visibility, lower operational costs, and increase reliability, in partnership with Mark & Space Telesystems. The technology tracks key operational, quality, and financial metrics at the local level, and is an essential tool for managing systems at scale. • Dashboard that applies business analytics tools to data generated through our remote monitoring systems • Water resource management to maintain the sustainability of the water source • Residual chlorine in treated water to mitigate recontamination risks
Next Steps	Safe Water Network India’s next phase of expansion focuses on getting safe water access to more people as well as standardizing its approach and developing toolkits to facilitate rapid scale-up. Its priority is to set up a field services entity to provide local technical support services for reliable operations. It plans to test this cluster approach in two or three states before taking it to scale. RMS, toolkits, and training curricula shall be made available to engage stakeholders’ participation through TA and shift the focus from direct implementation to replication in the next phase of operation.



Sarvajal (Piramal Water Private Limited)

FIELD VISIT | October 9, 2013 | Anuj Sharma, Chief Operating Officer

Summary	Sarvajal is a social enterprise brand established by Piramal Water Pvt. Ltd. committed to providing safe drinking water for the underserved at an affordable price. The company, supported by Piramal Group's CSR initiative, was established with the aim to develop market-based models for safe drinking water.
Founded	2008
Span of Operations	<p>Sarvajal has installed 200 water systems in Gujarat, Rajasthan, Haryana, Madhya Pradesh, and Delhi and is a pioneer in real-time online tracking of each water purification unit that ensures proactive maintenance and service accountability. Recently, Sarvajal has partnered with the Delhi Jal Board (DJB) to expand its model from rural areas to urban slums, beginning with the Delhi slum of Sawda Ghevda.</p> <p>Sarvajal has also launched an experimental pilot in Jaipur to develop a viable model for providing safe water to municipal schoolchildren. The pilot is supported by the Michael and Susan Dell Foundation. Once the model matures, it is expected that corporate entities will take interest. In the pilot, tariffs collected from consumers in the evening hours will be used to subsidize free water supplies to schoolchildren during the day. Piramal Water has installed safe drinking water solutions at locations with excessive dependence on groundwater sources for drinking purposes. Henceforth, apart from biological contaminants, the raw water is also rich in geological (ionic) contaminants like fluorides and nitrates, which deem water chemically unfit for human consumption. Additionally, the TDS of water sources might vary from 2,000–5,000 ppm.</p>
Model	It operates on a franchise model, with water treatment systems operated by a local entrepreneur or cooperative society. Sarvajal leases the water treatment system and related equipment to the franchisees, and revenue is shared (60:40) between the franchisee and Sarvajal. Sarvajal owns, installs, services, and maintains the water purification machinery, with franchisees responsible for day-to-day operations. The franchisee pays a one-time fee of INR 50,000 (US\$833), in addition to meeting other necessary investments.
Sources of Funding	<p>Funding to establish a plant comes from a range of sources, as illustrated below. Currently, Sarvajal funds the initial capital investment in the treatment system and ATW equipment (partly with funding provided by Piramal Foundation). It is now exploring opportunities to work with banks in creating loan products of franchisees to support capital costs.</p> <p>Franchisee</p> <ul style="list-style-type: none"> • Signup fee of INR 50,000 (US\$833) • Electricity, land, water source • 40 percent of revenue sharing with Sarvajal • Operational cost to run the ATW <p>Community</p> <ul style="list-style-type: none"> • Water sold at ATW at INR 6 (US\$0.10)/can (20L) to cover operating costs <p>Sarvajal</p> <ul style="list-style-type: none"> • Treatment system and ATW –INR 200,000 (US\$3,333)
Technology and WQSM	Treatment technology varies between communities depending on the number of households served and the quality of the source (raw water). However, the main technology used is RO, with a capacity of 500L/hour.
Economics and M&E	<p>The ATWs dispense purified water at INR 6 (US\$0.10) per 20L container to consumers who pay by RFID card or with coins. Water prices are determined by the franchisee and are generally in the range of INR 6–10 (US\$0.10–0.17) per 20L. The Sawda Ghevda slum initiative operates under a public-private partnership (PPP) model, in which the government plays a role in deciding the price along with the franchisee. The upper limit is set at INR 10 (US\$0.17) per 20L.</p> <p>Recently, Sarvajal has focused on designing loan products to support system capital. Banks and NBFCs (Non-Banking Financing Companies) have approved pilots where investment is made in the form of loans. It is expected that breakeven would be achieved in two years among a population size of 4,000 people (about 1,000 households).</p>
Product Innovation	Impact Tracking: Online tracking enables Sarvajal to gather micro-level data regarding the quantity and quality of water withdrawn by each user. The remote sensing equipment on the water ATMs enables Sarvajal to track system performance and identify the cause of any breakdowns. It also offers transparency and protection to the consumer, as it displays the TDS level at the time of dispensing, and whenever the quality of the water dispensed is below the acceptable standard, the ATM automatically shuts down.
Next Steps	Sarvajal now seeks to transition to a prepaid card-only model. This will benefit Sarvajal by reducing the transaction costs and improving consumer tracking. Consumers will also benefit from enhanced transparency in the system.

