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An analysis of the Indian water crisis and privatization

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Abstract. The paper analyzes the India water crisis. Water scarcity in India has been a problem for a number of years now as many Indian water sources contain biological pollutants and excessive use of groundwater for irrigation depletes water reservoirs. This paper will explore non-revenue water levels and conduct a cost benefit analysis. It will conclude with a recommendation on where the solution to mitigating the Indian water crisis lies – privatization.
Keywords. Privatization; Water crisis; India.
JEL. E62; I28; H52; H11.

1. Introduction

It is estimated that nearly 900 million people around the world lack access to clean drinking water. Over the last 25 years, clean drinking water has been made accessible to an estimated 2.6 billion people in developing nations, yet, many countries around the world are still witnessing a scarcity of water. Water companies, either sponsored by the government or privately owned, are only producing a limited quantity of water. However, too much water is lost due to leakage and the final amount of water supplied is not adequate to meet water needs. Endemic water crises around the world, from South Africa to India, can be mitigated through educated economic decisions to reduce leakage or building new water reservoirs to increase production.

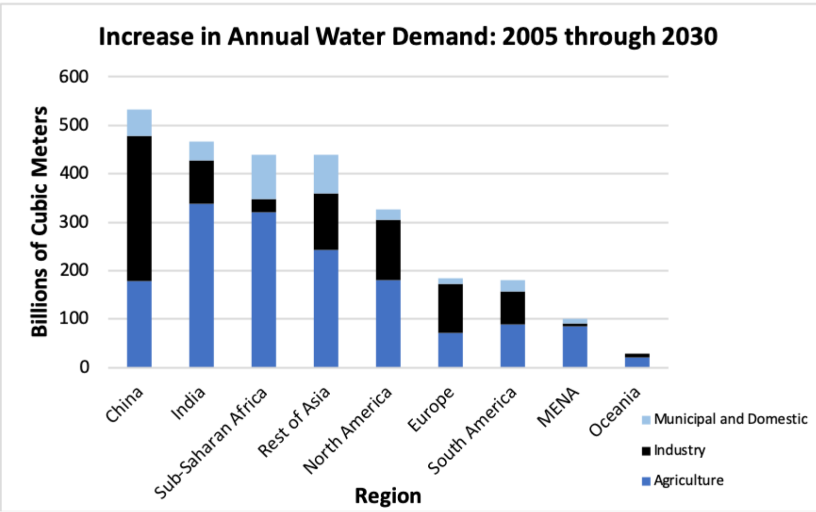

Figure 1. *Increasing Global Water Demand*
Source: McKinsey and Company, Water Resources Group. 2009. *Charting Our Water Future: Economic Frameworks to Inform Decision-Making.*

These water crises are global and endemic. After a year of scarce rainfall, reservoirs were almost empty in Cape Town, South Africa. The subsequent water shortage became so severe that local restaurants and businesses were asking customers not to flush toilets.

In Zimbabwe, years of resource mismanagement by President Robert Mugabe left the economy in shambles. Coupled with a period of high inflation as well as daily blackouts and medicine shortages, the water crisis is severely worsening the quality of life for the people of Zimbabwe. Two of Zimbabwe's major cities, Harare and Bulawayo began water rationing programs in July, 2019, only allowing residents to access tap water once a week. More so, a shortage in purifying chemicals is exacerbating water quality issues in the city of Harare.

India has likewise been suffering a water crisis. State and local governments have mismanaged water leakage controls and insufficient water resources have perpetuated a problem initially created by a reliance on groundwater, biological pollutants, and other factors.

However, hope remains for these water crises and shortages around the world. Through better management of resources, fixing leakage, and building additional reservoirs or dams, crises can be alleviated. This paper analyzes this solution and focuses its analysis on the Indian water crisis.

2. About the Indian water crisis

Recently, India suffered one of its worst water crises in history. Both natural and man-made causes are resulting in water scarcity. The National Institution for Transforming India (NITI Aayog) and the Indian Government released a *Composite Water Management Index* in June 2018 that listed more than twenty cities which will run out of groundwater by 2020 (National Institution for Transforming India [NITI Aayog], 2018). Cities in the south are facing the worst of these problems, with the state of Karnataka and city of Chennai feeling the harshest effects from massive water shortages.

