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India, Factor 2: Water Scarcity

### **India: Water Scarcity**

Throughout my short 16 years on this planet I learned very little about what India truly looks like until recently. Soap operas retold through my sole friend of color were one of the very few connections I had to India. I live in a majority white suburb and Indian culture, and India itself, is typically shown in a stereotypically way, completely ignoring real problems that actual people face. While India is presented in a variety of ways, from Bollywood to a bunch of job stealing criminals, very rarely is it presented as what it truly is: a country struggling with food and water scarcity. While Indian culture thrives and improvements are being made, citizens are still fighting to secure basic necessities and survive.

Family remains a central aspect of culture and life despite that living situation and status has changed. Families range in size from a single nuclear family to multiple generations. In addition, sometimes multiple families will live together in one house, each family inhabiting a singular room. While shared living space is very common in the city, it is not uncommon in the country – each family living in separate huts as opposed to living in separate rooms (EveryCulture). Sisters and grandmothers typically raise children. Home and family care is considered to be a woman's job under the supervision of men. First a woman is under her father's control, then her husband's, then her son's- this pattern being a normal part of culture and everyday life (EveryCulture). Arranged marriages are prevalent and the "norm" for most families. Romantic relationships or "love marriages" are frowned upon (EveryCulture). The minimum legal age for marriage is 16 (EveryCulture), and the mother's mean age at her first birth is 19.9 (CIA World Factbook). This leaves plenty of time for other children to be born and to expand the family further. Such large families require large amounts of food, and religious restrictions make finding nutritious and accessible food hard – for example, many followers of Hinduism avoid meat (Reference). Religious, caste level, and geographical differences create a diversity in what would be considered a typical diet. While half of the population's staple food is rice, the other half eats a variety of grains- including wheat, barley, maize, and millet (EveryCulture). Lower caste Hindus will eat any meat except for beef, but higher caste Hindus are mostly vegetarian (EveryCulture). In the attempt to provide safe food and water for such a diverse country, culture must be considered.

Everything from India's location between the Arabian Sea, the Bengal Bay, Burma, and Pakistan, to its giant size of 3,287,263 sq km, to the climate and geography shapes India's culture (CIA World Factbook). Geography is also diverse, flat areas to rolling plains along the Ganges, deserts in the west, Himalayas in the north. Climate also varies: tropical monsoons in the south to temperate weather in the north. Both of which dictates diet and access to food (CIA World Factbook). India's population also dictates the conversation around food, water, education, and culture as well. A population of 1,266,883,598 (July 2016 est.) with a growth rate of 1.19 percent functions very differently than a smaller community (CIA World Factbook). Even though India is prevalent in world affairs and has many large cities, they rank 75/113 on the Global Food Security Index (Global Food Security Index). There are clearly multiple issues manifesting in India. Every issue thoroughly intertwined with the others. Change is slow, although necessary. While culture around education is shifting, a large gender gap exists in literacy and schooling. 81 percent of males are literate while 61 percent of females are literate (CIA World Factbook). Female schooling is still not a common or accepted practice in some parts of the country. The average amount of years spent in school is 5 (CultureGrams) and the amount of India's GDP spent on education is 3.8 percent (CIA World Factbook), which is one percent lower than their health expenditures.

India spends 4.8 percent of their GDP on health; achieving a doctor density of .7/1,000 (CIA World Factbook) and an infant mortality rate of 42 per 1,000 births (Culturegrams), comparatively low to

America's doctor density of 2.45 (World Factbook). Health is a concern that directly affects the citizens and families of India. 60 million Indian children, or 45 percent, are stunted from malnutrition (World Bank). Only 40 percent of the total population has access to improved sanitation facilities, which leaves the whole population vulnerable to waterborne, and foodborne illness (CIA World Factbook). Indian citizens run the risk of contracting bacterial diarrhea, hepatitis A and E, and typhoid fever daily (CIA World Factbook). In spite of the harsh conditions, the life expectancy is relatively high at 68 years of age (CultureGrams).

