Where Water Is Worshipped, but Gets No Respect

This is a society where people believe if they take one dip in Mother Ganga, they are going straight to heaven. That's irrational, of course. But people are irrational. Thank goodness.

—Ashok Jaitly,
director, Water Resources Division,
The Energy and Resources Institute (TERI),
Delhi, India

IT IS STILL DARK at five-forty on a Thursday morning in late October, along a quiet boulevard in a neighborhood of Delhi, India, called Vasant Kunj. The street has a generous median in the center lined with wide-spreading trees, and Vasant Kunj is on Delhi's south side, tucked between the international airport and Jawaharlal Nehru University.

Sixty or eighty people are gathered on the sidewalk. Some have come on bikes, and many have brought young children. Although it is before dawn, everyone is dressed for the day—the women and girls in bright orange and turquoise and red skirts and blouses, the men and boys in slacks and untucked long-sleeved shirts, shorts, and T-shirts. Scattered at their feet are hundreds of battered containers of every kind—open-topped five-gallon buckets, two-and-a-half-gallon jugs with wide mouths and molded-in handles, ordinary pails, old bleach bottles, huge metal cooking pots. Every container has had a previous life—carrying paint or chemicals or fuel. Also sitting in the dirt on the ground, or leaning upright against the legs of men and women, are coiled hoses. The hoses, too, are a hodgepodge of every kind and diameter—some are ordinary green garden hoses, some

are as thick as fire hoses—and many of the loops have been patched over and over with tape.

Out of the darkness roars a truck that is both imposing and rickety. Its cab has the profile of an old-fashioned milk-delivery truck. The back end is an enormous blue tank, the size of a fuel-oil delivery truck in the United States.

The tanker grinds to a stop at the curb. For the hundreds of people living in the slum area of Vasant Kunj, tucked invisibly behind a gas station, Thursday's water has arrived.

Everyone moves with speed and intensity. Two tall adolescent boys hoist themselves up onto the top of the tanker truck, and ignoring the hoses and valves along the truck's flanks, they pop open a large hatch on top. Men and women on the ground toss their hoses up to the boys. One end of the hose goes into the big hatch, and deep into the tank; the other end goes into someone's mouth, who sucks until the water starts flowing. Sometimes it's the person on the ground, sometimes it's one of the boys. Once you get the siphon going, the water pours from the hose in a forceful stream.

Within minutes, there are fifty-five hoses draped out of the top hatch, trailing down the sides and back of the truck, filling the buckets, bottles, and jugs.

The equation here is pretty basic. You bring as many containers as you have, you bring as many people as you can to help you fill and carry the containers, you fill as many containers as you can, as quickly as you can. The amount of water you get depends on all those things—and on the diameter of your hose too.

This is today's water, Thursday's water. There will be more, of course—Friday morning at about five-thirty.

The tanker comes from Delhi's municipal water utility, the Delhi Jal Board (DJB), and it carries 10,000 liters, about 2,500 gallons. The fifty-five hoses, each primed with mouth power, empty the tanker in fourteen minutes.

When the water is gone, the hoses are quickly pulled back to the ground and coiled. No one fusses about keeping them clean.

Once the hundreds of containers are full and the tanker is empty, the handling of the buckets and pails and pots becomes a matter of great delicacy. Any water splashed overboard is water you can't use to cook or drink, to wash or brush your teeth with.

People stand surrounded by their day's water—one family member stays with the containers, everyone else carts water down a path, back to their shack in the slum, walking with that distinctive counterbalanced posture that involves carrying something that is both heavy and sloshing. Even if you manage to fill six or seven five-gallon containers, maybe you've got forty gallons of water for your family for the day. A single American seven-year-old uses forty gallons of water in a single bath; if an American family were to start the day surrounded by the day's water, there would be 40 or 50 five-gallon containers, nearly 2,000 pounds of water, to be hauled.

One boy uses hooks and straps to sling water containers on either side of his bicycle—a five-gallon bucket slung on the right side, a two-and-a-half-gallon jar opposite it, another five-gallon bucket bungee-corded onto the back—105 pounds of water wobbling home on a two-wheeler.

Many girls walk off with five-gallon buckets balanced on their heads—42 pounds of water gliding off into the dawn, steadied with both hands and a well-conditioned neck.

The cleanliness of this water is dubious. Even if the water that goes into the tank is pristine, and the inside of the creaky tanker is, by some miracle, cleaned routinely, the water that people walk off with is only as clean as the containers it is siphoned into, and as clean as the siphon hoses themselves. Actually, your water is only as clean as the dirtiest hose from your neighbors that goes into the big hatch.

Getting your daily water from one of the DJB's tankers requires a scramble that wrings the dignity out of you before the sun has even come up, except that it is so routine that it becomes more chore than insult. It is how each morning begins—it is how each morning must begin, because you can't skip a day any more than you can skip a day of having water.

The ritual of the water tanker wheeling to the curb, with dozens of people waiting to fill their jugs, is repeated thousands and thousands of times a day across Delhi. The DJB runs a fleet of water trucks like this to deliver water to people in what are bureaucratically called "unauthorized

settlements," but which everyone in India calls slums, ad hoc communities that have no routine water service.

Just delivering tanker water is a vast enterprise. The DJB has a fleet of a thousand trucks—if each delivers water for only two thousand people each day, that's 2 million people a day siphoning their water from a truck, then hauling it back to the shacks where they live with their families.

It is a kind of water slavery that millions—tens of millions—of poor Indians are trapped in every day, in India's fast-modernizing cities, and also in its villages. People are literally captive to the daily task of fetching water—their ability to go to work, to send their children to school, to get a full night's sleep, to be healthy, all hostage to the schedule on which the water is available, and hostage also to the quality of that water.

For India's poor the battle to get water has to be re-fought daily. But in India, in fact, everyone battles to get water.

Vikram Soni is a theoretical physicist who lives in Vasant Vihar, one of Delhi's better neighborhoods, which is just on the other side of the campus of Jawaharlal Nehru University from the Vasant Kunj slum. Vasant Vihar is home to two more universities, a sprawling, luxury indoor shopping mall, the DLF Promenade, and the embassies of Taiwan, Argentina, Iraq, South Africa, Saudi Arabia, Spain, and two dozen other countries.

Soni, who recently retired from India's National Physical Laboratory, has a special interest in the astrophysics of compact stars, and has lectured at MIT. He is as unprepossessing as you'd expect a theoretical astrophysicist to be—his three-story home is filled inside and out with well-tended plants, the furnishings are comfortable but well used, and like most professional Indians, he has servants. Soni has an intellect that is nimble and impatient, and in middle age, he has become what he calls a "half-time environmentalist," because he's worried, not to say disgusted, with how India is managing its water.

Right there in the Vikram Soni home, in one of the most upscale and politically potent neighborhoods of Delhi, the management of the household water not only isn't under control, it's a constant fight.

"The water in this house?" Soni shakes his head. "Once or twice a week, the water comes on in the pipeline. The pump goes on—the pumps are illegal, of course, but everyone puts on a suction pump, so finally every-

body succumbs and gets one." That is, every couple of days, for a few hours, there is water pressure in the pipes to Soni's house. When his pumps sense the water, they immediately kick on, sucking as much as they can from the water main to fill Soni's storage tanks, which are in turn connected to the plumbing inside the house.

The normal state of affairs in Vasant Vihar, in other words, is no water service. And if you don't have a pump to pull water into your storage tanks when the water pressure does come on, because everyone else on your water main *does* have a pump, you won't get any water. Everyone else's pumps will suck it away.

In fact, in Delhi, a city of 20 million people, every household, from the most pinched shack to airy homes like Soni's, has water storage tanks of some kind. So when the water arrives briefly, whether it's at the curb or in the water mains, you can bank as much as possible. For Soni's family, an hour of water a couple times a week doesn't do it.

"We get the rest of our water from a tanker truck. The Jal Board"—*jal* is the Hindi word for "water"—"they provide the tankers.

"But there are a huge number of water [customers], and to get the tanker to come, you have to keep calling and calling. And you have to tip the driver when he arrives—300 rupees or 500 rupees.

"We get ten thousand liters, twice a week. If we call. If you don't tip the drivers, you don't get the water next time."

Soni's voice has more than an edge of exasperation. "I'm just asking for a public service, and I have to provide a five-hundred-rupee tip!"

Although Rs 500 would, in fact, buy a whole tanker of water in many parts of India, it's not the money that burrs Soni. Rs 500 is just $10. It's the ceaseless aggravation, the petty corruption, the minor powerlessness, the idea that if you don't call, if you don't pester, if you don't tip, you don't get . . . water. The water that should, in any case, be coming to you in the water main that's already connected to your house, but that is empty forty-seven hours out of forty-eight.

Just talking about the jury-rigged system, the astrophysicist gets so cranky, it's hard to imagine how he deals three or four times a week with calling the DJB, a notoriously murky, not to say stagnant, water bureaucracy.

"Oh, I don't call," Soni says, chuckling at the very thought. "My brother manages all the water. Fortunately."

India is modernizing at a furious pace—new bridges, new highways, new subways, a new space-science university that received 86,000 applications for 150 slots. At the same time, India is allowing its water system to become not just an inconvenience or an embarrassment but a crippling impediment to its own future. Just one of the thirty-five largest cities in India has twenty-four-hour-a-day water service.[1] Like Delhi, most Indian cities provide water pressure just a couple hours a day. But Indians connected to a water system, even an intermittent one, are fortunate.

Forty-five percent of Indians do not have routine access to safe drinking water—that's 540 million people who don't have reliable water, every day.[2]

"Water is crimping economic development in India, absolutely," says Soni. "It's crimping human development. It's actually impacting on people's survival—it's that bad."

Water is doing what it always does—quietly working away on both the largest scale and the smallest. In India, water is carving points off the growth rate of the economy of the whole country. Water is also killing people. Just in India, forty children an hour under five years old die from contaminated water. One Indian toddler, not even old enough for kindergarten, dies every ninety seconds from bad water, twenty-four hours a day.[3]

One of India's most prestigious scientific research centers, The Energy and Resources Institute (TERI), analyzed the state of India's environment, economy, and quality of life after fifty years of independence. The resulting report, issued in November 2009, concluded bluntly that water is "arguably the biggest crisis facing the country today."[4]

Tainted water is such a serious problem that the TERI report went to the trouble to calculate the impact of diarrhea on the Indian economy. The conclusion: Diarrhea's total cost to India is Rs 900 billion a year—US$20 billion. That's 2 percent of the country's economy, spent dealing with diarrhea caused by bad water.[5]

India can seem to have an almost unsolvable tangle of water problems—urban water systems can't keep up with growth; villages don't have basic water infrastructure; the water people get, whether in the city or the countryside, isn't clean; wastewater isn't treated; the nation's rivers

are polluted almost beyond human imagining—and Indian farmers are so inefficient with irrigation that they waste roughly half the nation's water.