One of the reasons cited for the water shortages in India is the over-exploitation of groundwater. India uses more groundwater than China and the United States combined, accounting for more than half of India's clean water. Groundwater makes up 50 percent of urban water requirements and 85 percent of rural domestic water needs. As a result, groundwater levels in India have fallen by 61 percent between 2007 and 2017. The depletion of groundwater, which sustains larger bodies of water, harms ecosystems and also increases the risk of floods in urban areas (Hanke & Walters, 2011). Distribution requirements are yet another problem. More than 80 percent of rural Indian households do not have access to piped water (NITI Aayog, 2018). To make the issue worse, around 40 percent of piped water in India is lost to leakage in cities such as Bengaluru (India Water Portal, 2018).

Underpricing water further contributes to India's water problems. When water is underpriced, residents feel that they do not need to worry about the amount they use. Low water prices lead to shortages, but if water was priced to reflect scarcity, a decrease in supply would cause the price to increase. As a result, people would demand less water. In fact, prices or recoveries from the sale of water and other charges are 22-25 percent lower than the operation and maintenance costs (Matkin, 2015).

Biological pollutants contaminating water sources make the problem even worse. A staggering twenty-one percent of India's diseases are water-related and only 33 percent of the country has access to traditional sanitation. Around a third of India's population practices open defecation into bodies of water, rendering a significant amount of freshwater undrinkable. Despite a growing number of initiatives to build toilets, as long as public defecation continues, managing India's water resources will likely be an uphill battle. The usage of ineffective irrigation techniques as well as mismanagement of the water supply lie at the heart of India's water crisis.

3. Non-revenue water and leakage

Non-revenue water (NRW) is the volume of lost water as a percentage of net water produced. High levels of NRW correspond with inefficient water distribution systems. When water is lost, water collection, treatment and distribution costs increase, and programs to promote increasing demand must be implemented. It is generally assumed that reducing NRW in India by one cubic meter per day will cost roughly US$500 (Kingdom *et al.,* 2006).

NRW is water that is effectively lost before it reaches the customer, consisting of unbilled authorized consumption, apparent losses, and real losses (such as leakages). In developing nations, these losses often occur through leaky pipes. Unbilled authorized consumption is a result of outside considerations that are not always justified. In some cases, water delivered to special customers is not billed. In India, this accounts for as much as one to three percent of the water supply. However, when considering overall NRW, it is difficult to know exactly how much of a factor unbilled authorized consumption is. Water theft is another problem which must be adressed in developing countries such as India. Estimates point out that water theft accounts for around 16 percent of all water supplied (Kingdom et al, 2006). Some water service providers choose to deliver a limited amount of water to the poor for free, but many destitute people who cannot afford water services would prefer a reliable service that allows them to avoid buying water from vendors to cover for shortfalls in public supply. Notably, the Bangalore Water Board used this methodology (discussed further in upcoming sections), and the cities of Vadodara, Kerala, and Dehradun used similar billing requirements. In some situations, if poor segments of the population pay for water services, they will be able to obtain other services using a proof of residency. Connecting the urban poor with water would improve revenue and service quality for water service providers, since public taps would be removed and water could flow nonstop during supply hours (reducing pressure, and potentially, leakage). This can be accomplished through the subsidization of water connection fees and monthly rates, as well as simple procedures and applications for new connections. When collecting fees for water services, public entities should be separated from the private, fee-collecting institutions.

The main purpose of a water utility is to satisfy customer demand. Intermittent supply poses health risks, such as contaminated groundwater. Sewage can enter the leaking pipes during low supply and low-pressure periods. Therefore, reducing leakage to enable continuous supply is the best possible outcome for water consumers. The urban poor are particularly affected by high water losses. In countries such as India, water distribution systems do not reach many groups of urban poor in large cities such as Mumbai, Chennai, and Bengaluru.