Even though jobs are distributed through a filter of age, gender, and caste level, 49 percent of the labor force works in agriculture (CIA World Factbook). Agriculture is a major industry in India claiming 16.5 percent of the total GDP (CIA World Factbook). And, while agriculture gives millions of people a job and puts food on many tables, 30 percent of Indians live below the poverty line (CultureGrams). Poverty exists in both rural and urban settings even though 32 percent of the population lives in an urban area while 68 percent of the population lives in a rural area (CIA World Factbook). 78.8 percent of the population has electricity, but the other 21.2 percent lives without (The World Bank). The lack of electricity affects how families can store and cook food, leaving 21.2 percent of the population vulnerable to foodborne illness (The World Bank). India has 4,699,024 km of roadways, the second most in the world (CIA World Factbook). This allows easier transportation of food and other necessary products to all areas. Advancements in transportation and accessibility have been made; however, much of the country especially rural areas are not accessible. India's amount of irrigated land is not sufficient for its agricultural needs; approximately 667,000 square km of India are irrigated (CIA World Factbook). Irrigation is important to small farmers who cannot maintain their farms solely on groundwater because of lack of water in their local water tables (NRB).

India grows a diverse range of crops, livestock, and animal products including peanuts, rice, tobacco, wheat, cotton, milk, sugarcane, rubber, grains, oilseed, jute, tea, coffee, lentils, onions, potatoes, dairy products, sheep, goats, poultry, and fish. Many farmers, however, only grow cash crops in order to bring in the most revenue (CIA World Factbook and CultureGrams). Three common agricultural practices in India are subsistence farming, plantation agriculture, and shifting agriculture (Your Article Library). None of the afore mentioned are particularly sustainable or helpful to long term ideals. Subsistence farming typically does not produce many agricultural products, as the tools are extremely simple and rustic (Your Article Library). Plantation farming was brought by the British and mainly grows cash crops. These farms typically have better equipment and bring in more profit (Your Article Library). Last is shifting agriculture, which deteriorates soil quickly and requires clear cutting forests (Your Article Library). Even though the majority of India's land is farmable, 60.5 percent (CIA World Factbook), production rates are significantly lower than other leading countries in part because the typical farmer owns less than 2 hectares for farming (First Post). Because farmers with small family farms do not pull in much profit, they cannot afford new machinery or education to further their ability to farm efficiently (Quora). India is a country with vast natural resources and geographic diversity. India's farmland is plentiful with 52.8 percent of the land being arable and 3.5 percent being used for permanent pastures (CIA World Factbook).

In order for India to become a mass producer of food for themselves and the world, India's water supply has to be carefully maintained and restored. Water scarcity impacts agriculture production dramatically. If the farmers do not have the ability to water their crops, they will not have any means to properly support themselves. Crops like nuts and livestock take a huge amount of water (Take Apart). 2,000 gallons of water are used to produce one gallon of milk (Green Optimistic). To ignore these needs would be to deny a farmer's survival. This affects not only the farmers but also their communities and the wider population of India. Approximately 5 percent of India's population of 1.25 billion does not have access to sanitation facilities (The Water Project). Communities without access to safe water generally do not have the ability to help themselves or each other. Without access, people will collect water from dirty water sources like rivers or ponds. This practice is made necessary in part because of the high cost of buying clean water

from tankers, which would consume the bulk of their daily earning capacity (Wall Street Journal). This limits their resources for buying other necessary items and supplies like food and shelter. Many rural communities will drill wells to access groundwater, and while this helps communities in the short term, it only furthers the problem in the long run by depleting the water table (The Water Project).

In 2009 NASA reported that satellite images showed a decrease in groundwater resources in northern India's irrigated fields. Drilling deeper for water only worsened the problem creating a vicious cycle (The NY Times). One can clearly see the difference in water scarcity in different parts of India by observing the satellite images of the northern and southern climates. Some places have an abundance of water and do not manage for sustainability, while other places have so little water that it is the women's main job to collect water (Reset). The cities that have an abundance of water tend to let water collect in potholes or other untended areas, which leads to the spread of waterborne diseases (Reset). These trends of water mismanagement and pollution point towards India becoming a water scarce country by 2025 (Times of India).

Even communities on the banks of the Ganges River do not have a sustainable source of clean water. Effluents, sewage, and dead bodies float in the country's holiest river (BBC). The Ganges has provided water for communities for centuries; over 500 million Indians rely on the Ganges for wash water, drinking water, and water for their crops (Reset). If the Ganges continues to be polluted at this rate, alongside other rivers, even more families will be unable to survive on its banks.