But, in fact, almost all of India's problems are really one problem. "Money is not the issue," says Ashok Jaitly, one of the wise men of water in India, director of TERI's Water Resources Division. "We are flush with funds. And technology is not the issue. We have the whole range of technology, from the sand filter to the reverse-osmosis plant.

"Everybody knows what the problems are. We also know what the solutions to the problems are. We don't always get down to solving them. Which is the real problem."

India, quite simply, mismanages its water. It has enough water, it has more than enough smart people and more than enough resources. What India doesn't have is a culture of taking water seriously—water, water service, and water management.

"Government officials are aware of the problems," says Jaitly. "But they are not aware as you and I are aware of it. It's not pinching someone important hard enough."

Most major Indian cities, for instance, had water service twenty-four hours a day in 1947, when India became independent from the British Empire, at least in the urban cores, and many cities still provided twenty-four-hour-a-day service in some areas right into the 1970s and 1980s. That level of service, and more important, the expectation of that level of service, has slipped away, both in the professional water community itself and among Indians.[6]

People expect water to be a struggle, they have learned to make do, and they are skeptical, not to say cynical, about the likelihood that water service will improve.

The result is that water in India is not invisible the way it is in much of the developed world—Indians who live on $1 a day and Indians who study the physics of collapsing stars both have to make securing their daily ration of water part of the texture of daily life.

The poor line up for hours at public taps—the fixed version of the water delivery trucks—where the water is turned on a few hours a day. In villages that don't have wells or taps, the poor carry water home from wells in neighboring villages, often paying for those daily buckets with the futures

of their daughters. In India's 600,000 villages, it is girls who traditionally make the walk to fetch water for the family, typically twice a day. What that means is that they often don't go to school.

The well-off urban professional class does, in fact, have 24/7 water—but it is fake 24/7 water. As with astrophysicist Vikram Soni, their homes are equipped with expensive, energy-consuming pumps and tanks and sophisticated filtration systems. So when they turn on the tap in the kitchen or the bathroom, water usually comes out. But it's water that their systems have hoarded for later use—it is the illusion of 24/7 water. And even for those with money, managing the water system, thinking before they drink or cook or wash the dishes or brush their teeth, makes water a constant worry in their lives too.

The daily wrangle to secure water is corrosive not just to economic development and to health but to the spirit of the Indian people. Water problems become a creeping attack on human dignity, a kind of erosion of the spirit.

The curb where the water tanker pulls up to deliver water before dawn each morning, just outside the slum in the Vasant Kunj neighborhood—that street, and the slum area itself, are tucked amid much better-off neighborhoods, a situation that is quite typical throughout both Delhi and India.

Just a car ride of 120 seconds away—1.5 kilometers, not even a mile—is a hotel called the Grand, an imposing granite edifice hidden behind guarded gates. When you step inside, you are in a dazzling white marble lobby, as big as a ballroom, whisper quiet. The entire back wall of the lobby is a window of floor-to-ceiling glass, and through the glass you can see the hotel's garden, the central feature of which is a tiered expanse of water stretching back 160 feet, with fountains, waterfalls, and pools. The long pool is lined with palm trees and blazing pink bougainvillea. The pool is purely decorative. Birds have free access to it—flitting along the edges, drinking, bathing, playing in the shallows.[7]

The contrasts in India are perhaps a little too facile, but this one is hard to ignore. It's not just that the tourists who stay at the Grand have access to things the people in the Vasant Kunj slums don't. It is the birds. The birds who live in the garden at the Grand have access to clean water 24/7 in a way

that would be a dream for the people of Vasant Kunj, just a two-minute ride away.

THE NAMES OF INDIA'S CITIES today ring with energy and possibility, even for people who've never been there: Bangalore and Hyderabad, Delhi and Mumbai. India is the place where the people are smart, disciplined, hard-working, and ambitious enough to stay up all night (their time) talking to us about our credit card bills, gratefully doing work we ourselves used to do, for pay one-fifth what we wanted to be paid. India is the place our X-rays often get read; it's the place companies are buying their legal and IT work.

India is China's partner in the twenty-first century's great leap forward—India skipped over building the laptop computers and went right to explaining to us how to use them.

In 2008, the Indian economy grew 9 percent. In 2006, 2007, and 2008—three years combined—the U.S. economy grew 8.4 percent. In the midst of the great recession of 2009, the U.S. economy creaked out 1.1 percent growth. The Indian economy slammed along at 7.4 percent.

The transformation from that growth is truly astonishing. Between 1985 and 2005, according to an analysis by McKinsey & Company, India managed to cut the number of truly poor people in the country in half—even as the population grew dramatically. And the remaking of the Indian economy and society has only just begun. McKinsey estimates that between 2005 and 2025, if India sustains its economic growth, more than seventy thousand people *a day* will move from poverty to middle class, every day for twenty years.[8]

The evidence is everywhere. In Bangalore, at one point, nine hundred new cars were being sold per day. India has 636 million cell phone subscribers—that's twice as many cell phone talkers as the United States has people.

And India's economy isn't just creating consumers who want cars, cell phones, and good jobs. India is making millionaires and billionaires. On the *Forbes* 2010 list, two of the five richest people in the world are Indians. And except for the United States, no country has more billionaires in the top fifty than India.[9]

But India is so large—nearly four times the number of people as in the United States in a country only one-third as big physically—and still so poor that twenty years of soaring development and growth have taken Indians only so far. Forty-four percent of Indian homes have no electricity. Twenty percent of Indian homes use either crop residue or cow dung as their primary cooking fuel. The Census of India measures eight kinds of "fuel used for cooking," and "cow dung cakes" is the fourth most common.[10]

And in some ways most stunning of all, 39 percent of Indian adults cannot read or write, with the burden falling most heavily on women. Fifty-two percent of India's adult women are illiterate—more than 200 million Indian women who can neither read nor write.[11]

Some of that deprivation is simply a function of the fact that India remains largely rural—three-quarters of Indians live outside urban areas. Economic modernization spreads out to the countryside much more slowly than it energizes the cities.

The contrast between the ambitious, media-savvy, high-tech India and the impoverished India is nowhere more dramatic than in the world of water.

In September 2009, in a discovery that changed forever the way humans will look at the Moon, NASA announced that its scientists had discovered water on the Moon's surface—a thousand pounds of dusty Moon rock would yield two eight-ounce glasses of water.

In March 2010, NASA announced an even bigger discovery of water on the Moon: Instruments scanning forty craters at the Moon's north pole had found ice, lots of it. Each crater contains iceberg-size quantities of ice—660 million tons in just the craters examined.[12]

It was, in fact, India's space program that made possible the discovery of huge quantities of water on the Moon. The NASA instruments that found the water rode to the Moon on Chandrayaan-1, India's first Moon-bound spacecraft, designed, built, and launched by the Indian Space Research Organization (ISRO). Although India's instruments didn't discover the water, the Indian press overflowed with pride:

The *Times of India*: "One Big Step for India, Giant Leap for Mankind."

The *Hindustan Times*: "Water on Moon Is India's Discovery, Says ISRO Chief."[13]

Nothing quite captures the dichotomy of modern Indian society like India's twenty-first-century spacecraft finding water on the Moon. The Indian scientists and engineers who created Chandrayaan, at ISRO headquarters in Bangalore, don't themselves have running water at home. Officially, municipal water service is provided in Bangalore just 4.5 hours a day.

None of India's global brand-name cities—Mumbai or Hyderabad or Delhi—does any better. Quite the contrary, the water service in India's great cities is nothing short of primitive, and getting worse.

In Delhi, most homes receive water just an hour or ninety minutes a day.

In Mumbai, that's the goal—an hour or ninety minutes a day. Many people receive water only every other day.

In Hyderabad, some areas have water four hours a day, some two hours, and some people get just ninety minutes every other day.[14]

Thames Water, the water utility for metropolitan London, is one of the companies that have outsourced many critical IT functions to India. Thames Water uses Wipro, the renowned Indian technology provider based in Bangalore, with 100,000 employees. So the biggest water utility in Britain, where uninterrupted water service is the unquestioned basic, gets its IT from people in India who don't themselves have water service most of the day.[15]

Indians have adapted to human-created water scarcity, but that doesn't mean they've lost sight of either the frustrations or the ironies. No less a body than the Indian Supreme Court, in an April 2009 order, demanded that the Indian central government immediately tackle the nation's water problem "on a war footing."

The justices, despairing of what they described as "serpentine queues of exhausted housewives waiting for hours to fill their buckets of water," ordered the immediate establishment of a scientific panel to, within months, come up with solutions to a whole range of Indian water problems that took half a century to develop.

The Supreme Court's order was more an expression of official vexation than it was a practical effort to provide water. "It is indeed sad," the Court

wrote, "that a country like India, which scientifically solved the problem of town planning . . . during the Indus Valley Civilization and which discovered the decimal system in mathematics and plastic surgery in medicine in ancient times, and is largely managing the Silicon Valley in the USA, has been unable to solve the problem of water shortage till now."[16]

Ashok Jaitly, of TERI, is on the panel advising the Supreme Court's water reform effort. "We were ordered by the Court to find a way of providing everyone in India with safe drinking water in three months.

"Three months! Could anything be more ludicrous?

"I'd be satisfied if we could do it in three hundred years. Well, okay. If we could do it in thirty years."

For Westerners, India combines the familiar and the exotic in a way that camouflages, for a while, how differently Indians think about some things. The newest urban landscapes, for instance, seem on the surface no different from what you'd find in fast-growing parts of the United States. Many of the main highways around Delhi are new and have four or five lanes in each direction, vast flyovers are under construction everywhere, and one of Delhi's booming suburbs, Gurgaon, is home to large, glassy office buildings with logos from PriceWaterhouseCoopers, Convergys, Ericsson, and GE. IBM, Google, and Microsoft all have offices in Gurgaon, which looks like Tysons Corner, Virginia (Gurgaon has the shopping too—it is considered India's "mall capital"). The zippy pace of urban life has a distinctly hectic vibe. One of India's cell phone companies uses this tagline in its ads: "Impatience is the new life." Indians are friendly, many people speak English, and with the infusion of Indian immigrants into U.S. society, India seems closer than ever.[17]

But Indians think differently about matters both minor and profound. The idea of driving between painted lines in a somewhat predictable fashion is as new as the highways themselves, and there are regular road signs exhorting, "Lane driving is safe driving." India's roads are a cacophonous experience that verges on insanity. Drivers talk to each other in a ceaseless conversation, conducted exclusively with the car horn, and every truck in the country has a colorfully painted sign on the back reading in bold letters

"HORN PLEASE!" Indians will often shake their heads side to side—the gesture Americans learn from infancy means no—to mean just the opposite. *Yes! I agree with you! That's why I'm shaking my head back and forth!*[18]

America seems to have lost its sense of smell, compared with India. Indians still live amid the aromas of daily life. You can often smell meals cooking, in both cities and villages, and walking around urban areas, you often catch a whiff of what the Indians call "drains"—the open sewers where almost all waste ends up. The animals that Indians live with, in the villages and in the cities, smell like the livestock they are. And in the villages, neat round cakes of cow dung—the size and shape of Frisbees—are everywhere drying in the sun and perfuming the country air. Many places, including taxis, have plug-in air fresheners to muffle the ambient odor. The big luxury hotels actually perfume the air in their lobbies (and burn incense in their public restrooms).