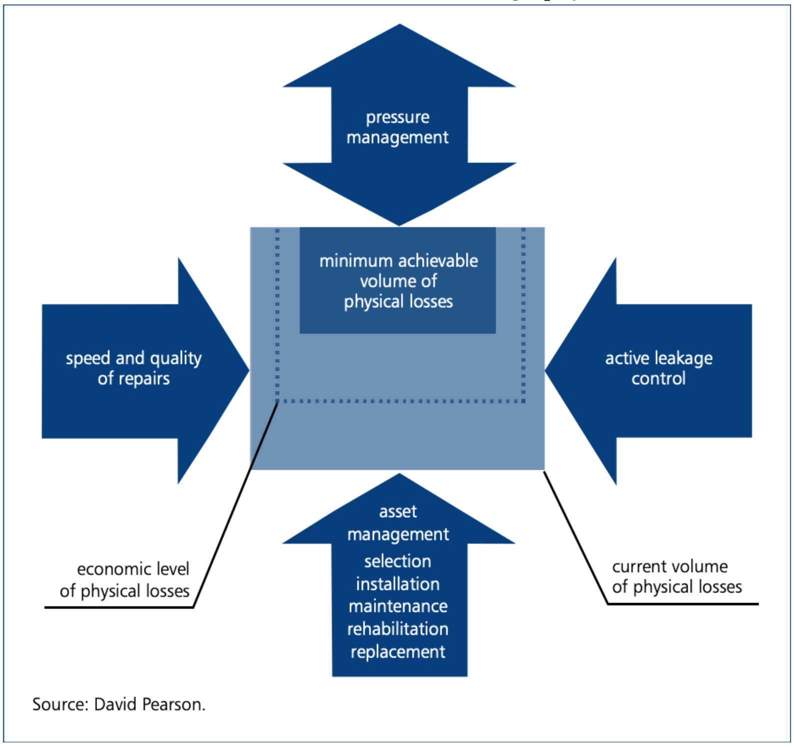

Figure 2. *Physical Water Losses and Mitigation*
Source: Asia Development Bank. 2010. *The Issues and Challenges of Reducing Non-Revenue Water.*

4. Helping India manage its water resources

Due to rising water demand, India has had trouble managing its water resources. In 2009, India's non-revenue water was 41.9 percent (IBNet, 2009) and with similar leakage numbers currently reported in Bengaluru and Mumbai, India has seen little forward progress due to mismanaged water resources. One of the largest hubs for textile/agriculture in the state of Karnataka, Davanagere is one of the ten municipalities chosen for the "Smart Cities" program by the American water company Suez. Suez has been supporting large cities like Delhi, Bengaluru, Kolkata, and Coimbatore to improve drinking water. Over four years of the program, Suez instigated 1,200 kilometers of water distribution services in Davanagere. In mid-2019, the Delhi Jal Board (DJB) gave Suez a €145 million contract to build and operate a wastewater treatment plant with a capacity of 564,000 m^3/day. This new plant will replace the old Okhla plant and be the largest wastewater treatment plant in India, and hopefully restore water quality in the polluted Yamuna River.

Ilkal, another city in Karnataka, chose Veolia Water, a French water company, to build a distribution network and manage water supply services for 110,000 residents. The challenge was that 25% of Ilkal residents live in rural, poverty-stricken areas. Veolia's five-and-a-half-year contract generates four million euros in revenue and the maintenance phase will last four years. In 2008, Veolia also secured a €24M contract in the city of Nagpur. The contract covers the design, building, and operation of a new water production plant for 15 years. This plant will have a capacity of 240,000 m^3/day.

Establishing and keeping an effective NRW program is generally a managerial problem. To reduce physical water losses is a continuous activity which involves politicians, engineers, technicians, field staff, and managers. In

India, the role of politicians presents an issue. Endemic corruption at the local, state, and federal levels of government can potentially hinder the positive development of physical NRW reduction programs. India was given a 41/100 score in the Corruptions Perceptions Index, and The World Bank estimates that 20-40 percent of water sector finances are lost as a result of dishonest practices. The India Corruption Study of 2010 stated that 39 percent of respondents believe that corruption has increased in the water sector. A surprising 21 percent of the surveyed rural households have either paid a bribe or were asked to pay a bribe to help water supply services. Corruption occurs in all water sectors and contributes to water scarcity in many developing countries. India, which is ranked 78^{th} of 180 in the Corruptions Perceptions Index, has a lack of integrity, accountability, and transparency in all levels of government. Moreover, specific forms of corruption such as embezzlement of funds, bribery, and extortion affect many areas of government. Importantly, falsified meter readings, unfavorable site selection, and nepotism in public offices which target the effectiveness of water supply all reduce the effectiveness of NRW reduction programs and make solving water crises much more difficult.