In addition to having rapidly depleting sources of water, India's population continues to grow – projected to reach 1.6 billion by the year 2050 (The Water Project). Population growth will create additional strain on India's already scarce and mismanaged resources. The combination of shrinking water supply and an ever-growing population will most definitely prove to be too much without a change. Aquifers are 85 percent of the country's source of drinking water, but 56 percent of the country's aquifers levels are falling (The Wall Street Journal). This is due in part to climate change, which has already started to reduce India's water supply. Monsoon season is becoming less and less predictable; fluctuations can lead to extreme drought (BBC). Only improving the quality and quantity of water is insufficient. India must also correct the disparity in access between its rural and urban citizens (The Water Project). All people need water and no one should be ignored regardless of where they live in a country.

By resolving, or at least beginning to change India's water crisis, many aspects of both an urban Indian's and a rural Indian's life could improve. The rate of water borne diseases could decrease (Reset) in urban areas by addressing water management systems and in rural areas by addressing the need for clean natural water sources. As reported by the United Nations, over 3 million people in the world are killed by water borne diseases each year. In India specifically, over 100,000 people die annually (Reset). Tending to contaminated rivers, groundwater sources, and general supply of water would reduce the number dying and increase the quality of life for all. Sustainable water would also contribute to farming, allowing farmers to know how much they could plant responsibly and afford to plant. By giving farmers the means to have enough water, farmers could engage in more sustainable and long-term profitable farming – generating more food and more income.

Climate change is dramatically altering India's water supplies. This likely to continue. For example, the 1,000-year-old Lake Upper has decreased from 15 square miles to 2 square miles. This lake is a primary water resource for 2 million people (Natural News). Monsoon rainfall levels have been decreasing since the 1950's and monsoon season is becoming more and more sporadic (World Bank). Dry seasons are predicted to become drier, and wet seasons are predicted to become wetter – throwing off the balance, which had sustained India for millennia (World Bank). A dramatic change in monsoon season will push parts of India into extreme drought and other parts into extreme flooding (World Bank). These droughts would not only interfere with agriculture, but with drinking water supply as well (World Bank). Thousands of people could be left without a source of water or without a sustainable source of food (World Bank).

Not only does climate change threaten India's already delicate water situation, population growth does too. "Populations are dense, resources are dwindling, and aspirations are high. This is where the conflict will be."- Pulitzer Center. As India's population continues to rapidly grow, experts are predicting that in 2050 India's population will stabilize at 1.6 billion people (Pulitzer Center). Those 1.6 billion people will all be competing for resources, including water. Families living in the slums are already fighting over control of water sources. Some conflicts have even escalated to murder. "It was in one such unregistered slum that the Malviya family drilled a hole into a municipal water pipe, and traveled there shortly before the water began flowing one night, to collect the liquid in whatever containers they could get their hands on. The family was confronted by a group of neighbors, including a local man named Dinu who accused them of blocking the pipe and cutting off water farther down the hill. Dinu slapped Gyarasi Malviya, and when her son Raju tried to interfere, one of the people gathered drew a sword. In the ensuing clash, all the Malvijas were hacked to death" (Pulitzer Center). Water scarcity is already a dire issue and will only worsen, as more people have to compete for water. Even if the government recognizes these problems it is difficult for them to address them as many slums are built illegally. Millions of people live without sustainable solutions and live in fear of being evicted (Feeding the Cities).

In addition to population growth and climate, India faces water pollution as well. The Guardian states that half of India's rivers are polluted, jumping from 121 rivers to 274 in the short span of five years. A considerable amount of this pollution stems from untreated sewage that is deposited into water sources (The Guardian). Up to 80 percent or more of India's sewage is left untreated, and flows into the country's rivers (Huffington Post). A 2011 survey states that out of 8,000 towns only 160, or 2.25 percent of the towns, had sewage systems and a sewage treatment plant (Huffington Post). Out of the world's 20 most polluted cities, 13, or 65 percent, are in India – both for water pollution and air pollution (The Guardian).