Spring Health Ltd.



FIELD VISIT | January 2014 | **Jacob Mathew, Chief Executive Officer**

Summary	Spring Health has developed a highly decentralized, low-cost model for providing clean drinking water in areas suffering from bacteriological contamination. Its model provides a good example of how lower-cost, technologically appropriate systems without unnecessary complexity provide safe drinking water to communities.									
Founded	A subsidiary of Windhorse International, founded by Paul Polak in 2008.									
Span of Operations	The company differentiates itself from other players by engaging with communities of 200–500 HHs (or at least 600 HHs in a 2km bicycle delivery radius). As of October 2013, Spring Health had 106 operational kiosks. It works in villages in eastern India (primarily Odisha). Drinking water supply in this region is mainly from shallow surface and sub-surface water sources prone to microbial contamination.									
Model	<p>Each water kiosk is established in partnership with a local retailer who is responsible for filling up the tank and managing daily sales of treated water. A Spring Health Business Associate visits the kiosk regularly and based on the volume of water in the tank, adds the appropriate chlorine dosage and tests it after 30–45 minutes. Pre-qualification criteria for shortlisting the villages, aimed at ensuring the need and paying potential of the village, include:</p> <ul style="list-style-type: none"> • Prevalence of open defecation (a direct indicator of microbial contamination in the area) • Population density (to ensure enough customers and viable distance between villages for efficient delivery) • Availability of water (given that the model does not include setting up a water source) • Absence of chemical contamination (as chlorination can only address microbial contamination) • Paying potential <p>In a potential village, Spring Health engages with the local community and explains the need for safe drinking water. Stakeholders provide their approval by inviting Spring Health to set up a kiosk in their village. Elders in communities shortlist entrepreneurs. Adoption among local panchayat, village council, village elders, schoolteachers, and medical professionals influences others to join. Spring Health typically has four teams involved with on-the-ground activities:</p> <ul style="list-style-type: none"> • A scout team responsible for identification of a potential community and initial engagement • A build team responsible for setting up the kiosk • A launch team responsible for carrying out promotional activities, pre- and post-launch • An operational team responsible for daily chlorine dosage, quality monitoring, and revenue collection <p>The operational team is headed by a senior officer and covers up to 100 villages. Business associates cover five to six villages. The team also includes a part-time accountant.</p>									
Sources of Funding	<p>The company has received funding from Rianta and The Stone Family Foundation, alongside a group of individual investors.</p> <p>Local Entrepreneur</p> <ul style="list-style-type: none"> • Land, water source, and electricity connection • Subscription fees to cover 20 percent of capital cost <p>Community</p> <ul style="list-style-type: none"> • Water sold at INR 3 (US\$0.05) per 10L; this covers the cost of operations and awareness programs, and contributes toward the recovery of capital costs <p>Spring Health</p> <ul style="list-style-type: none"> • Salaries for business associates, other field personnel, HQ staff • Setting up the water kiosk (water tank and pump) • Community awareness programs 									
Technology and WQSM	Spring Health's technical solution relies wholly on chlorination to eliminate microbial contamination, and pre-filtering and flocculation also help reduce the bacterial load prior to chlorination.									
Economics and M&E	<p>Water is sold to the consumers in 10L branded containers at a price of INR 3 (US\$0.05). Bicycles, cycle trolleys, or auto rickshaws increase their radius for home delivery (95 percent of sales). One additional rupee (\$0.02) is charged for every 10L can delivery. Senior officers earn a monthly salary of INR 20,000–25,000 (US\$333–417) and business associates earn INR 10,000–15,000 (US\$167–250) per month, with a 12 percent raise each year. Spring Health establishes a revenue-sharing agreement with the retailers, with a built-in incentive for the retailer to increase the sales volume.</p> <p>Sixty-eight containers (680L) of water sales per day are required to cover the operational cost of the kiosk, and the retailer is expected to earn up to three times his initial investment within a year. Spring Health is able to recover its capital costs in 7 months, which increases to 15 months when the cost of awareness programs is also included. The company reports that 90 percent of kiosks currently meet these expectations. Setting up the kiosk near the retail shop is also reported to increase sales of other goods by some 25–100 percent.</p>	<table border="1"> <thead> <tr> <th>Water Sales</th> <th>Retailer's Share</th> </tr> </thead> <tbody> <tr> <td>0–1,250L</td> <td>25 percent</td> </tr> <tr> <td>1,250–2,000L</td> <td>50 percent</td> </tr> <tr> <td>Over 2,000L</td> <td>75 percent</td> </tr> </tbody> </table>	Water Sales	Retailer's Share	0–1,250L	25 percent	1,250–2,000L	50 percent	Over 2,000L	75 percent
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Over 2,000L	75 percent									
Product Innovation	RMS with RFID transmission is under development for installation in every tank to measure water inflow and outflow; it also records the visits of business associates to the village for monitoring dosing of the tank and quality checks. The device design was taken up as a classroom assignment at Stanford University.									
Next Steps	Plans are to set up kiosks in 10,000 villages within five years for which the company plans to triple its rollout rate from 25/month to 75/month within the next year. It has also set a goal to achieve sales targets for a new plant within 60 days of launch, against the current average of 180 days. It is also experimenting with RMS technology and is in the process of incorporating a basic enterprise resource planning (ERP) system into its model.									