5. Cost-benefit model framework

Three core factors: leakage rate, marginal cost, and price, are highly influential in a cost-benefit model pertaining to water. To maximize net benefits, water authorities must ensure incremental benefits exceed incremental costs. For example, if a dam is under consideration, leaders must consider a tradeoff between increasing the price of water or reducing water leakage, both of which would allow for increased revenue for the water company.

The benefits of reducing NRW include increased access to water supply, fairness among users by acting against illegal connections, better service, and more economic growth through new business opportunities. These additional externalities should be evaluated when considering the cost of individual water loss reduction programs. The implementation of a commercial loss reduction program could be economically feasible with short payback periods. For physical loss reduction, regulators must first find the amount that is lost and then discover how much investment is necessary to reduce it. For developing countries with high physical loss levels such as India, initial loss reduction programs with short payback periods ought to be implemented, so that near future financial benefits can be seen across a variety of fields.

A water conservation policy should be adopted only if the following holds:

$$\Delta(Q \times MC) \geq \Delta U$$

The following variables are defined:
Q = reduced water production
MC = marginal water cost
U = resource cost to the water company of adopting the policy

The left hand side represents the benefits and the right hand side expresses the costs.

Leakage repair for water distribution systems only makes sense economically if the change in benefits is at least the change in costs of detecting (the product of Q and MC) and repairing leaks (U). In order to deal with leaks, the water company or governing authority should build more reservoirs, dams, and new treatment plans in order to increase capacity. Another possibility is to instate leakage detection and control (Hanke, 1981).

6. Cost-benefit analysis

In India, the reduction of non-revenue water is valued at US$500 per ($m^3$/day) and the average cost of obtaining said reduction is US$246 per ($m^3$/day) (IBNet, 2009). To conduct a cost-benefit analysis, Alan Wyatt's model in *Non-Revenue Water: Financial Model for Optimal Management in Developing Countries* will be utilized. While Steve H. Hanke's model seeks to assess the economic feasibility of leakage repair, Wyatt's framework provides values for optimal, steady state non-revenue water levels without the need for large amounts of data. Wyatt's model also finds costs associated with loss-control activities.

The model also investigates aggressive active leak control programs, which need frequent surveys and repair, but allow low, steady state level of losses. A more relaxed method would cause higher steady state losses. A tradeoff exists between the cost of loss and loss control.

In order to use data from IBNet 2009, a few calculations must be performed. To find the average cost for justifying a program, first calculate the total saved NRW during a contract period. For this, use the following expression: (Given NRW per day) * (365 days). In India, water leak prevention programs typically save four percent of unaccounted for (NRW) water (Kingdom *et al.,* 2010). Using the IBNet data:

$$(0.04 * 120.43)\ m^3/km/day * 365\ days = 1758.28\ m^3/km.$$

Four percent of the total given NRW is saved, allowing for the equation above. The units are in cubic meters per kilometer.

The average cost to justify these programs is unknown. As a result, using the proxy Savings/Amount Saved (in USD/m^3) suffices. Dividing the given cost of the contract by 1,758.28 m^3/km yields the average savings (similar to average cost) needed to justify the program. In 2009, the cost incurred of supplying Indian households was about 62 US$/$m^3$ (Kingdom et al, 2010). As a result, the average cost needed to justify the contract, is 62 US$/(1758.28 m^3/km) = 0.035 US$/$m^3$/km, showing that water leakage prevention programs in India are indeed justified. Therefore, water companies in India should implement programs to control water leakage instead of building new reservoirs or dams.

The Wyatt model assumes that leak detection programs are continuously conducted, and separate repair crews make repairs right after each section is surveyed. The segment will be returned to the level of leakage at the end of the previous survey. The steady state loss level will be a mix of background (undetectable) leakage, small unreported leaks (usually discovered by leakage surveys) and reported bursts.

7. Controlling non-revenue water levels

In general, the first step which a company should undertake in developing a NRW reduction program is to understand the components of NRW, how much water is being lost, and why. Thereafter, the company needs to draft techniques and procedures to help reduce the various components of NRW. A physical loss strategy should comprise of active leakage control, pipeline and asset management, speed and quality of repairs, and pressure management. The final step is to consider the cost feasibility of the entire initiative.