While it is widely accepted and known that India's water scarcity is an overwhelming problem, there is no known magic solution. There is however, a combination of known practices that will be needed to start India down the road of recovery. In cities, for example, community rainwater collection efforts could replace water tankers if implemented properly. Organizations like WaterAid and RainCatcher have already started to help communities in need of rainwater collection (WaterAid). Although both organizations have mostly worked in rural areas, WaterAid in rural India and RainCatcher working in rural Africa, their practices could be expanded to urban areas as well (RainCatcher). In urban areas, some communities already have gutters or are much more likely to be able to be fitted with gutters. This would greatly help the process of creating a rainwater collection system. Gutters can be made or bought by communities. Funding is the largest challenge to this work. WaterAid, an organization that helps communities to become water sufficient, could be asked to help provide gutters or gutter materials. Organizations like Kiva, a micro lending system, could also be a resource that could help provide the means to buy materials (Kiva).

RainCatcher would be asked to provide the actual rain barrels. RainCatcher has worked in Africa, but has the resources necessary to help India as well. Large rain barrels with included filters would be of great help to both rural and urban communities (RainCatcher). The built in filtration system is able to filter both bacteria and sediment – providing communities with water that is much more sanitary than what they currently have access to (RainCatcher). Even areas like Jaisalmer with very low average rainfall could benefit from rain harvesting as 6,000 gallons can be harvested for every one inch of rainfall per 1,000 square feet of roofing (Rain Barrel Guide). If 6,000 gallons were divided by 365 gallons per person, one gallon per day, 16 people would have enough water for an entire year (Modern Survival Blog). While this would not be a one size fits all solution, it could provide areas with no access to water tankers safe, clean water. By placing a rain barrel on every corner of a city block, water would become accessible and safe – leading to less violence within urban areas and free, safe water. In rural areas, three or four rain barrels could provide the people with safe drinking water and free up their other water sources to help with farming (RainCatcher and The Miracle Water Village). The issue of who would control access to the shared barrels is prominent, but hopefully would lessen after a few years. Rural areas with little rainfall

and no other access to water would need to become extremely conscious of their water usage, agreeing to take care of each other by limiting water use. Urban areas would perhaps need a more complex solution for a short period as urban areas are somewhat less community driven. Ultimately it would be best for the communities to create a culture of respect and caring so that they could effectively manage water usage on their own.

Drip irrigation farming could be a potential system to conserve water while watering crops and cutting back on how much labor needs to be invested (The Miracle Water Village). Drip irrigation is suitable for most row crops like soft fruits and vegetables, however drip irrigation can also be used for tree and vine crops as well (FAO). Pros for drip irrigation include: less disease in plants because leaves remain dry, sprinkler systems can use as much as twice the water as drip irrigation systems do, and labor and operating costs are considerably low. However drip irrigation farming, like all systems, is not perfect. Cons include: no frost protection, higher initial investment costs, and water filtration is needed (Penn State Extension). Again a combination of micro lending organizations like Kiva, the national government, and international involvement like WaterAid could aid rural communities in their ability to farm more efficiently.

Another potential solution for some rural areas is contour trench farming. A process in which shallow trenches are dug into the side of a hill to capture water. These trenches are dug longitudinally around the hill and trees are planted directly after each trench. The trees are watered from the rainfall, and draw water from the trenches. This process, besides creating sustainable environments for orchards also refills the water table (The Miracle Water Village). Contour trench farming requires no extra materials and could be used in many parts of India, as the hills do not need to be extremely steep (The Miracle Water Village). Communities that have already started to use contour trench farming could help their neighbors get started and international organizations could aid in gathering of materials in partnership with national and local governments. This would create a network of knowledge as well as bringing professionals to teach the community about sustainable farming.

A combination of the three solutions above: rain harvesting, drip irrigation, and contour trench farming would provide rural areas with drinking water and farming water and would provide urban areas with clean drinking water. However this does not solve India's sanitation problems. In regards to cleaner natural water sources, the best solution is to fit every village with proper bathrooms of some sort (WaterAid). WaterAid has already provided some Indian communities with the necessary resources to build bathrooms and provide clean water in the following 11 states of India: Uttar Pradesh, Bihar, Jharkhand, Odisha, Madhya Pradesh, Chhattisgarh, Telangana, Andhra Pradesh, Karnataka, Delhi, and Rajasthan (WaterAid). Depending on the community and circumstances, different designs are needed (WaterAid). Household bathrooms are generally easier to build and require less community organization. This may be where most rural communities start (WaterAid). Composting toilets and facilities could also be extremely useful to rural areas. A design in which waste is left until safe to use as fertilizer could aid areas without fertile soil – providing a safe way to dispose of human waste and helping to grow crops (WaterAid). Community composting systems require less individual work, but more communication and organization. Each design has its own benefits and drawbacks, such as cost, level of organization, and initial investment (WaterAid).