Water for People

FIELD VISIT | September 17, 2013 | Arumugam Kalimuthu, *Country Director*

Summary	Water For People is an international NPO. Its goal is to help people in developing countries improve their quality of life by supporting the implementation of locally sustainable drinking water resources, sanitation facilities, and health and hygiene education programs.
Founded	Operations in India started in 1996 by the American Water Works Association (1991).
Span of Operations	Water For People began with a pilot project in West Bengal to help eliminate naturally occurring arsenic in water supplies. Its success led to expansion of the program to 156 villages in the districts of Nadia and North 24 Parganas in West Bengal; the filters were installed in schools and communities. Presently, it is engaged in diverse WASH program interventions to develop and demonstrate a scalable model. Water For People is engaged in the regeneration of groundwater resources affected by arsenic, which exposes around 13 m people at risk in four states. North 24 Parganas and Nadia are two of the nine severely arsenic-affected districts in West Bengal.
Model	Water For People collaborated with Bengal Engineering and Science University (BESU), local SHGs, and roughly a half-dozen local NGOs to execute the program. Filtration units are installed at public water sources after aligning with GPs and concerned government departments. A single well head unit fitted with a hand pump serves around 100 families, whereas a unit connected with an electricity-based pumping system serves around 200–250 families. These units are fully owned and operated by the local community, who contract paid services from the resource centre at BESUS. Two technicians at the center are responsible for timely regeneration of the resin bed and/or changing the chemicals.
Sources of Funding	<p>Community (sellers)</p> <ul style="list-style-type: none"> • Land plus 10 percent of capital cost • Operations managed by the community <p>Community (buyers)</p> <ul style="list-style-type: none"> • Water sold at INR 10–25 (US\$0.17–0.42) per month, for which users can collect 20L of water per day <p>Water For People</p> <ul style="list-style-type: none"> • Organizing and training WATSAN committees and operators on maintenance, accounting, and bookkeeping • Remaining capital cost (60–70 percent) <p>Local Govt.</p> <ul style="list-style-type: none"> • 20–30 percent of capital cost
Technology and WQSM	<p>Water For People adopted an activated alumina-based resin technology designed and developed in conjunction with BESU for the treatment of arsenic-affected water. Popularly known as the AMAL Well Head filter, it comes in two models:</p> <ul style="list-style-type: none"> • Without electricity—fitted to a hand pump or tube well; water passes over the resin bed through gravity and regeneration is done manually on a regular basis • With electricity—installed below an overhead tank and fitted with a 1,000L storage tank to hold treated water and multiple dispensers; a pumping system ensures better backwash and easy maintenance <p>The WATSAN committee monitors water quality on a monthly basis with testing completed by established, government-recognized laboratories near the plant. Results are displayed at the plant site for the benefit of users.</p>
Economics and M&E	<p>Water For People makes an initial investment covering 60 percent of capital costs, with partner organizations mobilizing additional funding to cover remaining costs. The unit cost of the filter is INR 125,000 (US\$2,083), varying slightly depending on whether the pumping system is attached to the unit and whether or not storage tanks are used. This excludes the cost of water source and pumping system. Operating expenses are recovered through priced water. The cost of regeneration for an arsenic removal filter, including labor and chemicals, is roughly INR 6,000 (US\$100) annually. Monthly maintenance costs average roughly INR 1,500 (US\$25). The typical user charge of INR 20 (US\$0.33) per month enables a family to purchase 20L of water per day. Revenues are generally sufficient to meet the expenses of regeneration and establish a reserve for replacement of resin media and other costs. Some AMAL filters have already exceeded their eight-year projected lifespan, and except media replacement, no other major replacement has been experienced. At some sites, reserves fund of over INR 100,000 (US\$1,667) have been accumulated. Users' groups/WATSAN committees have been formed to maintain the treatment facilities and oversee operations, including financial record-keeping, technical supervision, and maintenance. Water For People supports these committees in establishing an operation and maintenance fund. At each water system, a caretaker is trained to carry out backwash, complete water quality testing, and provide operational assistance to committees.</p>
Product/Process Innovation	<p>Field-Level Operations Watch (FLOW), developed in conjunction with Akvo, combines Android-powered cellphone technology and Google Earth software, allowing workers and partner organizations to use GPS-enabled mobile phones to take pictures of the work sites and upload them instantly on the website. FLOW also provides a mechanism for collecting feedback from community members. It has enabled Water For People to know the status of the systems it installs and to respond quickly to any emerging issues. It minimizes errors during the data collection phase by providing an easy-to-use touchscreen interface and combining all key tasks (answering questions, taking a picture, and reporting GPS location) into one simple application. It facilitates monitoring and evaluation, as project management staff can review incoming data in near real time (if there is network coverage), and helps secure data from the field and makes it available broadly to stakeholders.</p>
Next Steps	Water For People crafted a new Strategic Plan in 2010, calling for post-project monitoring for at least 10 years, a one-of-a-kind development in the industry. It is also in the process of developing a life-cycle cost tool that is flexible and easily applicable to a variety of contexts.