Reducing commercial losses is typically cost-effective and rewards returns quickly. The solutions are straight forward, but the primary roadblock is political acceptance of such a commercial loss reduction program. Because the reduction of physical losses through leakage control can be expensive, requires technical knowledge, and must be implemented with extensive care, water companies must reach an equilibrium between the costs of limiting leakage and the associated benefits. In India, the focus is on physical loss reduction. Although the amount of lost water from items such as unbilled water cannot be neglected, leakage from transmission and distribution mains, overflows from reservoirs and storage tanks, and service connections is the main problem perpetuating the water crisis (Kingdom *et al.,* 2010).

There have been a number of programs implemented across India to decrease NRW levels. These initiatives typically involve improving management and networks, as well as refurbishment. However, the extent to which these solutions are developed or implemented only counter the current level of leak detection, frequency, and assessment. Additional capital investment is needed for further, long-term solutions.

Leakage management for mitigating losses is categorized into three groups: passive control, regular leakage surveys, and leakage monitoring in zones. Passive control is a response to clear, visible leakage in the system which exists as a result of pressure drops. Regular surveys are inspection methods implemented for a water distribution system in which leakages are found through listening devices on pipelines or through analyzing water inflows. Lastly, leakage monitoring in zones tracks leakages by using a hydraulic supply system divided into operational zones based on existing reservoirs and pumping stations (Kingdom *et al.,* 2010).

Quantifying existing levels of NRW under conditions of intermittent supply is not as straightforward at it may seem. In India, this poses significant challenges in designing effective NRW reduction programs. Reducing supply hours would cause leakage to fall by a proportionate amount but contractors only take this plan of action because India's water supply already does not reach a significant portion of the population, particularly the rural population. For example, in mid-September 2019, the water supply in Mumbai was cut for 30 hours so a leak in the water main could be repaired. Another option for the public utility would be to extend supply time by increasing the amount of water entering the system, but this would increase leakage due to higher water pressure and longer run times. An advantage of this approach is that more people may gain access to water, but this would not make economic sense due to additional operating costs.

8. Privatization of water systems

Private enterprises are owned by individuals who are free to use and transfer their private property and have claims over their company's assets. The management of a private company is incentivized to compete with other companies in order to provide the best possible services. Stockholders of private companies monitor the actions of management to ensure leadership delivers the best results for the company (and as a result, the investment) (Hanke, 1987). Furthermore, customer cross-subsidization (overcharging some customers so others can be sold water at prices below the actual cost) is more common in private companies than public companies (Hanke, 2011).

Public enterprises are not owned by people who have a claim on assets. The taxpayer-owners cannot buy and sell the public company's assets, and as a result, taxpayers do not have incentives to monitor the behavior of public managers and employees. This leads to the Free Rider Problem, where only a small number of people care to track the actions of publicly run enterprises, but everyone is able to reap the benefits. Profits of public companies can be refunded to taxpayers, but these would be spread to a large number of individuals, so the benefit is small (Hanke, 1987). Moreover, owners of private enterprises can be given stock options to decrease their cost of monitoring. The duality of monitoring and compensation makes managers of private firms operate more efficiently. If the actions of managers are not ideal, share prices and profits will fall, allowing for the possibility of a takeover. The threat of takeovers also allows for a check on the actions of private companies. Meanwhile, takeovers of public enterprises are impossible. (Hanke & Walters, 2011).

When the government fails to provide adequate quantities of water to the population, privatization steps in. But to operate effectively, enough regulation must be present for private companies. In Kathmandu, Nepal, tankers provide water to the people. However, these tankers sell overpriced water that is often not of drinkable quality. The government failure is twofold. First, the city government is unable to provide an adequate quantity and quality of water. Then, the government does not provide enough regulation. Tankers often bribe pipe officials to disrupt water supply, forcing people to buy water from the tankers, then increasing prices (Schwartzstein, 2020). The solution: a well-paid Drinking Water Inspector. The inspector would oversee the water contracts and a high salary would decrease the prevalence of bribes. There should be periodic review, at least once every ten years, to assess the situation for the director and his or her performance. The investment programs, as well as standards of service, should be investigated. Committees acting in the interests of consumers should identify concerns, deal with complaints, and advise on daily issues. Economic regulators should then concentrate on balancing the interests of various groups. They should oversee water quality, metering, and ideally ought to be consultants. Data collection, as well as the specification of information on the progress of investment programs to increase water quality standards is crucial. (Byatt, 2019).