India is a large complex country filled with many nuanced people all in need of water. Each family situation is slightly different. Urban and rural areas both need water in drastically different ways. Every person and situation needs something new. Fortunately each person brings different skills and experiences to the world table. The mother of eight growing her own food in an urban farm brings wisdom that the grandfather in a remote village could not bring. And he brings knowledge that she could not. By deeply listening to each problem and trying to address it in a meaningful way, India is more likely to help its people. The people of India are in desperate need of a solution, and luckily the world has much to give. Global organizations and generous people of the world are ready to send help as soon as the opportunity

arises. A world of water will exist for India as soon as we help each other. There is no reason that India, or any other country, should be food or water scarce as long as we strive for creative and sustainable solutions. While India, and truly the whole world, is facing climate change and population growth, there is still enough water to go around as long as we capture each opportunity to help each other. As Benjamin Franklin said, "When the well is dry, we know the worth of water" (Goodreads). Now that our well is dry and we now know the worth of water, we must think creatively, reach out to each other, and build a better world.

## Works Cited

“Access to electricity (% of population).” *The World Bank*, data.worldbank.org/indicator/EG.ELC.ACCS.ZS?end=2012&locations=IN&start=1990&view=chart. Accessed 18 Jan. 2017.

Agarwal, Vibhuti. “Indians Have the Worst Access to Safe Drinking Water in the World.” *Wall Street Journal*, blogs.wsj.com/indiarealtime/2016/03/22/indians-have-the-worst-access-to-safe-drinking-water-in-the-world/. Accessed 24 Jan. 2017.

“The Average Gallons Of Water People Consume Each Day.” *Modern Survival Blog*, modernsurvivalblog.com/preps/the-average-gallons-of-water-people-consume-each-day/. Accessed 27 Feb. 2017.

“Benjamin Franklin > Quotes > Quotable Quote.” *Goodreads*, www.goodreads.com/quotes/53013-when-the-well-is-dry-we-know-the-worth-of. Accessed 1 Mar. 2017.

*Biodiversity International*. www.biodiversityinternational.org/about-us/where-we-work/central-and-south-asia/. Accessed 7 Feb. 2017.

Biswas, Soutik. “Is India facing its worst-ever water crisis?” *BBC*, 27 Mar. 2016, www.bbc.com/news/world-asia-india-35888535. Accessed 24 Jan. 2017.

Chabba, Ajay Pal Singh. “Water-Borne Diseases in India.” 31 May 2015, en.reset.org/blog/water-borne-diseases-india. Accessed 25 Jan. 2017. Manuscript.

“Chapter 6 Drop Irrigation.” *FAO*, www.fao.org/docrep/s8684e/s8684e07.htm. Accessed 27 Feb. 2017.

“CIA World Factbook India.” *CIA World Factbook*, CIA, www.cia.gov/library/publications/resources/the-world-factbook/geos/in.html. Accessed 6 Jan. 2017.

“Climate Change Response Strategies for Agriculture: Challenges and Opportunities for the 21st Century.” *FAO*, www.fao.org/fileadmin/templates/em2009/docs/World\_Bank\_\_2008c\_.pdf. Accessed 31 Jan. 2017. Working paper.

“Delivering Services.” *Water Aid*, www.wateraid.org/what-we-do/our-approach/technologies. Accessed 10 Feb. 2017.

The Editorial Board. “India’s Water Crisis.” *NY Times*, www.nytimes.com/2016/05/04/opinion/indias-water-crisis.html?\_r=0.

“Global Food Security Index India.” *Global Food Security Index*, foodsecurityindex.eiu.com/Country/Details#India. Accessed 6 Jan. 2017.

“Global Warming Forecasts - 2025.” *Global Warming Forecasts*, www.global-warming-forecasts.com/2025-climate-change-global-warming-2025.php. Accessed 1 Feb. 2017.

“Half of India’s rivers are polluted, says government report.” *The Guardian*, [www.theguardian.com/world/2015/apr/07/half-india-rivers-polluted-new-government-report](http://www.theguardian.com/world/2015/apr/07/half-india-rivers-polluted-new-government-report). Accessed 1 Feb. 2017.