WaterHealth International

FIELD VISIT | February 2014 | **Vikas Shah, Chief Operating Officer**



Summary	WaterHealth International, Inc. (WHI) is a for-profit company that develops, installs, and operates water purification and disinfection systems that provide affordable, high-quality potable water for underserved populations in rural and peri-urban areas.
Founded	Founded in 1996, with its headquarters in California and its affiliate offices in Bangladesh, Ghana, Nigeria, Liberia, Philippines, and in India as WaterHealth India Private Limited (WHIN).
Span of Operations	Since 2006, WHIN has set up approximately 500 treatment plants in India across the states of Gujarat, Andhra Pradesh, and Karnataka that are equipped with a seven-step filtration process with reverse osmosis (RO) technology and UV waterworks as per WHO standards to address a range of mineral and microbial contaminants.
Model	WHIN works with communities as represented by Gram Panchayats to identify suitable installation sites where safe drinking water can be accessed by the community or supplied door-to-door by DSP, who charges the user a nominal charge for the service (not linked with the price of treated water). The WHCs are operated using the Build, Operate, and Transfer (BOT) model. The community provides land and the source of raw water to WHIN. WHIN installs WHCs based on a patented modular RO-UV-based water purification system, UV Waterworks™ (a patented water disinfection system developed at Lawrence Berkley National Laboratory, USA). The WHCs are modular in nature, which significantly reduces the setup time; on average, a WHC can be set up in 30 days. Once WHI builds a center, it operates and maintains it for a period of 10–15 years, during which the revenue from providing clean water to the community covers operation and maintenance, debt service, and profits to WaterHealth. The center transfers to the community at the end of the 10–15 year term through the Gram Panchayat.
Sources of Funding	<p>The company's prime investors include Dow Venture Capital, Sail Venture Partners, Plebys International, Tata Capital Innovations Fund, Acumen Fund and IFC, with the Coca-Cola Company having recently joined the league.</p> <p>Community (sellers)</p> <ul style="list-style-type: none"> • Land, water source, and electricity connection <p>Community (buyers)</p> <ul style="list-style-type: none"> • Water sold at INR 6 (US\$0.10) per 20L, contributing toward operating costs and partial capital recovery <p>Financial Institutions</p> <ul style="list-style-type: none"> • A fraction of capital expenditure <p>WaterHealth International</p> <ul style="list-style-type: none"> • Remaining capital expenditure • Recruitment and management of personnel
Technology and WQSM	<p>WHI houses the water treatment systems in small-scale, decentralized facilities called WaterHealth Centers (WHCs), where it uses RO and UV-blend technology to disinfect water, as well as multi-stage filtration to remove silt, contaminants, bad taste, and odors. The water treatment system is offered in two main configurations, providing 21,000L per day or 65,000L per day, depending on the population size of the community. Centers are operated and maintained by workers employed from the community with WHI's central oversight. A center is managed by one or more operators based on community size, while technicians support maintenance of several centers. WHI trains local workers in water quality testing, dispensing water, maintenance, and other functions.</p> <p>Water quality tests are conducted every month against a minimum of 30 parameters, including microbiological contamination, chemical contamination, odor, TDS, pH, etc. Each WHC is audited once a month on various quality and environment, health, and safety (EHS) parameters.</p>
Economics and M&E	<p>The system's cost varies depending on the contamination and the capacity, which is based on population of the village. Nevertheless, in order to operate on economies of scale, WHI has a target of minimum sales volume of 200+ cans for a WHC; each can is sold at INR 6 (US\$0.10) per 20L.</p> <p>The plant operators send a daily SMS on meter reading to indicate the amount of water dispensed at WHCs and reports on revenues and volumes on a monthly basis. Internal audits are conducted every month.</p>
Product Innovation	WHI has a dedicated 24/7 consumer helpline number called Grahak Seva where consumers, plant operators, etc. can register their complaints, feedback, and queries. This is the first-of-its-kind service offered in the decentralized community water system industry. The company ensures that each registered complaint is addressed by the respective stakeholder within the defined Service Level Agreement (SLA).
Next Steps	In the future, WHI plans to target underserved and unserved communities in urban slums, as well as use wireless remote monitoring and sensing equipment to reduce downtime. WHI also plans to introduce customer smart cards to manage revenue collection and consumer records more efficiently.



