Pavithra Premsai
Woodbury High
School Woodbury,
Minnesota India, Water
Scarcity

India: Without any to drink, will India sink?

On the surface, India is a multifaceted nation that drips with cultural diversity, from it's 22 major languages and over 720 dialects to its infamous architecture and its astounding customs and traditions. Due to this vast cultural diversity, India has become one of the world's largest cultural melting pots where numerous cultures and religions have come together to coexist peacefully and created the India that the world recognizes today. However, the country suffers from a life-threatening humanitarian catastrophe—one that has no regard or sympathy for caste, religion, gender, or age; one that threatens a basic need that 66.66% of the global population takes for granted (Keenan). According to the World Bank, India houses 18% of the global population, but only owns 4% of the global water resources (The World Bank), which causes the children of 100 million families to live without water at home (India Together). Furthermore, an estimated 21% of communicable diseases in India are water-related ("Water In India"), with more than 500 children under the age of five dying each day from diarrhea alone (The World Bank). Water accessibility in regions with higher poverty rates could raise the standard of living for those who obtain these resources for themselves, by providing these regions with the resources they need for their day-to-day lives. These individuals can then utilize that time to get a proper education or find a job, instead of trying to meet their daily needs. To battle the water crisis in India, a course of action must be executed nationwide, spanning from rundown, rural areas, to thriving, industrial urban sprawls. Implementing an incentive program that administers water consumption trackers and rainwater harvesting systems throughout the country and educating the general public on the importance of this issue and sources that contribute to the escalating conditions are solutions in this plan of action regarding ending the water crisis in India.

India is the 7th largest country in the world by landmass and the 2nd most populous country, at an astounding population of 1,377,566,886 (as of Monday, April 27, 2020, "India Population"). In addition, India has the largest democracy in the world, consisting of a federal parliamentary republic that is governed under the Constitution of India. As of 2018, 65.97% of the subcontinent's population is rural, making 34.03% of the population urban ("India - Rural Population"). An estimated 30% of urban and 90% of rural households still depend completely on untreated surface or groundwater. India has 1,891,761 square kilometers of cultivated land, with its major crops and exports being rice, cotton, sugar, beef (buffalo), soybeans, guar gum, corn, and wheat (USDA Foreign Agricultural Service). The average size of farmland in India is less than 2 hectares, which is sharply declining each year, and can be compared to the average farm size in the United States, which is at 179.276 hectares (USDA 5).

India's distinction is also expressed in its various climatic regions, its wide range of weather conditions,

and its region-specific topography—arid deserts in the West, alpine tundra and glaciers in the North, and humid tropical regions supporting rainforests in the Southwest and the island territories. Its eight major rivers, which are the Brahmaputra River, Cauvery River, Ganga River, Godavari River, Indus River, Krishna River, Mahanadi River, and the Yamuna River, constitute a majority of the nation's water resources. The temperature often exceeds 40°C (104°F) in most regions during the summer and stays above 10 °C (50 °F) in winter. India's average annual rainfall is 300–650 millimeters (11.8–25.6 inches),
but this number can prove to be extremely misleading, as the wettest place in the world, Mawsynram, is also located in India, which receives about 11,871 millimeters (467.3 inches) of rainfall each year (Sawe).

The average household size in India is 4.8 people ("Household Size and Composition" 18). According to the Population Reference Bureau, only an estimated 24 million out of 192 million households have a proper sewage connection, and 78% of rural households lack a latrine in the house, while less than half of urban households have a flush toilet. People in rural areas live in extremely simple, self-constructed housing, while those in urban areas live in high rise apartments. The majority of rural households also have readily available access to amenities, such as electricity and internet connection. However, the widespread availability of electricity is not always reliable and power outages are frequent. Nevertheless, even these amenities are exceedingly more attainable than basic healthcare.

A typical diet varies from region to region, though generally speaking, the frequency of consumption of meat is low─a few times a month, and the traditional cuisine is rich in fiber, carbohydrates, and the necessary vitamins and minerals from fruits, vegetables, pulses, and rice that are bought from local markets. Although a majority of households in both urban and rural areas use LPG (liquid petroleum gas) for cooking, it is still common to use firewood in rural areas, making food preparation difficult and time-consuming.

The literacy rate in India is 74.04% ("State of Literacy" 114) and has been on an upward trend since the nation gained its independence on August 15, 1947. According to Forbes.com, "India has capitalized on its large educated English-speaking population to become a major exporter of information technology services, business outsourcing services, and software workers." The average wage in India from 2011-2012 was about 247 INR ($3.28) per day, and the average wage of casual workers was about 143 INR ($1.90) per day ("India Wage Report" xiii). Only highly skilled professionals and a limited number of workers on a consistent payroll (mostly centralized in urban areas) earn significantly higher than average wages. Daily wages in urban areas remain more than twice as high as wages in rural areas.