Water is as complicated a cultural element in India as any, and it's easy to leap to what seem like logical conclusions about Indians and their water, which turn out to be utterly wrongheaded. Several of India's major rivers are considered holy—they are, in fact, considered to be goddesses, and their water is thought to have great powers of cleansing and redemption. The Ganges (or Ganga), which flows through what many regard as the most sacred city in Hinduism, Varanasi, and the Yamuna, which flows through Delhi, are regarded as the holiest of India's rivers. They are also among the most polluted rivers in the world. The water in the Ganges and the Yamuna is so fouled with routine city pollution and industrial waste that it is too dirty to be run through American sewage treatment plants—it would have to be cleaned up before the sewage treatment plants could take it. In many places, the rivers are chocolate brown or charcoal black.[19]

And yet both rivers attract millions of pilgrims who believe that the goddess rivers can, with a simple dip, wash away a lifetime's sins. Funerals by the thousands are conducted on the banks of the Ganges and the Yamuna, with the remains of the deceased burned and committed to the water.[20]

How is it possible to worship a river that you also treat as an open sewer? For Westerners, that contradiction is so vivid, it seems unresolvable. A fundamental hypocrisy.

For Indians, the condition of the rivers is terrible, but it isn't a contradiction.

Praveen Aggrawal is a general manager at Coca-Cola for public affairs and sustainability in India and South Asia. Criticism of Coke's use of local water supplies in India helped trigger what has become a sustained water consciousness and conservation effort for Coke worldwide. Aggrawal, based in Coke offices in Gurgaon, works every day with water issues. Coke, of course, needs water to make its drinks, and Aggrawal is also part of a group of companies trying to change how Indian businesses approach water issues.

"For us," Aggrawal says, "water is a bounty given by the gods. You can't commoditize it. This is a deeply religious and spiritual subject for our population.

"For most people, water is sacred. In most rural homes, in the area where you store the water, you go barefoot—that kind of respect."

Why wouldn't that lead to the cleanest rivers in the world, instead of the most toxic?

"Most Indians, the inside of their houses are really clean," Aggrawal says. "They leave the muck just outside. We have an expression, 'Shit in public, eat in private.' Which means, basically, My house is clean—the outside is someone else's responsibility."

And so for Indians water that isn't in their immediate control also doesn't feel like their responsibility. "How can a factory manager who regards the Yamuna [River] as sacred pipe toxic waste into it? Well, the water leaving the factory with acids and toxins is going to the gods. They'll be responsible for it. There is no emotional connection there."

It is a leap that's hard for Westerners—but for Indians, the very fact that the rivers are goddesses means you can't hurt them by polluting them. The power of the Yamuna and the Ganges transcends anything a factory's wastewater pipe can do.

Ashok Jaitly of TERI says that you can't tackle the problems of water in India without taking account of water's cultural significance.

"It goes very deep in India, our attitudes about water," Jaitly says. "It's so complex. It's so fascinating. Water and religion, water and music, water and literature, water and spirituality—water is integral to all of those. It

has all those connotations, and you have to deal with that as part of the politics of water in India.

"This is a society where people believe if they take one dip in Mother Ganga, they are going straight to heaven. That's irrational, of course. But people are irrational. Thank goodness."

The irrationality is layered through how Indians use water, as well as how they treat it.

Farmers in India use 80 percent of the water consumed in the country, but because both water and the electricity necessary to pump the water into farm fields are basically free, farmers have no incentive to be careful about how they use water. Irrigation efficiency—the amount of irrigation water that actually helps grow crops—is between 25 and 35 percent in India. Which means that roughly 70 percent of the water Indian farmers use is wasted. And since farmers account for 80 percent of water use, 56 percent of the water available to the country is wasted.[21]

India's big cities—the focus of so much of the country's entrepreneurial energy and growth—don't supply water to the people they've got now, and millions of new residents each year are pouring into those urban areas. Indians talk more seriously about Delhi running out of water than they do about Delhi getting water service twenty-four hours a day.

Millions of Indians in villages of a thousand or two thousand people—where 70 percent of the country's people live—rely on water-gathering systems that would have been regarded as primitive in the developed world a hundred years ago. Yet getting water to the villages is harder than it seems, because even small-scale solutions, like compact, solar-powered water purification systems, require the kind of continuous support from someone with technical skill that has proved hard to sustain.

Finally, there is the complexity of Indians' sometimes conflicted attitudes about water service itself.

One of the interesting things about water is that it is one of those rare areas where the gold standard of service and the basic level of service are the same thing: Water should be provided twenty-four hours a day, seven days a week, in pipes that keep it clean and safe. In many parts of the world, 24/7 water is *the* fundamental municipal service.

And many places with more modest resources, and equal challenges,

have decided that continuous water service is simply part of being a twenty-first-century city, and have done the work to put 24/7 water in place. Hanoi and Ho Chi Minh City, in Vietnam, both have water service 24/7. Phnom Penh, the capital of Cambodia, and Kampala, the capital of Uganda, also both have continuous water service.[22]

In India, which takes such pride in its economic and technological achievements, there is virtually no political support for the idea of 24/7 water. "In fact, when someone says water 24X7," wrote a senior official of the Delhi Jal Board in 2006, "we laugh it off as an absurdity."[23]

Puzzling as it may seem, there is resistance to the very idea of 24/7 water. Wealthy and middle-class people have created a world of artificial 24/7 water that meets their needs; however inconvenient, they are all too familiar with the Indian bureaucracy, and skeptical of what 24/7 water might require. Poor people already spend a huge portion of their time and limited income to get water. For them, promises of 24/7 water simply ring hollow; why spend more for something that seems unlikely to materialize?

The slow deterioration of India's municipal water systems owes something to an attitude that is a parallel to the attitude about the sacred rivers. The water infrastructure was a given. It was installed under the British Raj, it was the job of the government to provide water, the water itself needed to remain cheap, and the pipes, pumps, and treatment plants would sustain themselves—just as the sacred Ganges and Yamuna absorb their pollution.

As a result, Indian water utilities charge so little for water, and let so much water leak away unbilled (as much as half in Delhi), that they don't come close to covering the cost of their basic operations—payroll and energy—with revenue from water bills. Customer payments cover only 60 percent of the Delhi Jal Board's operating costs. With huge operating deficits (covered by their local governments), it's not surprising that expensive maintenance, upgrading of the systems, and expansion aren't high priorities for Indian water utilities. India's cities have grown far faster than their ability to keep up. Streets, highways, and traffic are a nightmarish tangle, and that's something that everyone suffers through every day. The water infrastructure gets far less attention than the roads under which it is buried.[24]

As for actually restoring 24/7 water service, at this point, no major city

could simply turn the water on for everyone twenty-four hours a day. In fact, all Indian cities are providing water twenty-four hours a day to someone. Ninety percent of the city will be valved off at any given time, and 10 percent of water customers will be receiving their two hours of water. To provide twenty-four-hour pressure to a whole system again requires, first, that all major pipes be able to hold pressure for twenty-four hours; leaks aren't that important when the water is on for only ninety minutes a day, but they are devastating when the water is always on. Every customer needs a meter, and many Indians with a connection have no water meter. Most utilities would need to change the infrastructure—the valves and control systems—of a water system long adapted to intermittent supply, and many would have to dramatically increase their pumping capacity to be able to provide citywide pressure twenty-four hours a day. Customers would have to adapt their in-home systems, disconnecting automatic pumps and giving up the use of storage systems.

One thing that probably wouldn't be necessary is more water, except for the initial startup. It turns out that in the few cases where Indian cities have tested 24/7 water, they discover that people who can get water anytime they need it actually use less than people who are hoarding water against the next time the pressure comes on.

As it is, the neglect of India's water system leaves Indians to make their own ad hoc arrangements. That forced, and inconvenient, self-reliance breeds skepticism and cynicism about official vows to make things better. And India's growth, rather than being harnessed to fix water problems, ends up making them worse.

But India's drift into a self-created water crisis—the result of poor management and of a failure of Indians themselves to understand the support that good water service requires—is what makes water in India more than simply an Indian problem. The invisibility of the water system in the developed world breeds its own kind of indifference to the needs of the water infrastructure. India is simply an extreme version of the kind of benign neglect of water systems found in many other places.

It's the kind of attitude that allowed Atlanta to slide into a water crisis, it's what makes us think Las Vegas (and Los Angeles) can sprawl without regard to their water supplies, it's the kind of attitude that undermines

a century-old consensus that tap water is fundamental, and worth paying for.

In the United States in 2009, water projects necessary to keep systems operating through 2014 totaled $255 billion in cost—which comes to $170 for every person in the United States every year, just to keep the pipes well maintained. As the Indians have learned, water problems get worse, more complicated, and more expensive if you push them off into the future.[25]

India's problems are about human nature, and about how hard it is for communities to plan for the future. India's water problems are already becoming our water problems—not just the way we take water for granted but the fact that we fail to appreciate two things: the value of easy, reliable water service in our daily lives and our economy, and the level of investment that kind of water service requires.

Maintaining water systems is like saving for retirement. It not only provides no immediate satisfaction, it actually reduces your ability to enjoy yourself right now. But if you don't save slowly and steadily for retirement—just like if you don't steadily maintain and improve the water systems you've got—at some point it becomes too late. You can't possibly save enough to retire if you don't start until you're sixty—and if you haven't started, you're in trouble. Likewise, at some point it becomes almost impossible to rescue water systems that fall too far behind, as the people in Delhi and Bangalore know all too well.

V. S. Chary is an Indian expert on water systems and water attitudes, based at the Administrative Staff College of India. Chary has made bringing back 24/7 water service a mission, and he also wants to restore the Indian public's expectation that 24/7 water service is the basic they should get.

"It's easy to slip into interim water supply," says Chary. That is, it's easy to go from twenty-four hours of water a day, to nineteen, to fourteen, to four hours in the morning and four hours in the evening, to three hours whenever the utility can manage it. "It's easy to slip into it, but it's very difficult to recover back to twenty-four hours a day. Physically and psychologically."

Chary knows something else, which drives him to insist on nothing less than 24/7 water for the cities of a country audacious enough to find water on the Moon. "It's not rocket science," he says. "It's plumbing."