Waterlife

FIELD VISIT | September 18, 2014 | **Sudesh Menon, Co-founder**

Summary	Waterlife is a for-profit company driven by an objective to apply a rigorous business approach to provide safe and clean water to underserved communities.
Founded	Founded in 2009 by Sudesh Menon, Mohan Ranbaore, and Indranil Das.
Span of Operations	In less than five years, Waterlife has improved the quality of available water in 4,000 villages across 12 states in India. The water quality issues are prominently with fluoride, chlorine, iron, salinity, high TDS, and microbiological contamination. In the rural areas where the main water source is groundwater, lack of proper awareness leads to consumption of this groundwater, causing fluorosis, diarrhea, and other waterborne diseases.
Model	<p>The identification of communities is driven by the government. Waterlife bids for tenders that cover villages that satisfy certain criteria around community size, contamination situation, and affordability. The company works in communities ranging from 2,000 to 25,000 people. In most cases, Waterlife works through public-private partnerships. The raw water source, land, and electricity connection where required are typically identified or provided by the government. Waterlife provides the housing structure and sets up the treatment equipment.</p> <p>As per the government contract, Waterlife sets up the treatment system and operates it for a predefined period (5–15 years). It charges the local community for water at a fixed rate (prescribed in the contract) to cover operational and maintenance costs. Typically, the government also provides viability gap funding, in case the revenue generated is less than the operational cost. Similarly, the operator gives a share of revenues to the government if they exceed the operator's price quote (which includes operational costs and profit margin).</p> <p>The system operator is identified from the local community and is trained by Waterlife. The company has a servicing team of 120 employees, and has deployed a national toll-free number for technical support.</p>
Sources of Funding	<p>Community (sellers) • Land, water source, and electricity connection</p> <p>Community (buyers) • Water sold at INR 5–8 (US\$0.08–0.13) per 20L, contributing toward operating costs and awareness program</p> <p>Government</p> <ul style="list-style-type: none"> • Full capital cost • Viability gap funding (if applicable as per contract) <p>Waterlife</p> <ul style="list-style-type: none"> • Working capital for plant operations • Recruitment and management of personnel • Plant maintenance
Technology and WQSM	In most cases, the government provides water quality analysis reports for each community. These reports inform the choice of technology solution. The company has the technological capabilities to address both microbiological and chemical contaminants. It deploys resin-based and membrane-based solutions. Of the 4,000 filtration units established to date, 400 are based on adsorption media-based filtration technology, 450 are using membrane-based reverse osmosis technology, and the remaining are using the hand pump attached filtration unit for removal of arsenic and fluoride. On-site quality monitoring is done 1–2 times per month, and includes field and laboratory tests conducted by the technician and the operator.