Challenges that typical households face are improving the overall access and affordability of healthcare services, the lack of job availability, and sustainability problems, such as waste management, urban congestion, and pollution, as 9 out of the 10 most air polluted places on the planet are all located in India. All of these barriers can be traced back to rapid urbanization without the appropriate resources or space.

India has the largest national urban transformation of the 21st century, and this has undoubtedly caused several problems including adequate housing and infrastructure and addressing slums. Fostering a smooth and efficient urbanization process will continue to be a challenge, but it can be attained through the implementation of a strategic policy that requires national, state, and local governments to cooperate, communicate, and collaborate. India will need to enforce a set of policies that caters to several needs, such as effectively administered cities with high-quality services, a sanitary water supply that is both sustainable and affordable, an improved public transportation system, a proper nationwide sewage connection, a more accessible public education system, and affordable health care. With the combined forces of these policies that procure vital services for the development of the nation's economy, India can ensure a better quality of living and a consistent growth pattern for generations to come.

The water crisis in India has only been amplified by rapid urbanization which depletes water reservoirs and groundwater levels at a remarkably abrupt rate. One in four cities worldwide (with populations greater than 750,000) are water-stressed, with the ratio of water usage to availability being over 40%, and Indian cities fare especially worse. Currently in India, approximately 163 million people lack access to
safe drinking water and 210 million people lack access to improved basic sanitation (Ali and Dkhar). In 2018, more than 13 million people were diagnosed with four major water-borne diseases (cholera, acute diarrhoeal diseases (ADD), typhoid, and viral hepatitis), claiming the lives of 2,439 individuals (Kumar).

While India’s situation is predicted to deteriorate faster than ever before, a course of action must be executed on a national level, starting in a single city, spreading to a district, a state, and in time, the entire nation. At its earliest stages, implementing an incentive program that administers water consumption trackers and rainwater harvesting systems in every corner of India will address the urgency of this issue and provide the data that is necessary to brainstorm more innovative solutions in the future. Another crucial precaution is educating the general population on the relevance of this issue and its contributing factors, and how to raise awareness and postpone the effects of complete water depletion to protect India’s future.

The first phase of this plan of action would be to implement a rainwater harvesting system in every corner of India; from schools to factories to housing facilities, all buildings should be equipped with some sort of mechanism to accumulate and store rainwater. Rainwater harvesting has been embedded in traditional Indian practices of agriculture and construction for over 4,000 years, where it was used for irrigation and drinking water by both humans and livestock. According to the Centre for Science and Environment, it is already mandatory for a majority of India’s states and union territories to harvest rainwater in both public and private buildings. However, in the name of urbanization and the adoption of Western practices, rainwater harvesting was highly neglected, especially in metropolitan areas, and problematic water management policies were put into place, leading to the depletion of groundwater and the destruction of natural reservoirs. In 2015, the city of Chennai was devastated with heavy floods, with more than 500 casualties, due to unusual amounts of rain during its winter season. In the aftermath of the floods, all of

the excess water that filled up roads, houses, and buildings all slowly drained back into the ocean, and only a small percent ended up in the storm sewers, which then flowed into treatment plants or other reservoirs.

Widespread installation of this system would replenish the nutrients in the soil, help improve the quality of groundwater, reduce soil erosion, increase the fertility of the soil, and prevent wells from drying up. There are several techniques that can be used to harvest rainwater, all of them varying from simple and straightforward to complex systems designed for factories and industrial buildings, and the amount of rainwater that can be harvested is dependent on the intensity of rainfall, the system's location, and the efficiency of the system. These systems generally harvest rainwater from the roof or the ground and can be inexpensive to install—even free in some cases—as many of them can be locally sourced. Simple systems, such as surface runoff harvesting (streams that are redirected to different reservoirs that are built on the surface or underground), rooftop rainwater harvesting (a container is placed underneath the roof level and pipes are used to direct the rainwater into the containers), recharge pits (pits filled with sand, boulders, and gravel, which act as natural filters, used to accumulate and store rainwater), are highly efficient in urban areas and can be implemented anywhere with available space, such as high rise apartments, schools, and other public buildings. More traditional methods of rainwater harvesting, such as the use of taankas (large, cylindrical, underground wells that catch and store rainwater), talabs (natural or man-made reservoirs), and johads (small dams, usually constructed in an area that has a naturally high elevation on three sides and excavated soil is used to build a wall on the fourth side), prove to be highly efficient, especially in rural areas that don't receive much rainfall.