DEFENCE COLONY, which started as a residential area for officers in India's military, is one of the nicer neighborhoods in Delhi, a calm oasis in a city so big, so busy, and so complicated that it can be overwhelming. Defence Colony is a patch of land not even a mile on a side, with about 25,000 residents. The quiet streets are lined with multistory homes and small apartments, all set behind walls and gates. The parks are well tended and crowded with joggers, walkers, kids playing soccer, and seniors doing yoga. Defence Colony has a market, with good restaurants, stands specializing in fresh fruit and flowers, along with a couple outposts of the global economy, including a Citibank with a 24-hour ATM and a Baskin-Robbins.

Early each morning, if you walk the streets, you'll find that almost every car is in the process of being washed. Virtually every family has at least one car, and a lot of those who have a car have a driver; cars in Delhi get dirty quickly, and water problems notwithstanding, many drivers in Defence Colony spend the first hour of the day washing the grime off their employers' cars. It's not typically a running-hose-style wash; it's more bucket-of-water-and-a-cloth. Still, it's striking: almost every car washed every day.

For about a week while I was visiting India, I stayed with friends in Defence Colony who had an apartment on the first floor of a three-story house. Defence Colony is one of those spots on the globe where it is possible to experience firsthand the idea that upper-income people around the world—in Boston or Beijing, Managua or Damascus or Delhi—can seem to have more in common with each other than they do with their fellow citizens from lower income brackets. It wouldn't take a professional from Denver more than a few hours to get her bearings in Defence Colony.

Except, perhaps, for the water.

Because in Defence Colony, as in Vikram Soni's diplomatic neighborhood across town, the water supply is both spotty in frequency and sketchy in cleanliness. The house where my friends live has the requisite pumps and tanks. The Jal Board opens the valves to Defence Colony's water mains each day for a little more than an hour, and the pumps come to life automatically with a muffled roar. When you turn on the faucet in the kitchen

or flush the toilet, there's usually water, piped from tanks. The quality of the water is something else again.

The kitchen has a reverse-osmosis unit to clean the water from the house plumbing—it is literally a tiny countertop version of the same technology being used in the vast seaside water factory to save the city of Perth, Australia. That RO water is the water to cook with, it's the water stored in the big water bottle in the refrigerator, it's the water for making a cup of tea and for filling the water bottles propped on the bathroom sinks.

You don't want to rinse your mouth—or, more difficult to remember, your toothbrush—with the faucet in the bathroom. So, in fact, there are two water systems inside the house: the regular municipal water, and the thin stream of water produced by the RO appliance. The house water is assumed to be non-potable—not just unpalatable, but dangerous. The two systems are supplemented with cases of bottled water. Not bottled water for convenience, but bottled water because the RO appliance needs electricity, and the power goes out a couple times a week.

People do shower in the tap water. My first couple showers, I thought there was a vague, odd smell in the bathroom, but I couldn't quite place where it was coming from, or what it was. During my third shower, I figured it out. Or rather, it hit me—the smell and the source—like a bucket of water in the face. The odor was the very faint tang of raw sewage. And it was coming from the shower spray.

When I realized this, I was facing the showerhead, rinsing the shampoo suds out of my hair and off my face. I immediately closed my eyes and my mouth. The water was unquestionably dirty, in ways that had been described vividly.

The cross-contamination of water supply pipes by sewage pipes isn't just a function of the deterioration of India's water system—it's actually a debilitating side effect of not maintaining 24/7 water service.

In Indian cities—and in other cities around the world—water supply pipes and sewage pipes sometimes run alongside or on top of each other, having been laid together in the same trench for convenience. When poorly maintained sewer pipes leak, it is possible for the liquid they are carrying to seep into water supply pipes. Possible, but in most instances, not likely. The water supply pipes are protected by the pressure necessary to move the

water along—the pressure means clean water leaks out of cracks or sloppy joints, but it is hard for contaminants to leak in against a well-pressurized system.

In Indian cities, though, the water supply pipes don't have any pressure in them most of the time, so the pressure that would otherwise keep leaking sewage from seeping in doesn't exist, leaving the supply pipes vulnerable.

And the practice of every home, apartment building, and business in India's cities being equipped with its own suction pumps makes the problem much worse. Instead of the water being pushed steadily through the water mains by the Jal Board's pumps, the battalions of individual pumps suck the water along through the pipes, creating negative pressure in the water mains. If there are any breaks or cracks in the mains, they will suck in water and contaminants, aspirating any leaking raw sewage right into the clean water mains.

That's why there was no question what the funky smell coming from the shower water was. The only question then is, How much faith do you have in your soap?

The cross-contamination of supply pipes with sewer pipes that results directly from not having 24/7 water service is neither unusual nor trivial. In May 2009, in Hyderabad, the problem killed nine people, including at least three children, sent two hundred people to the hospital, and resulted in angry protests over the poor quality of municipal water—at the hospitals where the sick people were taken and at the headquarters of Hyderabad's water board. Hyderabad officials were so grimly certain of what had happened that the day after the sicknesses started, when only four people had died, they had already announced they would pay compensation of Rs 200,000 (US$4,000) to the survivors of each victim who died. Within three days, Hyderabad's Institute of Preventive Medicine had found *E. coli*—human intestinal bacteria—contaminating the drinking water from the neighborhood where the deaths occurred.[26]

In Defense Colony, in homes that look no different from those in nice neighborhoods in Coral Gables or London, providing yourself and your family with safe water is merely an inconvenience. But it is an inconvenience that is never far from your mind—you have to think about what

water you are using each time you use it. You have to worry about whether the pump is working and whether the tanks have been cleaned, and you have to pay enough attention to the water-main service to know if your tanks actually got filled. If water service doesn't come for a couple days for some reason, you need to summon a private water tanker.

Comparatively, of course, the residents of Defence Colony have water service that doesn't typically limit their lives. But the population of Delhi is 20 million—there are almost as many people in Delhi as in the entire nation of Australia. One detailed analysis of Delhi's residents and their access to water concluded that no more than half the city's residents lived in buildings that had a water connection.[27]

The Jal Board reports that it has at least 11,500 public "standposts," that is, neighborhood water spigots, for those who live in buildings without water service. If only a hundred people line up for water each day at each of those public spigots (a very conservative estimate), and if each of those hundred people is only collecting water for a total of five people (also conservative), that's 6 million Delhi residents who stand in line each day, surrounded by jugs, buckets, and containers of every kind, waiting to collect water, when the pressure is turned on at the public spigot. The spigots don't get better service than the homes—they, too, only get an hour or two of water each day, and someone from the family has to be standing ready with the containers when the water is turned on, whether it's four in the morning or one in the afternoon, whether it prevents kids from going to school or prevents adults from holding down a job with fixed daytime hours.

So between the 2 million people relying on water delivery trucks and the 6 million using standposts, at least 8 million Delhi residents a day rely on water carried home by a family member—which means that more than a million Delhi residents devote hours every day to waiting for water, which is itself of dubious quality, right in India's capital.

THE VILLAGE OF JARGALI is a strange place in the twenty-first century, if not in India itself. Jargali is just fifty miles south of Delhi. You drive past the high-tech office parks of Gurgaon to get to it, but beyond the office

towers, you are quickly in rural India. Jargali is a media-dark zone—no one listens to the radio here, no one watches TV, there are no newspapers, no Internet. Homes have the flag of India painted on their outside walls—three crisp stripes, saffron on top, white, then green. In the white stripe is writing that indicates what kind of public assistance that home is entitled to. The people of Jargali do have water from a well, but it isn't potable.

So twice a day, the women and girls of Jargali follow the dirt road out of town, headed for a well near the village of Molhaka. As water walks go, in both India and the wider world of people with limited access to water, the women and girls of Jargali are pretty lucky. The round-trip takes just an hour, so a trip each morning and each afternoon frames each day, but doesn't consume it.

The Census of India has an unself-conscious approach to cataloging a country that encompasses both the Grand hotel and Jargali. To record where drinking water for home use comes from, the census has three broad categories—"within premises," "near premises," and "away" ("away" is at least one kilometer, round-trip).

In India, 32 million households get their water from "away"—17 percent of the country. About 170 million people drink water every day that has been carried home by foot, one out of six people in a country of 1 billion.[28] That's the number of people in the United States who live east of the Mississippi River. It's as if everyone from Maine to Key West, from New York to Chicago, from Memphis to Atlanta, relied on water that someone had walked to collect every day.[29]

The number of people worldwide who have to walk to get water is one of the few estimates related to water that no one seems to have made. But clearly, in the twenty-first century, perhaps 100 million people are making the water walk every day, with hundreds of millions depending on water that has been carried, almost always on the head of a woman or girl, from a well or a spigot back to home.

I joined the women and girls of Jargali for their water walk one sunny afternoon in October. I was given two pieces of equipment: an open-topped metal pail, and something called an *eendhi*—pronounced like "India" without the final "a"—a tightly woven ring, about the size and thickness of a bagel. The *eendhi* was the first surprise—water is darned heavy, the top

of people's heads is a bit touchy and not all that flat, and the *eendhi* is a way of establishing both a cushion for your head and a reasonable surface on which to settle a heavy, awkward container of water.

We set off walking east, along the road out of town, and then branched onto a well-trod dirt path that threaded along the edge of fields planted with millet and mustard. Ten girls and two women made the walk that afternoon. Anjana was one of the girls who walked with me. She said she was eleven, but might have been twelve or thirteen (Indian villagers tend not to keep close track of birth years). Anjana wore loose, fire-engine-red pants, an elaborately embroidered black top, and purple flip-flops, and she carried two jars on her head, a fat orange plastic one that held 3.5 gallons and a second, smaller stainless-steel one that held another gallon or so. Balance was key for Anjana—her slim arms could only just reach the top of the first jar she was carrying once both jars were on her head.

Basdevi was one of the adults making the walk that afternoon—she was tall, a little severe and skeptical. She carried a single, large yellow bucket with a snap-on lid, the kind of five-gallon container sold at home improvement stores in the West.

Almost everyone balanced two empty containers on her head—the five-gallon bucket, then a smaller, narrow-necked metal jar or pot on top of that. My own wide-topped metal pail held about 2.5 gallons of water—and there weren't any experienced water carriers using something with a wide-open top, for good reason, as soon became clear.

Because a foreign man was on the walk, we were swarmed by curious, highly amused boys, ranging in age from six to eighteen. Not one male but me carried a water container.

Headed to the well, the girls effortlessly wore the empty water containers on their heads, walking along briskly in bright clothes and tired flip-flops, using just a single hand to steady their buckets. I was the last to arrive at the well, twenty-two minutes after I set out.

The well itself was wide-mouthed, dark, vertiginous. It was a classic well, in the sense that it was a deep, round hole, lined with carefully placed stones all the way around, and as far down as you could see.

It was, however, completely unmarked—simply a hole in the ground, eight feet across, in the middle of a farm field. If not for the girls surround-

ing it and already hauling up their water, I would have walked right by. There was no ledge or rail, just a flat circle of stones around the lip. The top of the water was twenty feet down.

Hauling water up out of a well is, simply, hard. Water weighs 8.3 pounds per gallon, so even 2.5 gallons of water means hauling twenty-one pounds of water up from twenty feet down.