In 1999, only five percent of the world's population was served through private water suppliers. This number had grown to twelve percent by 2010. The World Bank is also increasing its aid and access to water supply. However, in the 1990s, a number of significant private water supply contracts in Latin America were ended by governments. As a result, many poor people started paying more for lower quality water. As some Latin American nations (such as Bolivia and Argentina) started experiencing high inflation levels, the national government was unable to provide water efficiently. The World Bank then started implementing water privatization in Cochabamba and La Paz (both in Bolivia). In Colombia, privatized water systems saw improved water quality, better service, and positive health effects. Privatization in Argentina also decreased deaths from water-related diseases. Yet, the privatization of water systems increases the need for local knowledge of political and economic conditions. In Cochabamba, company executives were unaware of how political pressures would affect rates and how people would think about the rates, and ultimately struggled. In contrast, in La Paz, the company was able to convince the municipality to build capital investments into the rate base, decreasing the chance of political "scapegoating" (Hanke & Walters, 2011).

In the United States, the privatization of water supply is slowing. An executive order in 1997 encouraged public-private partnerships and subsequently, the number of publicly owned water systems operated by private companies under long-term contracts increased from 400 to 1,100 by 2003. With that being said, there has been a recent revived interest in privatizing American water systems. The benefits of privatizing water systems can easily be seen; operating cost savings range from ten to 40 percent in sampled facilities. (Hanke & Walters, 2011).

The incentives of NRW programs must be considered. Even though there are benefits from NRW reduction, the performance of utilities in the developing world is complicated to consider. Introducing new NRW reduction initiatives requires assessing problems which arise from the water utility's poor performance. Since government workers are generally opposed to taking on risk, when there is a choice between reducing NRW and increasing production capacity (through building reservoirs and dams), they pick the second solution (The World Bank, 2008). This may or may not be economically viable based on the cost-benefit model, but this is yet another reason that private companies should be more heavily involved in water initiatives. As this paper has showed, in India, water leakage reduction programs make more sense than building new reservoirs or dams. Private enterprises have a financial stake in programs and will chose to either reduce NRW levels or build new infrastructure – whichever makes the most sense from an economic perspective. Contracts with private companies can be negotiated in a variety of ways, but an example is Phase I of the Selangor NRW reduction contract. A private firm can be contracted to reduce the amount of NRW to specific targets. The contractor can be provided with adequate flexibility to conduct NRW activities and is paid to cover all necessary materials. Yet another positive from a privatized water system is competition for prices and services. These private companies have new technology and the knowledge to implement it, can create solutions for program design, and are flexible (Kingdom *et al.*, 2010).

France provides a great example of the benefits of water privatization. The first franchise contract in France for water distribution occured in 1782. The Perrier brothers were allowed exclusive distribution in Paris for fifteen years and charged one cent per liter. However, their firm was later nationalized and the price of water in France went up by a factor of five by 1854. More recently, since around 1950, many French municipalities have turned to privately managed water systems. Today, 55 percent of drinking water in France is sourced from private companies. The privatization of the French water supply has usually taken two forms. The first is *concession*, in which a private franchise is allowed to construct and operate the facilities. This makes sense when the municipality does not have sufficient money for capital expenditures. The private company monitors, manages, and maintains facilities while receiving payments from users. Contracts are long-term, usually around thirty years, and the companies set the price of water using fixed and variable components. The second form is *affermage*, where expenses for installation are covered by the community. The private franchise then manages the facilities and provides working capital. This solution is viable when municipal funding can be obtained at low interest rates that allow for the project to be profitable. *Gerance*, a variant of *affermage,* does more to limit the private firm's scope. *Regie interressee*, another alternative, allows for the management of a public authority by a private company which shares revenues or profits. This allows more leeway with the municipality but retains access to the company's specialized services. The nature of water supply technology and transportation allows for bidders to be selected, contracts drafted, and maintenance performed at a feasible cost. Many nations, such as Brazil, Peru, Italy and Morocco have learned from the French water system (Hanke & Walters, 2011). India should follow in the footsteps of these privatized water supply systems.