Economics and M&E	The systems cost varies depending on the contamination and the capacity, which is based on population of the village. It also depends on what type of purification is provided and whether the system is run by grid or solar power. Typically the price varies between US \$5,000–50,000.
Product Innovation	<p>Waterlife provides technologies that are green and environmentally friendly. A lot of care is taken to ensure minimal wastage of precious water and there is also a high focus on the quality of the water supplied.</p> <p>The main products of Waterlife's breakthrough technology are:</p> <ol style="list-style-type: none"> 1. Community-Based Water Systems <ul style="list-style-type: none"> • For populations between 2,000–10,000 people • Long-term operation and maintenance through a user fee model 2. Institutional or Enterprise Systems (IS) <ul style="list-style-type: none"> • For schools, hospitals, offices, apartment complexes, and public places 3. Customized Contamination Removal Units (CCRUs) <ul style="list-style-type: none"> • Hand pump attached units • No requirement of electricity • No wastage of water 4. Large Government Projects—Infra Projects
Next Steps	Given the extent of the water quality challenge, Waterlife has set a target of providing safe water across India by the year 2020.



Key Successes

Bala Vikasa

- Established water systems in over 500 communities across the state of Telangana
- Conducts annual general body meetings to enable system managers to share experiences and discuss policy matters
- Federation of village water committees and other support systems to strengthen sustainability
- Trained large number of operators and village committee members to transfer knowledge and skills to enable local troubleshooting and system management

Healthpoint Services

- In the communities where both primary healthcare and safe drinking water is being provided, the association of the water kiosk with a medical facility provides credibility to the health advantage quotient of the plant, reportedly helping to accelerate adoption of safe water.⁵⁸
- By continuously improving operating efficiency, Healthpoint Services has increased the number of plants covered by each technician to an average of 30

Naandi Foundation

- Naandi reports that government engagement not only results in improved sustainability (due to capital support), but also more rapid adoption because of “community connect” activities that begin prior to plant installation
- It has been able to effectively engage the community in plant operation and in bringing about a maturity with regard to handling plant operations and financials; transferring ownership to the community after a specified period also frees resources to enable investment in other areas
- Naandi reports success in bringing about a change in mindset around the idea of paying for water, accomplished in part through effective messaging, which emphasizes that the water is owned by the community itself, and Naandi’s role is to provide the service of purification for a fee

- Over the last three years, Naandi has seen a steady rise in the revenues of 12 percent annually. With a concerted effort from the field teams, there has been an increase in the distribution facilities in 39 percent of the villages. Increased revenues and rationalization of costs has led to a significant increase in gross profit margins—from 6 percent last year to 23 percent this year. The time-of-deployment of a CWC has reduced from 120 days two years ago to 80 days. Among the recently commissioned CWCs, 70 percent have reached sustainability within a year of operations