You tie your water container carefully to a cloth rope, so as not to lose it, you pitch it down toward the center of the well, you let it sink well below the surface, that is, you "drown the bucket" to get both a fresh slug of water (not filling over the edges from the surface—that might be dirty) and a full container.

The hauling up is not just hard, you have to lean out over the well, while simultaneously reeling in your bucket hand-over-hand; you need to keep your balance, and you need to keep your twenty-one-pound (or, in the case of the girls, forty-two-pound) bucket from banging the sides of the well. Otherwise you scrape dirt and debris into the water, and you splash out the water you're trying to bring home. The girls had no leverage to help with the hauling. I could easily imagine losing my balance and falling in. The stonework lining the well was so smooth that I wasn't sure how I would get out if I did fall in.

Hauled up to ground level, the water itself was crystal-clear and cool. How clean it really was—from a shallow, open well in the middle of farm fields—was questionable. But it looked good.

Walking back home, we fell into single file, using both hands to steady the buckets. The girls walked from the waist down, assuming the stately, hip-rolling walk that, it turns out, you need to keep forty or fifty or sixty pounds of moving water well behaved on your head. You use your hips as a kind of gyroscope—the bottom half of your body, ideally, copes with the changing terrain; the top half of your body stands tall, keeping the load of water on an even keel.

My own return trip was a bit of a mess. Keeping both hands above your head while walking two or three kilometers takes conditioning. My arms tired quickly, and even with the *eendhi* as cushioning, the metal bucket with twenty-one pounds of water in it seemed to grind into the top of my

head. You feel the weight of the water in your neck, your shoulders. The soft, fine, sandy soil becomes a trial to walk through, even without slippery, thin flip-flops. And there is a reason the regulars don't use open-topped vessels. A quarter of my water sloshed out, splashing across my face and shirt. Any water you spill is water you don't get to use or drink. By the time I was back in Jargali, my shirt was soaked, my neck and shoulders ached. And I was thirsty.

I carried half the water, and half the weight, of the typical twelve-year-old girl walking ahead of me. And I stopped twice to give the crown of my head a break.

As I wobbled back into Jargali with the pail of water on my head, laughing villagers shouted at me in the local dialect as I walked by. Translated, the gentle heckling included:

"You are learning that life in India is hard."

"I would like a drink of your water."

"You look beautiful carrying the water!"

The whole trip took fifty minutes. Thirteen of us carried water. If the average haul was 5 gallons (19 liters), we managed to bring back 65 gallons (227 liters) total. Global health experts agree that the generally accepted minimum of water per person per day for all routine activities is 13 gallons (50 liters).[30]

So, technically, thirteen of us went on a water walk and managed to carry enough water for only five of us for the day. A grown woman, experienced at carrying water, can handle perhaps 8 gallons (30 liters) herself—that's walking four kilometers round-trip, the second half of the trip carrying 67 pounds of water on her head. And in that single trip, the woman can't even carry enough water to meet the world health minimums for herself for a day.[31] Which means, of course, that the 32 million families getting their water from "away" in India—and the half-billion people around the world who rely on foot-supplied water each day—don't get anything like the 50 liters of water per person per day that is considered the minimum.

If the typical American had to walk with the hundred gallons of water she herself uses every day—not to mention the hundred gallons that

her husband and her children each use—that hundred gallons of water would require twelve round-trips to the well (thirty miles of walking in Jargali); each time carrying sixty-seven pounds of water on her head.

Walking is simply not a great way to move water.[32]

Back in Jargali, I talked briefly to Anjana and Basdevi. Anjana had carried twenty liters of water that afternoon—forty-four pounds, for a girl who was lucky to weigh twice that. Anjana does two walks a day, taking the morning walk early enough so she can be in school by eight. She has never lived in a house with running water—in fact, she said she didn't know that some houses had water piped directly to the inside of the house. Anjana said, "The men and boys customarily do not fetch water." I asked, "Do they get to drink water, then?" When that was translated, she burst out laughing, as did the crowd of forty villagers who had gathered to listen to the conversation.

Basdevi has lived in Jargali for fifteen years, and has eight children. She makes the water walk twice each day, trying to bring home thirty liters a trip—for a total of sixty liters of water.

Basdevi thinks that walking for water is ridiculous. "Water should be delivered to every individual's doorstep," she says. And she knows. She grew up in a home with tap water.

MEHMOOD KHAN KNOWS THESE VILLAGES, because he grew up in Nai Nangla, the village next to Jargali. "The gap between this kind of village, this kind of area, and the developed parts of India is even wider than fifty years ago," says Khan, who is fifty-five years of age. "Water was not an issue at all in my childhood."

If there is an Indian version of the Horatio Alger story, Khan qualifies. When he was growing up in Nai Nangla, one of five children, the village had 300 people, perhaps 60 families. His father was a farmer, and head of the village council for three decades, and dug two wells that still exist, each just a short walk from the heart of Nai Nangla.

Khan walked to school each day, a 6-kilometer round-trip. There was no electricity or refrigeration. "I did my homework under a kerosene lamp." He left Nai Nangla at age sixteen, in 1970, went to college, then got

an MBA from one of India's most distinguished business schools. At age twenty-eight he went to work for Unilever. "I started out procuring buffaloes for them, then I was a trader, trading tea, coffee, black pepper." Khan went on to help open Eastern Europe for Unilever, and then to run its Asian business, based in Vietnam. He has traveled the world many times. He's been to seventy countries, including North Korea, which he's visited six times. Unilever is a global consumer giant that is equally comfortable selling laundry detergent in Jargali and Nai Nangla—in small packets like those for ketchup, at 1 rupee (2 cents) each—and Ben & Jerry's ice cream in Whole Foods markets in the United States.

Khan's last posting was at Unilever headquarters in London, where for eleven years he was head of the corporation's global innovation process. All that time, Khan had been visiting Nai Nangla every year, and in 2003 he started returning several times a year to try to find ways to improve life in the village, which has about 1,200 people, and in the surrounding region of Mewat.

"I got involved with people doing things with education," he says. By 2003, the literacy rate for girls had fallen to 2 percent; overall in Mewat it was just 23 percent. And although Nai Nangla had a school, which it did not when he was growing up, "these kids, even the fourth and fifth graders, they could not read. They could not write. I was better off forty years ago than these kids were."

In Nai Nangla today, there is still no refrigeration, most people have no electricity, the store is a single, small room with products in dusty jars and cans on the dirt floor, and each day the villagers collect the dung from their cows and water buffalo by hand, form it into dinner-plate-size disks, and set it out in the sun to dry as a source of fuel. Although there is a pond on one side of the village, its water is unfit even to wash clothes in, though the women of Nai Nangla do anyhow. The village has no other water supply.

It is a little arresting to imagine that a senior corporate manager—for global innovation, no less—at one of the world's largest companies started life here. (There was something in Khan's family, and perhaps in the Nai Nangla water then as well: Khan's brother is a cardiologist in Florida.)

The Mewat region has 550 similar villages, each with about 2,000 people. Khan can tick off the cascade of problems: poor schools or no schools,

low literacy, no jobs, primitive agricultural practices leading to low food production, a quicksand poverty that means people struggle to survive.

"They are living on today," says Khan. "Not even for tomorrow. Just today. If I talk about 'one year from now' or 'two years from now,' people say, 'who knows?' That's the kind of pathetic condition that the community has gotten into."

When Mehmood Khan started to dig in, to hold community forums, to peel back each problem, at the bottom of almost every problem he found: water.

Girls don't go to school because they have to fetch water.

Girls drop out of school because the schools have no working bathrooms.

Rainfall is less than it used to be; groundwater levels and well levels have fallen; the water used on fields is brackish, producing less food and slowly poisoning the soil with salt.

Villagers' health is poor because they don't get enough food or water, because they live amid not just the waste of their animals, but their own waste as well. Children who get diarrhea are in serious trouble. The scarcity of water means it isn't often used for hand washing.

"Of all the issues in Mewat," says Khan, "the most hopeless of all is water."

That is the first lesson of water poverty—in rural India, but anywhere else as well. Water poverty doesn't just mean your hands are dirty, or you can't wash your clothes, or you are often thirsty. Water poverty may mean you never learn to read, it means you get sick more often than you should, it means you and your children are hungry. Water poverty traps you in a primitive day-to-day struggle. Water poverty is, quite literally, de-civilizing.

In August 2009, Khan and his wife decided they couldn't keep visiting Nai Nangla's problems. He resigned from Unilever to work in Mewat full time. "I decided to bring my day job back to the village," says Khan. "We ditched our flat in London to return to Nai Nangla." They keep an apartment in Gurgaon, and Khan has turned his parents' old white stucco house, with its open courtyard, into a charitable foundation that includes a computer training school and a sewing school, along with a spartan bedroom for Khan.

Khan has used his charitable foundation to unleash venture-capital-style entrepreneurial philanthropy. The computer school is linked to a bank and an insurance company—students who do well take their skills right to jobs. The sewing school is linked to a clothing manufacturer in Gurgaon who is buying the work the girls make.

Khan persuaded India's largest milk processor, Mother Dairy, to set up a milk-buying storefront right in Nai Nangla. Villagers used to sell their milk to itinerant brokers, at whatever price was offered, typically Rs 12 a liter. The Mother Dairy outlet, locally staffed, has a generator, a refrigerated holding tank, and computerized equipment so that villagers can instantly see the quality, quantity, and price of the milk they bring in daily. The dairy outlet pays about Rs 20 per liter; in a year this one room has raised the total income of those living in the village by 40 percent.

Khan has started an orchard of fruit trees and perennials, and underwritten construction and start-up of a dairy farm. "People have gotten out of the habit of thinking long term," says Khan. "The orchard is something you have to cultivate and take care of, that comes back year after year. Patience is required. The initial work is more, but it pays off."

Khan, who is white-haired at fifty-five, typically dresses all in white and wears open-toed sandals, giving him an air of ascetic focus. He doesn't do the work himself: He enlists young people, he gives them responsibility and financial incentives, and then he coaches, cajoles, runs interference with bureaucrats, and takes great joy in watching things move along. Although the fact that Khan grew up in Mewat gives him credibility, "I'm seen as a kind of alien here," he says. Villagers say, "Which planet does he come from?"

Water is constantly on Khan's agenda. Following in the footsteps of his father, Khan is bringing water back to Nai Nangla, or at least much closer. Khan enlisted a local college student named Ronak to find a new supply of "sweet water" nearby, to irrigate the farm fields Khan's family still owns, to revive the two wells nearest Nai Nangla, which had long since become dirty and stagnant, and to sell irrigation water to other farmers.