Simultaneous to phase one of this course of action, an incentive program that encourages the use of water consumption trackers, which analyze monthly water consumption rates and provide data to users, must be
encouraged by the government for both the general public and industrial companies to employ in their day-to-day life. The trackers can be installed in any building, and provide detailed information on overall usage of water, long-term trends of consumption, and have limits on the maximum amount of water consumption which is determined by the region you live in, the number of members in your household, how much rainfall your region receives, and other circumstances. Industrial companies and other businesses that exploit higher amounts of water can also utilize these trackers, with a different set of guidelines. A website would act as a tool, and users could make accounts that are tied to a valid identification source, such as an Aadhar card (a unique identification card that residents or passport holders of India can obtain, based on their biometric and demographic data), where users can log in, to view their monthly consumption data. If they meet or go under the maximum limit, users can then choose from a list of incentives, such as a discounted utility bill, or an increased amount of food that can be allotted to them through their Ration card (a card issued by state governments in India to households that are eligible to purchase subsidized food grain from the Public Distribution System, under the National Food Security Act), or other possible incentives, which would motivate users and encourage them to stay within the maximum limit in the future. The government can instill policies or laws that result in a monetary fine or other consequence if users go over the maximum limit.

The second phase of this course of action is to focus on heavily educating the general population of India

on the importance of this issue and its contributing factors. A few examples of possible topics would be the importance of native plants and trees, rainwater harvesting, natural water filtration methods, the dangers of pollution, the effects of commercial monocropping and chemical farming, the significance of minimizing water consumption, and how the use of pesticides, hybrid seeds, and artificial fertilizers impact groundwater. Government funds will be set aside for research on more efficient desalination plants, educational programs that visit schools and corporate companies and educate them on what they can do to be more sustainable, and the re-establishment of forests, wetlands, and other reservoirs. The government would also fund research on wastewater recycling plants, such as Singapore's NEWater, where wastewater is purified using dual-membrane and ultraviolet technologies, in addition to conventional water treatment processes. They should also encourage the general public to donate to different humanitarian charities if they are able, where the charities have a 100% transparency policy, and all of the donations would go directly towards facilitating water preservation methods, instead of it being used to run the program itself. These humanitarian charities would focus on making people become self-sufficient and inspire them to practice more sustainable methods.

To aid in the funding and organization of this course of action, the government of India could establish a unique national agency, which would be responsible for the distribution of funds and the execution of the different phases. At its commencement, a law that mandates all newly constructed buildings and new renovations to pre-existing buildings to have water consumption trackers and a rainwater harvesting system could be passed. In order to fund these measures, the Indian government could provide grants to secondary companies they partner with, such as soft drink companies, to sell subsidized containers that would otherwise end up in the landfills to households that cannot afford a rainwater harvesting system otherwise, and accept donations from the public, which would encourage them to play an active role in solving this issue. A similar program has been constructed in Singapore by PUB, Singapore's National Water Agency, and during its relaunch in 2016, it required a great deal of investments in its early phases. Despite this potential obstacle, Singapore's government continues to be hopeful and aims to provide "Water for Every One" and have "Everyone for Water" (PUB). Since this course of action's ultimate goal is to minimize water usage as much as possible, the government of India would lose some money over time due to the revenue from water bills being lowered; however, it would be reimbursed by the reduction of carbon emissions in the future, so it would eventually become self-sustainable. Additionally, young girls in India are often burdened with the responsibility of handling household chores such as collecting water, leading to them being forced to sacrifice their education. Having access to clean water would not only mean that more girls will get an education that their male counterparts already have, but it would also lead to an eventual increase of people in the workforce, therefore improving the economy.

This course of action not only serves as a solution to India's water crisis, but also shows promise in easing other problematic issues, such as climate volatility, sustainable agriculture, waste production, malnutrition, infectious diseases, education, and infrastructure. Climate volatility causes rainfall to occur in two types of extremes: long, harsh dry spells or flooding. These harsh dry spells result in droughts, leading to forest fires. The proper maintenance of reservoirs significantly decreases that risk, mitigating the consequence of droughts. Increasing the efficiency of water consumption will decrease soil erosion, improve soil quality, and result in an increased amount of water which can then be used to increase agricultural production, and in turn, assisting in ending hunger and malnutrition. Investing in wastewater

recycling plants will greatly reduce the amount of waste production, and will help increase the amount of water reservoirs. If the public is educated about water pollution, they will be more mindful of the environmental repercussions, leading to the improvement of its quality, which in turn lessens the chance of acquiring infectious diseases such as Escherichia Coli, Typhoid, and Giardia. In addition, water accessibility in regions with large poverty rates will improve, saving them time, which individuals can then utilize by getting a proper education or finding jobs, which will improve India's infrastructure and aid in the termination of poverty.