The classic principal-agent problem also exists with regard to water systems. When some people ("agents") look after the interests of others ("principals"), there can be inefficiencies due to the mismatch of two sets of interests. The principal-agent problem is less prevalent in private systems. In the Thatcher-era water privatization in England and Wales, public systems were sold in 1989, and firms were subjected to rate regulation (known as "price caps"). This did not allow for gains in productivity and since water prices rose at a higher rate than input costs, private companies acquired large profits (Hanke & Walters, 2011). To prevent this, enough regulation must be present to make sure information is spread across the industry and is comparable across companies.

Indian water systems have generally been supply based, where a government institution works on a project without community involvement, and generally requires no water fees to be paid. But, since 2002, the Indian government has rolled out a national program called *Swajaldhara* to change the way water and sanitation services are supported in rural areas, placing responsibility on rural local governments. According to a World Bank study in 2008, *Swajaldhara* allows for lower capital costs, lower administrative costs, and better service quality when compared to the supply-driven program. However, even with the reform, continued water mismanagement by the government has perpetuated the Indian water crisis. Although the overreliance on groundwater has made the situation worse, leakage levels of 35-40 percent are far too high for water to be allocated efficiently. In Bengaluru, when the Bangalore Water Supply and Sewerage Board, a publicly owned water utility, was managing the water supply, sewerage system, and sewage disposal, about 40 percent of water was lost.

In India, the private sector plays a limited, but recently increasing role in operating and maintaining urban water systems. The Jamshedpur Utilities and Services Company (Jusco), a subsidiary of Tata Steel has a lease contract for Jamshedpur, a management contract in Haldia, and another contract in

Mysore. Since 2007, Jusco has been working to reduce non-revenue water in part of Bhopal, where Jusco's water loss prevention program allowed for the savings of US$10,000. The utility created a District Metered Area with 24-hour water supply in its Circuit House Area, which was not possible previously. The utility also undertook a metering program of system inlets, large consumers, and industrial connections and outlets. The bulk metering program consisted of two phases, costing US$1 million in total. Phase I took place over 13 months and involved the installation of 41 bulk meters while Phase II installed 89 meters over just eight months. Bulk metering and monitoring allowed the utility to analyze leakage and survey pipelines for illegal and unknown connections. The results are impressive. Non-revenue water fell from 23 percent in 2004 to ten percent in 2006, and since then, new neighborhoods have been served with water that was saved using the metering system. Along with the French company, Veolia water, there have been several other companies working on reducing non-revenue water and maintaining water systems in India.

The cities of Hubli, Belgaum, and Gulbarga in Karnataka have seen continuous water supply under private operator Veolia. Veolia increased water supply from once every 2-15 days for 1-2 hours to 24 hours per day for 180,000 people. This success occurred over a period of only two years (2006 through 2008), when Veolia changed the distribution network, installed meters, and fixed leakage problems in the pipes. As the reach of private companies broadens worldwide, the concentration of market share is shifting. In the early 2000s, 73 percent of global private water providers were served by one of the following: France's Veolia Water, Suez Environment, Société d'Aménagement Urbain et Rural (SAUR), German's RWE, and Spain's Aguas de Barcelona (indirectly controlled by Suez). By 2010, their market share fell to 32 percent. (Hanke & Walters, 2011).

Despite these success stories, cities in India are still running out of water. Water management must be privatized to allow for lower prices and better service standards. Critics of private water systems claim that water is a social good and that a private water supply is undesirable. But, even if water is a necessity to which everyone has a "basic human right," necessitating public management, people with higher incomes can still use large amounts of subsidized water for themselves, leaving the poor without access. If the costs of supplying subsidized water are covered by regressive tax systems, as they commonly are, greater inequity may result, which was initially what these critics feared in the first place. In covering the costs, sales taxes incur significant burdens on wealthy individuals and income, payroll, and corporate profits taxes may have negative effects on employment levels or prices paid for consumer goods. All this will result in deadweight losses, which will be made worse if the public water system remains inefficient.

The solution to mitigating the Indian water crisis is simple: reducing non-revenue water levels with thoughtful, impactful programs from private enterprises.

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