Near Molhaka, the same village the women of Jargali walk to, test wells found a great spot for a new tube well. "Ronak found the sweet water. He negotiated to buy the piece of land, he bought the pipe, he got the rights

to lay pipe along the farm fields, he got the machine to dig the trenches, he laid the pipe!," says Khan. Ronak laid 5-inch pipe to irrigate the farm fields, and 1-inch feeder lines that will flow constantly into the two old wells on either side of Nai Nangla, cutting the routine walk for water from a 4-kilometer, half-hour round-trip to 5 minutes. Water for the villagers is free, but the land and equipment cost Khan's foundation Rs 1.5 million (US $30,000).

That's another lesson of water poverty in Nai Nangla: It is possible for one relentlessly determined person to start unraveling the problems. But Khan brings a combination of qualities that illustrate not the possibility for success, but why failure has so much inertia. Khan is simultaneously an outsider and a local. He has operated at the top of the economic pyramid—in London. He knows not only how things should work, he knows how to make them work. But Khan is a product of the village culture he is trying to fix; he knows what daily life here is like, he knows how to win political support, he knows how to goad the bureaucrats who often mummify progress in India. And Khan has financial resources and a sense of the connection between investment and return. (Ask him why he likes dairy cows, and he says, "If you feed a cow 50 rupees of fodder, she gives you 150 rupees of milk—300 percent ROI [return on investment] per day.")

It would be hard for anyone who had never left Mewat—no matter how energetic or talented—to see what is so clear to Khan. It would be hard for anyone from outside Mewat to have the political subtlety to do what Khan is doing, no matter how brilliant their ideas. Even in places like Nai Nangla or Jargali that seem simple, water problems are never simple, certainly not as simple as they seem. Each problem can be solved, but it often turns out to require solving two underlying problems first.

Coming back from visiting Ronak's new well, Khan slips into Nai Nangla's primary school. Education is the thing Khan is most proud of making progress on in the last six years, especially for girls—he talks often of "unlocking woman power." He greets by name the women and girls washing clothes along the edge of the foul pond, then says later, "You can see it in the eyes of girls at the wells washing clothes—the strength. They will not be BS'd by their husbands."

In the schools across Mewat today, says Khan, "among girls age six to fourteen, 86 percent are going to school," a remarkable leap. But 75 percent of them still drop out around fifth grade because of lack of toilet facilities as they reach puberty, get their periods, and value privacy.

Nai Nangla's school has stout cinderblock buildings arranged around a dirt courtyard, but as a launching pad for children into the global economy it is otherwise flimsy. None of the teachers has a desk, and in a school of 320 elementary-age children, not one student has a chair. In fact, there is not a single chair in the entire school. In every classroom, immaculately dressed children sit on the floor facing their teachers, who teach from blackboards at the front. The school has no water—teachers ask the children to bring them water from home—but it is supposed to have about five pit toilets. This is what Khan is curious about.

He sweeps in like the prime minister of Nai Nangla, requests to see the headmaster, then asks the wide-eyed man to be taken to the latrines. Two are padlocked. Several have an unappealing odor even from outside the door. None is functional.

Khan is furious. He upbraids the headmaster, because he knows that without working toilets, as soon as girls reach adolescence they will drop out. "I will pay to fix these toilets," Khan says. "We will do it this week. But you must take responsibility for making sure they work.

"And I will tell you how we will judge whether you are keeping them working: We will ask the girls whether they are willing to use the toilets!"

The headmaster nods with fearful reserve. It is quite easy to imagine Khan coming back in ten days, gathering a group of thirty girls, and asking whether the toilets are clean enough for them to use.

Khan sweeps out, his anger fresh. The children—320 children—simply use the field adjacent to the school when they need to go to the bathroom. "It is a crime," says Khan.

In some ways Khan's school-toilet tantrum is classic India. Why did the headmaster even listen to Khan, who holds no official position and has no direct power over the school? "Because he knows who I am!" says Khan, in a rare burst of realpolitik. "I met with the education minister just last week, and he knows that." More puzzling still, why would the teachers and the headmaster tolerate working in a school with five nonworking

latrines? Khan shakes his head. "The sense of initiative you want in teachers is often totally missing," he says.

Other progress notwithstanding, it is the kind of moment in which Khan knows that he did the right thing in leaving Unilever to return to the villages, and also in which he is discouraged about his chances of changing this most basic element of Indian life.

"I will beat the system on a lot of things," he says. "But I'm not sure I can beat it on water."

EVERYBODY IN INDIA HAS A WATER STORY, and not just a water story but a story about water management and water mismanagement. Each story is a kind of Indian water allegory.

In Hyderabad, the high-tech metropolis eight hundred miles south of Delhi, Hanumantha Rao determined to provide 24/7 water to one of the three sections of the city whose water service he supervises. Hyderabad is a city of 4 million, and Rao is a general manager for the city's water utility. He embarked on the project in 2006. The neighborhood that was most easily isolated for the 24/7 experiment had five thousand water connections, and 55,000 people, just over 1 percent of Hyderabad's residents. It had been receiving water ninety minutes, every other day, and to turn the intermittent water service on and off to that one neighborhood, workers had to open and close sixty-seven valves by hand. Before moving to 24/7 service, every customer in the test section had to have a water meter installed, and significant leaks in the mains had to be fixed to hold 24/7 pressure. The preparation took nine months, with twenty-four people from Rao's staff working on it full-time. Pipes were fixed, meters were installed, and in late 2006, the neighborhood of Adikmet got 24/7 water. "The customers were happy," says Rao. Some customers did get huge initial bills, because they had leaks, or because servants let faucets run for hours. The big surprise was about water consumption.

"They were not using any more water in twenty-four hours a day than in ninety minutes every other day," says Rao. "A person getting 24/7 water isn't going to take ten times the water they used to get." In fact, people quickly adjust, and use only the water they need. All went well for six

months. "My personal opinion was, it was successful," says Rao. "Senior management decided it was a 'costly experiment.'" And it ended. Adikmet gets five hours a day of water now; Rao was ordered to cut that to two hours. But his own testing has shown that homes take 10 percent *more* water when they get only two hours of supply—a hoarding effect. "I am not reducing it to two hours," Rao says. Given his success, is 24/7 water coming to Hyderabad anytime soon? Rao squints silently as if the meaning of his experiment might not be clear after all. "It is a dream," he says, meaning, It is a fantasy.

Pentair is a $3.3 billion global water infrastructure company, based in Minneapolis, with factories and operations worldwide, including in the Indian seaside city of Goa and in Delhi. Pentair makes components critical to the huge desalination plants being built around the world. It also produces a line of freestanding reverse-osmosis units, ranging from sleek countertop models that residents of Defence Colony might buy, to closet- or room-size units to supply clean water for a school or an office building. Those mid-size units are perfect for Indian villages—installed in a storefront, they can become a kind of high-tech well, taking whatever water supply is available and turning it into safe drinking water, typically for a charge of a few rupees.

Pentair supplies these units at just the cost to make them—the company thinks it is the largest supplier of village RO units in India, through a partnership with an NGO. Pentair wanted to show off how this changes village life, and made arrangements for me to tour the unit installed in a village about forty-five minutes east of Delhi.

"We supplied that one for free, to a third party," says Mukund Vasudevan, who heads Pentair's India operations and has an MBA from the University of Chicago. "It was a couple years ago. It took us a while to track it down and check on it. It turns out the person who was supplying service to it stopped. And the RO unit itself is apparently gone." Pentair doesn't quite know what happened.

It's one of the frustrations for Pentair, whose staff in India thinks of it as an Indian water technology company with the potential to help solve an urgent problem. The challenge is that the very villages that could benefit the most from Pentair products don't have the wherewithal—the human

infrastructure—to use those products. Councils of village elders don't have the kind of taxing authority or financial resources that even small U.S. towns have. They don't have employees or buildings or a budget. Many villages don't have electricity. So while Pentair may have the "solution" to their water problems, there is no one to buy the solution or take possession of it if it is donated, no one to keep an RO unit connected to a source of power, to operate it and maintain it and fix it when something goes wrong. Vasudevan sums up the odd situation with sad precision: "There is no customer in the villages for Pentair."

Jyoti Sharma has some of the most hopeful stories about water in India—in her stories, Indians don't assert control over water, but they do assert control over their water supply, over the fate of their water.

Sharma, thirty-nine years old, left school with an MBA from the Indian Institute of Management Bangalore, one of the country's most demanding business schools, and started out at one of India's biggest ad agencies. But after she took time off to have kids, the world of high-dollar corporate marketing lost its appeal.

"I thought, You only have one life. Is that how you use your good brain? I wanted to do something where I could make a change.

"Water appealed to me because water is a problem which *has* a solution."

For Sharma, water has become too much of a big-picture, big-project issue—the problems are big, the solutions must be big, everyone sits around with his arms crossed waiting for someone with big resources to do the big fix. Sharma thinks in the smallest possible units of solution.

She also thinks, as she puts it, "We spend too much time blaming each other for the water problems. In the process of blaming, we don't actually do what we can do. My personality is, no blame games. If the politician is corrupt"—she smiles lightly, this is India, of course—"oh, let him be."

Sharma founded a group called FORCE (Forum for Organised Resource Conservation and Enhancement), and after five years, she has a vast tapestry of connections. She knows the water-deprived and water-privileged communities in Delhi, she can make a call and get senior officials from Coca-Cola on the phone, and just as easily reach senior engineers from the Delhi Jal Board. It is, in fact, her ability to connect to everyone—

to treat water as both an open-source community and susceptible to open-source solutions—that gives Sharma and FORCE their power.

FORCE has driven a rainwater harvesting effort in Delhi, to capture monsoon rains and channel them into recharging the city's failing aquifers. Delhi has gone from having two rainwater harvesting structures to having more than three hundred, and the city now requires all new buildings to collect, clean, and send into the aquifer any rainwater that falls on the footprint of the building.

Sharma is a master of patiently watching for the simplest solution, for the solution that clicks perfectly with real human behavior about water.

She thinks the daily scramble by the most impoverished Indians to the Jal Board's trucks—with the hoses trailing from the tankers, "like the head of Medusa"—is absurd. "A lot of fighting happens," she says, "a lot of wastage happens, and those hoses lowered into the water, they dirty the whole ten thousand liters." At the Shivanand settlement in West Delhi, the tankers come each day around 8 a.m., but there is no scramble by the three hundred families who live in the slum. The tankers fill three black, plastic water storage tanks that hold about twenty thousand liters of water. The tanks are clean. Clean water goes directly from the tankers into the storage tanks. Someone from the family can come anytime and claim the sixty-liter-per-day allotment. The water is waiting for you, rather than the other way around. Instead of daily water worry, says Sharma, "there is water security." How hard is that? Sharma helped broker the arrangement—even helping persuade the Jal Board to lay the concrete pad for the tanks and install them. "It does require a more human connection," she says.

One of the things that's clear is that water problems across India—magnified by population growth, by economic growth, and by severe drought—have grown so chronic, and yet are so untended, that rather than making people discouraged, it has energized them. Many communities have simply stopped waiting for the government, for "someone else," to fix their water problems.