Piramal Foundation

- Sarvajal Franchise Network—Piramal Water reaches out to 100,000 consumers daily through a network of over 125 rural franchises that are tracked by “Soochak,” a remote monitoring and automatic dispensing solution
- Urban Slum Project in Savada Ghewra—Piramal Water is the winner of India’s first decentralized safe drinking water tender released by Delhi Jal Board (Government of NCT of Delhi)
- Awards and recognition—recognized by World Intellectual Property Organization (2013), Frost & Sullivan Tech Awards (2013), Nokia Health Awards (2011), Sankalp Investment Forum (2008), Bill & Melinda Gates Foundation (2008)

Rite Water Solutions

- Rite Water electrolysis (AQUA-EDF®)-based community water centers have been recognized by state governments of Madhya Pradesh and Chhattisgarh as viable solutions to provide safe water to tribal habitations affected by fluoride water quality problems in the state
- Rite Water has set up Maharashtra’s first community water center for nitrate removal from groundwater, having >99 percent recovery of water and >90 percent efficiency in nitrate removal without use of harmful chemicals like acid/alkali for regeneration

⁵⁸ Safe Water at the Base of the Pyramid, by 300in Initiative.

Safe Water Network India

- Reliable operations with less than 2 percent downtime, with plants equipped with remote monitoring capability
- Satellite-based Water Resource Mapping for understanding key sustainability drivers
- Social inclusion (proportional representation by 15.3 percent scheduled castes and 5.1 percent scheduled tribes, as well as lower socio-economic classes (R3–R4) are 77.5 percent of enrolled households)
- An effective consumer marketing program, including a national award-winning tablet-based rural marketing program, implemented to increase safe water adoption
- Improved distribution networks that enable local entrepreneurs and provide convenience to the consumer
- Toolkits, training programs and field insights for capturing lessons from the field and providing technical assistance to local NGOs

Spring Health

- Spring Health's low-cost, high-return model is quite attractive for an entrepreneur. It requires low initial investment from his/her side (~INR 6,000/US\$100), and given its negligible operating expenses, the entrepreneur can quickly cover costs while also increasing his/her retail business; the revenue-sharing scheme provides a clear financial incentive for the retailer to promote sales, thereby ensuring an active participation
- Given the low technological sophistication of the model, minimal technical support is required; there are no breakdowns and no spare parts replacements are required except for pumps

Water For People

- To date, Water For People has installed more than 150 well head filter units across six districts in West Bengal; 60–70 percent of these sites are working well, with active involvement of the community and substantial funds accumulated for maintenance
- The most significant achievement of the arsenic mitigation program is that, even in districts where Water For People is no longer active, their systems are sustained by local communities, which continue to receive treated water

WaterHealth International

- WaterHealth International's Indian affiliate, WaterHealth India, has established over 500 water treatment plants in Gujarat, Andhra Pradesh, Telangana, and Karnataka using a Build-Operate-Transfer model
- As WHCs employ workers directly from the community, it provides the residents with economic opportunities from construction to water testing, operation and maintenance, and provision of water delivery services
- Facilitated a dedicated 24/7 consumer helpline number called Grahak Seva where consumers, plant operators, etc. can register their complaints, feedback, and queries

Waterlife

- Today, Waterlife has set up a range of filtration units, providing safe water access to about 8.5 m people, mostly in rural areas; it has ties with governments in UP, West Bengal, Pondicherry, Karnataka, Maharashtra, Bihar, and Jharkhand to construct water purification plants and to take care of their operations and maintenance

About Safe Water Network

Founded in 2006 by the late actor Paul Newman and a group of business and civic leaders, Safe Water Network works to develop innovative solutions that provide safe, affordable water to those in need. We bring together diverse capabilities to address the challenges of local ownership and sustainability. Working with the private and public sectors, we advance our field initiatives for broad replication. We also document and share this effort through forums, workshops, reports, and case studies. Our water systems provide affordable, reliable safe water access to over 300,000 people in Ghana and India.

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