“Helping India Combat Persistently High Rates of Malnutrition.” *World Bank*, [www.worldbank.org/en/news/feature/2013/05/13/helping-india-combat-persistently-high-rates-of-malnutrition](http://www.worldbank.org/en/news/feature/2013/05/13/helping-india-combat-persistently-high-rates-of-malnutrition). Accessed 1 Mar. 2017.

“Holy Cow! Crops That Use Even More Water than Almonds.” *Take Apart*, [www.takepart.com/article/2015/05/11/cows-not-almonds-are-biggest-water-users](http://www.takepart.com/article/2015/05/11/cows-not-almonds-are-biggest-water-users). Accessed 1 Mar. 2017.

“How Much Water Can You Collect in Rain Barrels During a Rainfall.” *Rain Barrel Guide*, [www.rainbarrelguide.com/how-much-water-can-you-collect-in-rain-barrels-during-a-rainfall/](http://www.rainbarrelguide.com/how-much-water-can-you-collect-in-rain-barrels-during-a-rainfall/). Accessed 27 Feb. 2017.

“India.” *CultureGrams*. *CultureGrams*, [online.culturegrams.com.ref.ualibrary.org/world/world\\_country.php?cid=75&cn=India](http://online.culturegrams.com.ref.ualibrary.org/world/world_country.php?cid=75&cn=India). Accessed 9 Jan. 2017.

“India.” *EveryCulture*, [www.everyculture.com/Ge-It/India.html](http://www.everyculture.com/Ge-It/India.html). Accessed 9 Jan. 2017.

“India: Climate Change Impacts.” *World Bank*, [www.worldbank.org/en/news/feature/2013/06/19/india-climate-change-impacts](http://www.worldbank.org/en/news/feature/2013/06/19/india-climate-change-impacts). Accessed 1 Feb. 2017.

“India: Climate Change Impacts.” *World Bank*, [www.worldbank.org/en/news/feature/2013/06/19/india-climate-change-impacts](http://www.worldbank.org/en/news/feature/2013/06/19/india-climate-change-impacts).

“India Plants 50 Million Trees in One Day, Smashing World Record.” *National Geographic*, [news.nationalgeographic.com/2016/07/india-plants-50-million-trees-uttar-pradesh-reforestation/](http://news.nationalgeographic.com/2016/07/india-plants-50-million-trees-uttar-pradesh-reforestation/). Accessed 6 Jan. 2017.

“India Set to Become Water Scarce Country by 2025: Report.” *Times of India*, 24 May 2015, [timesofindia.indiatimes.com/home/environment/developmental-issues/India-set-to-become-water-scarce-country-by-2025-Report/articleshow/47403894.cms](http://timesofindia.indiatimes.com/home/environment/developmental-issues/India-set-to-become-water-scarce-country-by-2025-Report/articleshow/47403894.cms). Accessed 25 Jan. 2017.

“Is Milk a Problem for the Environment?” *Green Optimistic*, [www.greenoptimistic.com/milk-problem-environment-20140908/#.WLbXkRIrL0E](http://www.greenoptimistic.com/milk-problem-environment-20140908/#.WLbXkRIrL0E).

Karanja, Nancy, and Mary Njenga. *Feeding the Cities*. 2011.

Kaul, Vivek. “India has enough land for farming but there are other bigger issues to worry about.” *First Post*, 6 Jan. 2015, [www.firstpost.com/business/india-enough-land-farming-bigger-issues-worry-2032327.html](http://www.firstpost.com/business/india-enough-land-farming-bigger-issues-worry-2032327.html). Accessed 18 Jan. 2017.

Kiva Loans. *Kiva*, [www.kiva.org/](http://www.kiva.org/). Accessed 10 Feb. 2017.

“Main Effects of Population Explosion in India.” *Economics Discussions*, [www.economicsdiscussion.net/articles/main-effects-of-population-explosion-in-india/2254](http://www.economicsdiscussion.net/articles/main-effects-of-population-explosion-in-india/2254). Accessed 31 Jan. 2017.



Mekonnen, M. M. "The Green, Blue and Grey Water Footprint of Crops and Derived Crop Products." [waterfootprint.org/media/downloads/Report47-WaterFootprintCrops-Vol1.pdf](http://waterfootprint.org/media/downloads/Report47-WaterFootprintCrops-Vol1.pdf). Manuscript.