In a much larger Delhi slum cluster, Rangpuri Pahadi, with six hundred homes and 3,500 people, residents got tired of standing in line at hand pumps to collect the day's water. The Jal Board will not provide "permanent" water connections for unauthorized settlements. But the people of

Rangpuri Pahadi were gradually becoming more prosperous. "They work as domestic help in the better neighborhoods, or in construction," says Sharma. They wanted water delivered to each of their shacks, as many of them experienced water delivered to the homes where they worked. "They wanted a distribution system. We said, 'This is how much it will cost.'" The residents collected the money to have better wells drilled, then bought a pump and a two-thousand-liter storage tank. Then the residents laid small water pipes to every individual shack that wanted to "subscribe" to water service—five hundred of the six hundred homes. "They did all the work themselves," says Sharma.

What they created, in fact, is a miniature Jal Board. Each dwelling gets water through a stainless-steel conduit laid in the dirt—half an hour a day for those who pay Rs 125 a month, an hour a day for Rs 250 a month. The water comes on a set schedule. The tariff—$2.50 or $5 a month—pays for electricity and the salary of an employee who is constantly opening and closing valves for customers. Rangpuri Pahadi's residents might earn $90 or $100 a month, so the water is costing a whole day's wages or more (the equivalent of an American spending $150 a month on water). But the water often makes the wages possible.

"This saves standing in line at the hand pump, which was at least an hour a day," says Bhawan Devi, a fifty-year-old woman who is on the five-member water board that oversees the system. "That meant you often couldn't work a job with regular hours. That's why people are willing to pay to get the water."

Sainik Farms is a Delhi neighborhood that seems to be from a different universe from Rangpuri Pahadi—the homes are large, airy, with acres of wide lawn, styled like haciendas or villas, set behind large walls. Sainik Farms is one of the more well-to-do communities in Delhi—home to retired cabinet ministers, prominent business and entertainment figures, lawyers, and government officials.

But it shares some important qualities with Rangpuri Pahadi. Sainik Farms, too, is an illegal settlement, outside the jurisdiction of the city of Delhi, built up over the last two decades on former farmsteads. It has been overtaken by metropolitan Delhi, but it remains "unrecognized," receiving

no city services. Residents work together to provide their own electricity, garbage collection, security, lighting, and roads.

Sainik Farms residents handle their own water needs, as if each were a solo homestead, drawing their water from wells.

The problem is, Sainik Farms' fifteen thousand residents are taking so much water from the aquifer that the wells keep running dry. "In 1985," says Pradeep Bhagat, sixty-four, who has lived in Sainik Farms for twenty-four years, "we had wells going down forty feet." He has had four wells drilled at his house, and three of them are dry. The one that works, he says, "is at two hundred and twenty feet, and it's almost over. It's erratic."

Over the last thirty years, every Sainik Farms home has simply drilled wells deeper and deeper—Bhagat says some are now four hundred feet deep, and there may be ten thousand wells in this one four-thousand-acre neighborhood. The wells are unmetered, unbilled, unmonitored, and people take as much water as they need, without regard for anyone else or for the health of the aquifer.

Bhagat is a retired executive for a global paint and chemical company who runs an organization that helps educate children in slum neighborhoods. He knew the water situation in Sainik Farms was a slowly evolving disaster. Today, in fact, 60 percent of the private bore wells in Sainik Farms are dry—and more than half the residents now have their water delivered in tankers. "Yes," says Bhagat, "we are trucking in water today, just like the slums."

Dried-out wells, right there in your own yard, are hard to overlook. They are as potent, and as scary, a symbol of mismanaged water as mains that are dry 23½ hours a day.

Bhagat shakes his head. "Something had to be done. Together."

FORCE has partnered with the Sainik Farms residents association to educate residents about the value and simplicity of rainwater harvesting—taking the almost unmanageable floods of monsoon rainwater that fall in the neighborhood and returning them to the failing aquifer. As it happens, the best way to turn rainwater into groundwater is to use the dry bore wells in reverse, to send harvested rainwater down after a basic filtration.

Rainwater harvesting has caught on in Sainik Farms. But there has

been a much more tectonic shift in thinking. The residents have decided to give up their thousands of individual wells, and have asked for both approval and assistance in moving to a system of twenty community wells, with distribution pipes and monthly fees—much like the slum colony of Rangpuri Pahadi.

"It would be a little water utility," says Bhagat. "We've said we will design the system, pay for the wells, pay for creating the distribution system." The Jal Board seems positive, but isn't sure about legal issues.

"The attitude in Sainik Farms had been, we don't need to create our own water security," says Jyoti Sharma. "We can just buy our way through. It has taken years to get to this point. And some hardship."

It is a huge leap—the leap from selfishness to community, the leap from thinking of yourself as an individual with entitlements to thinking of yourself as a member of a group whose behavior affects other members of the group. Water issues, in particular, are often made worse when everyone operates independently—all those pumps sucking water from mains in Delhi and Hyderabad and Bangalore make everyone's water dirty. The collective solution is usually cheaper, more efficient, less wasteful, and better for the fate of the water itself. Money and technology are often not the best solutions to water issues—rainwater harvesting is simple, low-tech, and it's a lot easier and less expensive than finding new sources of water.

Bhagat isn't quite as sanguine as Sharma about the motivations of his Sainik Farms neighbors. "Not everyone is with us, even now," he says. "Only the people who are suffering are behind it. People don't act until the time they can't get their own supply. They don't want to see beyond their own nose. That is the unfortunate part of our character."

JUST NORTH OF THE CITY OF DELHI, in the neighboring state of Haryana, the Yamuna River is wide and flat and peaceful, winding through undeveloped land, with a scattering of people net-casting from boats or from shore. The river isn't a pristine mountain stream, but it has an appealing naturalness. It is hard to believe that the northern edge of the fifth-largest urban metropolis in the world is just around a bend and under a bridge.[33]

At the border between Delhi and Haryana, there is a barrage, a low

dam across the Yamuna, and from behind the dam, Delhi has a water intake to supply drinking water to the thirsty city of 20 million people. Almost no water passes beyond the dam—the Yamuna is reduced to a trickle, not even 10 percent of the width of the river above the dam.

For perhaps 150 feet, the mighty and revered Yamuna River is little more than a creek. Then, all at once, the river's flow is restored from the west bank—a vast cataract of water comes rushing in from the mouth of a tributary that is 60 feet across, and if you close your eyes, the volume and the sound of crashing water are such that you can imagine a wilderness river. The surface churns with turbulent rapids.

But the smell and the color of this tributary are astonishing, arresting. The water is India-ink black. The smell is barnyard-organic fermented with chemical-plant acrid—manure and methane. At the point where the black tributary joins the Yamuna's riverbed, the smell is almost too strong to bear.

This is one of the "drains" that collect the wastewater from Delhi's residents, its hospitals, factories, and businesses, and pour it back into the Yamuna, almost a billion gallons a day. It is, in fact, a black river of raw urban sewage—this one drain puts out 1 million gallons of wastewater every four minutes.[34] Out in the middle of the restored flow floats the carcass of a dead water buffalo; along the banks you can easily spot every sort of debris—flowers, clothing, take-out food containers, a Bacardi rum bottle, a hypodermic needle.

In Delhi, if you are washing your clothes or brushing your teeth, cleaning out an industrial mixing tank or flushing a toilet—it's all going right into the Yamuna.

Just beyond where that first canal of sewage empties into the riverbed, there is an informal beach, where people come to make sacred offerings. You can rent the services of a boat and a pole man and float out onto the black river. The smell eventually dulls the nose. The surface of the Yamuna is odd—it's flat and shiny black, but pocked everywhere with tiny bubbles fizzing up, like the surface of a dark ale. Methane is bubbling up out of the fermenting river.

People at the beach wash clothes in this water; people come to take a dip in the Yamuna's sacred flow, to wash away their sins, as if anything

they have done could be cleansed by water this dirty. In fact, it's not wise to even put your hand in the water. It is unimaginably, almost immeasurably, filthy.

In a 2009 study, India's Centre for Science and Environment reported that as the Yamuna flows through Delhi, the pollution isn't just unsafe for swimming. India's standard for safe swimming is 500 bacteria per 100 milliliters of water—500 bacteria in about half a cup of water. (The U.S. EPA standard is half that.) Halfway along its trip through Delhi, the coliform count in the Yamuna was typically *10 million* bacteria per 100 milliliters, and was often 100 million. One eyedropper of Yamuna River water is enough to make six bathtubs full of water unsafe to sit in. Says the CSE report, "The river is unfit for any human purpose."[35]

The Yamuna flows for fourteen miles along the eastern side of Delhi, mostly hidden from easy public access, or even routine public view, by Delhi's ring road, an eight-lane highway that circles the city. By the time the river leaves the city limits, twenty-two drains have emptied into it. The Yamuna just gets dirtier as it goes. It is a real-life river Styx. The venerated Ganges River is, if conceivable, dirtier. And the Yamuna is the main tributary of the Ganges, contributing 60 percent of its flow.

It is easy to get discouraged about water in India—and the state of the Yamuna is a perfect example. It's hard to imagine, in a country that can compete in brain jobs with the United States, that can send science missions to the Moon and put six billionaires among the fifty richest people in the world, it's hard to believe that it treats its great rivers this way.

But two things are worth remembering. First, India is capable of dramatic, even inspirational, change. In 1998, responding to pollution that was turning Delhi's air into a toxic soup, the country's Supreme Court ordered all public transit vehicles in Delhi, all taxis, and the entire fleet of small, ubiquitous, three-wheeled vehicles called auto rickshaws, converted to low-emission compressed-natural-gas fuel. Today, all ten thousand of Delhi's public buses run on CNG, as do all five thousand taxicabs, along with every one of the signature green-and-yellow auto rickshaws. Conversion of the privately owned auto-rickshaw fleet was painful, but also impressive: There are at least 53,000 of the auto rickshaws, barreling with suicidal speed and heedlessness along every street and through every intersection

in Delhi. (New York City has thirteen thousand yellow cabs.) Delhi's air is still often gray and smoky, but it would be dramatically worse without the shift to CNG fuel of the last decade.[36]

Second, while India seems to have accommodated itself to some truly intolerable water circumstances for a modern nation—no major cities with a basic, always-on water service, one in six people relying on water that is transported by foot—we all get used to appalling circumstances, some just as stunning to outsiders as India's water compromises. The public schools in many of the great cities of America—Philadelphia, Detroit, Los Angeles—aren't just bad, they have become nonfunctional: ineffective at teaching, often not even safe. The schools in the nation's capital are, quite simply, a national disgrace. That's a failure at least equal to intermittent water service in Bangalore.

In both cases, change is hard at least in part because the rich have opted out of the public system, and the people who are left often have dramatically less money and political clout. Well-off Indians create their own twenty-four-hour water systems; well-off urban Americans send their children to private schools. Poor Indians don't have the power to demand improved water service, and fear they might not have the money to pay for it; low-income Americans don't have the time and influence to insist that public schools do a proper job of educating their children.