"THE MIRACLE WATER VILLAGE." *YouTube*, [www.youtube.com/watch?v=9hmkgn0nBgk](http://www.youtube.com/watch?v=9hmkgn0nBgk). Accessed 6 Feb. 2017.

PennState Extension. "Drip Irrigation for Vegetable Production." *extension.psu.edu*, [extension.psu.edu/business/ag-alternatives/horticulture/horticultural-production-options/drip-irrigation-for-vegetable-production](http://extension.psu.edu/business/ag-alternatives/horticulture/horticultural-production-options/drip-irrigation-for-vegetable-production). Accessed 27 Feb. 2017.

Presse, Agence. "India River Pollution: 80 Percent of Indian Sewage Flows Untreated into Country's Rivers." *Huffington Post*, [www.huffingtonpost.com/2013/03/05/india-river-pollution-sewage\\_n\\_2810213.html](http://www.huffingtonpost.com/2013/03/05/india-river-pollution-sewage_n_2810213.html). Accessed 1 Feb. 2017.

"Rain Barrel System 220 Gallons SHTF Water Storage Prepper Survivalist how to build make." *Urban Survival Site*, [urbansurvivalsite.com/220-gallon-rain-barrel-system/](http://urbansurvivalsite.com/220-gallon-rain-barrel-system/). Accessed 6 Feb. 2017.

"rain water harvesting method i.e. (Continuous Contour Trenches)." *YouTube*, [www.youtube.com/watch?v=RGa85nM29es](http://www.youtube.com/watch?v=RGa85nM29es). Accessed 6 Feb. 2017.

Sankaran, Lavanya. "Caste Is Not Past." *NY Times*, 15 June 2013, [www.nytimes.com/2013/06/16/opinion/sunday/caste-is-not-past.html](http://www.nytimes.com/2013/06/16/opinion/sunday/caste-is-not-past.html). Accessed 18 Jan. 2017.

Sentlinger, Katherine. "Water Scarcity and Agriculture." *The Water Project*, [thewaterproject.org/water-scarcity/water-scarcity-and-agriculture](http://thewaterproject.org/water-scarcity/water-scarcity-and-agriculture). Accessed 24 Jan. 2017.

Snyder, Shannyn. "WATER IN CRISIS - INDIA." *The Water Project*, [thewaterproject.org/water-crisis/water-in-crisis-india](http://thewaterproject.org/water-crisis/water-in-crisis-india).

"3 Major Types of Farming Practices Seen in India." *Your Article Library*, [www.yourarticlelibrary.com/farming/3-major-types-of-farming-practices-seen-in-india/20983/](http://www.yourarticlelibrary.com/farming/3-major-types-of-farming-practices-seen-in-india/20983/). Accessed 28 Feb. 2017.

"Water Wars Erupt in India as Drought Threatens Population Survival." *Natural News*, [www.naturalnews.com/027490\\_water\\_wars\\_India.html](http://www.naturalnews.com/027490_water_wars_India.html).

"What Are Hindu Dietary Restrictions?" *Reference*, [www.reference.com/world-view/hindu-dietary-restrictions-f071a0df09e3a0ed](http://www.reference.com/world-view/hindu-dietary-restrictions-f071a0df09e3a0ed). Accessed 28 Feb. 2017.

"What Are the Biggest Problems Faced by Farmers in India? What Problems Can Be Solved through Use of Technology?" *Quora*, [www.quora.com/What-are-the-biggest-problems-faced-by-farmers-in-India-What-problems-can-be-solved-through-use-of-technology](http://www.quora.com/What-are-the-biggest-problems-faced-by-farmers-in-India-What-problems-can-be-solved-through-use-of-technology). Accessed 1 Mar. 2017.

"When the Water Tap Is a Tanker Truck." *Pulitzer Center*, [pulitzercenter.org/articles/population-water-scarcity-delhi-tanker-truck](http://pulitzercenter.org/articles/population-water-scarcity-delhi-tanker-truck).

*World Bank*. [www.worldbank.org/en/region/sar/publication/urbanization-south-asia-cities](http://www.worldbank.org/en/region/sar/publication/urbanization-south-asia-cities). Accessed 31 Jan. 2017.