As with schools, there is no quick fix to water problems.

India is in the middle of a water crisis, but it is a slow-motion crisis, which is why it is important not just in India but for everyone beyond India. India's water problems can seem as hard to clean up as the Yamuna River—so messy that they are beyond solution. Where do you start?

But most of India's water problems aren't really water problems, they are people problems—problems with how they think about water and how they manage it. That is the most important lesson for Indians and the most important warning for the rest of us. It means the problems are, in fact, solvable—because we let them happen in the first place. You can have a perfectly good water system—as much of India did—that you let slip away because you don't take it seriously.

That's a lesson that Americans, and those in much of the rest of the world, are in danger of unlearning. We upgrade our running shoes every

year, we upgrade our cell phones every eighteen months, we upgrade our laptops every three years. But our water systems have become like a feature of the natural world, a kind of man-made geography that we have come to believe needs no more attention than a waterfall or a mountain.

It is just the opposite. Water systems fall behind fast, and catch up slowly, and only with grinding effort. There is no leapfrogging over an aging water system, the way, for instance, cell phone service or satellite TV service or wireless Internet service allow quick leaps forward. You can't beam water through the air.

ONE BIG CITY IN INDIA has brought back always-on water service—with both remarkable effort and remarkable results.

Navi Mumbai is a gawky adolescent of a municipality on India's west coast, whose many personalities can be hard to reconcile. Navi Mumbai's main thoroughfare, a modern, high-speed, four-lane boulevard that runs along the Arabian Sea, is called Palm Beach Marg (Palm Beach Highway). Palm trees line the median, and there are mangroves in places along the seashore. Navi Mumbai has dozens of apartment blocks, but many are somber, sterile, Soviet-style concrete towers, un-Palm-Beach-like, in fact, utterly untropical. Navi Mumbai's commercial zone stretches for ten miles, and includes gleaming glass office campuses, like those in Gurgaon. Wipro is here, and so is Tata. Right alongside the office parks are chemical factories and oil refineries. The city's old central business district is a few uninspired blocks of tired concrete buildings, but its parkways are home to elegant hotels and a half-dozen flashy shopping malls. Navi Mumbai's taxes on new cars are so low that many well-off Indians come here to purchase luxury vehicles—in 2009, 996 luxury cars were sold in Navi Mumbai.[37]

But a better indicator of Navi Mumbai's economic well-being is a fat green water main that runs right alongside Palm Beach Marg for many kilometers. Like the factories alongside the office parks, the prominently visible water main isn't attractive. For much of its length it is two meters in diameter, a single pipe big enough for anyone under six feet tall to stand inside, and it is painted the uninspired, flat green of bridge girders and boiler rooms. But the water main is the spine of a system that, by the end of 2010,

supplied 24/7 water to 65 percent of Navi Mumbai's residents—continuous water, anytime they turned on their taps, to 800,000 citizens, including all slum dwellers. That water main would make always-on water service available to every resident in 2011.

Vijay Nahata is Navi Mumbai's municipal commissioner, the equivalent of its mayor. With a grin, he says, "For water, we decided to have the ideal system."

Navi Mumbai was conceived around 1970 as a planned community designed to take pressure off Mumbai, which even then was bursting with unmanageable growth. So unlike many Indian cities that are hundreds of years old, Navi Mumbai is only forty years old, laid out with care—and it has attracted residents exhausted by Mumbai's crowding and cost. The city has 1.2 million people—double what it had just ten years ago. It is large and fast-growing, but relatively small by Indian standards—about twenty-eighth in size.

The effort to make Navi Mumbai the first modern Indian city with continuous water started in 2002, and came from the opposite problem: chronic water shortages. The city was buying its water from two state agencies that couldn't keep up with Navi Mumbai's demand. The city was routinely receiving one-third less water than it needed. Searching around for its own water supply, Navi Mumbai ended up buying a dam from another government agency that couldn't afford to finish it, and once that dam was finished, it more than tripled the city's supply.

"When we got our own dedicated source of water," says Sanjay Desai, executive engineer for water in Navi Mumbai, "the idea of 24/7 water came up."

"We liked the idea," says city engineer Mohan Dagaonkar. "We knew it can be done. How it can be done is another question."

"There were hundreds of hurdles to making this happen," says Desai.

The idea of Navi Mumbai being a "planned" city seems to have seeped thoroughly into its culture. The city counts, and reports, on almost everything. At the end of 2009, for instance, city land had 157,283 trees, and the city operated 320 public toilet facilities, with "total seats of 3,626." Navi Mumbai has become obsessive about good sewers, good landfills, and recycling. Precisely to avoid the cross-contamination between water mains

and sewer pipes that plagues the rest of urban India, it is standard practice in Navi Mumbai for the water main to run alongside the road, buried one meter down, and the sewer line to run in the center of the road, buried two meters down. No possibility of confusion, and almost no chance that a sewer leak will find the water main.

City officials take a sly pride in all this, because they know how unusual it is. Says city engineer Dagaonkar, "We do know where our pipes are. Here everything is on the network—it's on a geographic information system"—plotted down to the inch with GPS coordinates.

It has taken six years of planning, politicking, and construction to move the city's government and residents to 24/7 water. (Hoover Dam took five years.)

The big green water main had to be laid twenty-one miles from the reservoir to the city. Every home and business got a new, tamperproof water meter, and the city's 220 miles of water mains were inspected, repaired, or replaced. Every dwelling needed a supply pipe, including those in slum clusters and villages, which had traditionally been supplied with water tankers. And there were lots of meetings to explain that water bills would go up—with 24/7 service, they double, from Rs 65 to Rs 130 a month, that is, from about $1.50 a month to $3. "People were opposed to the increase," says municipal commissioner Nahata. "But it was small relative to income."

City engineer Dagaonkar says public support took time to muster. "Everyone wanted 24/7 water—they love the idea of 24/7," he says. "But they didn't want meters. They didn't want increased rates. They wanted us to do it for free. It took five or six years to convince them."

And one thing was evident—with roads being dug up for water mains, with the huge new green water supply pipe moving into town in kilometer-long leaps, with every home being visited to receive a new water meter, it was clear where the money would be going.

Navi Mumbai has discovered another technocratic technique that is not common in Indian governments: outsourcing. Navi Mumbai government is relatively lean, and many functions are outsourced with contracts, which include tight performance standards, and then managed. Garbage is outsourced, sewage treatment is outsourced, and the operation of the water supply system is outsourced. City officials say they find it easier to insist on performance from their contractors than they would from an army of employees. "We find that once you have a permanent employee in a job, they become lazy," says Nahata. "That's why we've outsourced."

The rollout of continuous water appears to have actually reduced water use per person in the city—from seventy-five gallons a day to sixty gallons a day, in part because of the metering, in part because people don't have to hoard water just in case. And Navi Mumbai has gone to the trouble and expense of installing something not of much use in most Indian cities: fire hydrants. Now that the city's water mains will have water pressure all the time, it will be possible to roll up to a fire hydrant and find water in an emergency.

Navi Mumbai appears to be the very leading edge of a critical shift in attitude. Just ten years ago, the idea of taking an Indian city from intermittent to continuous water wasn't even discussed, according to V. S. Chary, from Hyderabad's Administrative Staff College, the country's leading proponent of bringing Indian cities back to 24/7 water. "When I would talk to people about it here in India, they would look at me puzzled. They think I'm a fool."

Chary now has a roster of Indian cities that have committed to moving to 24/7 water and are receiving grant money to help them. It's not four cities, it's not a dozen, or three dozen. The list of cities publicly committed to restoring 24/7 water service is forty-five.

"It's not a tipping point," he says. "That is yet to come. But it is huge. It is a delight."

In Navi Mumbai, many who have gotten 24/7 water—especially the poorest residents—have a different life as a result. Sharda Sonawane lives in the slum area called Shivaji Nagar, in a small apartment with her husband and her in-laws. They got 24/7 water at the end of 2008—a sink with a tap, on the wall in the main room. Alongside the sink sits a small, portable washing machine for clothes.

The Sonawanes used to stand in line, along with everyone else in Shivaji Nagar, to use a public tap, an hour or more of waiting a day. "I worked for a cosmetics company then," says Sharda, "and I was often late for work because I was standing in line. My wages would be cut as a result."

Her mother-in-law, Vandana, a former municipal councilor, says her

home was occasionally robbed while she was standing in line for water. "While we stood in line, they would steal things. And because there was so little water, we would use the water in a miserly way. It was not very hygienic—we would use less water for bathing."

Everyone in the house has regained the precious hours each week they used to stand in line for water.

"We bathe more," says Vandana, "and the water is clean."

"We wash clothes every day," says her daughter-in-law.

The cost of their water has doubled. "Yes, we are paying more," says Vandana. "But we are getting more water. And it is better water. So we are happy."

The Shivaji Nagar neighborhood is in some ways representative of Navi Mumbai's best qualities. Although it is poor, the public pathways are spotless, and there is no stream of raw sewage running along the streets.

Bhimrao Rethod is an auto mechanic in his mid-thirties who has lived in Shivaji Nagar for thirty years, since he was a little boy. He shares an apartment with a total of eight people—his parents, his brother, his wife, and their three kids. As a boy, he says, "I used to stand in the queue, sometimes all night, I would skip school to stand in line. And then, we wouldn't get that much water."

How is the tap inside his apartment better? Rethod laughs.

"First, you save time. Second, you don't have to store the water. I can go to work on time. Illnesses and sicknesses are reduced. It's a hassle-free life! My children have 24/7 water!" Rethod has been speaking the local language through a translator. But his enthusiasm causes him to switch into English.

"Even rich people in Bangalore and Delhi don't have 24/7 water. I'm a lucky man, and I am richer than those people!"

9

It's Water. Of Course It's Free

You can "own" a glass of water, but only until you drink it and pee. Once you pee, you don't own that water anymore.

—Mike Young,
water economist,
University of Adelaide,
Australia

When you check into one of the Starwood chain's Four Points hotels in the United States and Canada (there are 109), you'll find a couple bottles of water in your room. Nothing unusual about finding bottled water in a hotel room—it has become standard, as if the hotels didn't have much faith in their own tap water, and the glasses and ice bucket they provide.[1] What is unusual is that the bottled water is a gift from Four Points—no extra charge for the water, any more than there's a charge for using the bottle of hand cream by the bathroom sink. Four Points puts a little tag around the neck of the bottles:

"It's water. Of course it's free."

The water is a treat, and the tag is just the right touch of hospitality. Pause a moment and appreciate that Four Points has gotten the customer service right, and it has picked a way of presenting that service with an edge of irony, guaranteed to make its guests smile.

"It's water. Of course it's free."

But why is the tag funny, exactly?

First, of course, it's funny because in many hotels almost nothing these days is free—from the WiFi to the gym. And of course, bottled water itself