Overall, it can be concluded that despite India's long and strenuous battle with its water crisis, following this course of action by implementing an incentive program that administers water consumption trackers and rainwater harvesting systems throughout the country and educating the general public on the importance of this issue and its contributing factors will steer India towards rapid progression resulting in a bright and sustainable future. The first phase of this course of action is to implement a rainwater harvesting system in every corner of India—from schools to factories to housing facilities—all buildings should have some sort of mechanism to accumulate and store rainwater. Alongside phase one of this plan of action, an incentive program that encourages the use of water consumption trackers which analyze monthly water consumption rates and provide that data to users, should be carried out. For these programs to be effective, they must be encouraged by the government for the general public and industrial companies to employ in their day-to-day life. The second phase of this course of action is to focus on heavily educating the general population of India about the importance of this issue and its contributing factors. In order for this plan of action to work in a rapid and efficient manner that can be maintained in the future, the collaboration, communication, and cooperation of local, state, and national governments with the general public are crucial. All parties must be held accountable in any case of violation, and consequences that are deemed fit must be enforced. In addition, restrictions regarding urbanization must be enforced with severe repercussions regarding matters such as deforestation, reservoir maintenance, protection of marshes and wetlands, protection of native species, and restricting carbon emissions. Ultimately, if social, political, and environmental improvements are made within the nation, along with the support of the general public and the government, India will soon rise from the deep end of the water crisis and dive headfirst into a period of prosperity and stability.

Works Cited

Ali, Qazi Syed Wamiq, and Nathaniel B Dkhar. "India's Rampant Urban Water Issues and Challenges." *TERI*, 28 Dec. 2018, www.teriin.org/article/indias-rampant-urban-water-issues-and-challenges.

Countrymeters.info. "India Population." Countrymeters, www.countrymeters.info/en/India.

C., Chandramouli, editor. "State of Literacy." *Provisional Population Totals 2011 : India* , ser. 1, Office of the Registrar General & Census Commissioner, India, 2011, pp. 1–187. 1.

"Farms and Land in Farms 2018 Summary." *United States Department of Agriculture National Agricultural Statistics Service*, Apr. 2019, www.nass.usda.gov/Publications/Todays_Reports/reports/fnlo0419.pdf .

"Helping India Overcome Its Water Woes." *World Bank*, www.worldbank.org/en/news/feature/2019/12/09/solving-water-management-crisis-india .

"Household Size and Composition Around the World 2017." *United Nations*, 2017, www.un.org/en/development/desa/population/publications/pdf/ageing/household_size_and_comp osition_around_the_world_2017_data_booklet.pdf.

"India." *Forbes*, Forbes Magazine, www.forbes.com/places/india/.

"India - Rural Population." India - Rural Population - 1960-2018 Data | 2020 Forecast, www.tradingeconomics.com/india/rural-population-percent-of-total-population-wb-data.html .

"India Together: A Children's Manifesto - 01 April 2004." *India Together: A Children's Manifesto - 01 April 2004*, 1 Apr. 2004, www.indiatogether.org/manifesto-children.

"India Wage Report." *International Labour Organization* , International Labour Organization , 2018, www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---sro-new_delhi/documents/publicatio n/wcms_638305.pdf.

International Agricultural Trade Reports. "India's Agricultural Exports Climb to Record High." India's Agricultural Exports Climb to Record High | USDA Foreign Agricultural Service, www.fas.usda.gov/data/india-s-agricultural-exports-climb-record-high.

Keenan, A. "1 In 3 People Globally Do Not Have Access to Safe Drinking Water – UNICEF, WHO."

World Health Organization, World Health Organization, 18 June 2019, www.who.int/news-room/detail/18-06-2019-1-in-3-people-globally-do-not-have-access-to-safe-drinking-water-unicef-who.

Kumar, Chethan, and Tnn. "Polluted Water Killed 7 Every Day in 2018: India News - Times of India."

The Times of India, TOI, www.timesofindia.indiatimes.com/india/polluted-water-killed-7-every-day-in-2018/articleshow/69996658.cms.

"Laws and Policy." *Centre for Science and Environment*, www.cseindia.org/laws-and-policy--1161.

"Profile - Physical Features." *Know India: National Portal of India*,

www.knowindia.gov.in/profile/physical-features.php.

Pub. "About Us." *PUB, Singapore's National Water Agency*, www.pub.gov.sg/about.

PUB. "Annual Report" 2018/2019. PDF file.

Sawe, Benjamin Elisha. "Wettest Places On Earth By Annual Rainfall." *WorldAtlas*, WorldAtlas, 16 Aug. 2016, www.worldatlas.com/articles/the-ten-wettest-places-in-the-world.html.

"TRADING ECONOMICS: 300.00 INDICATORS: 196 COUNTRIES." *TRADING ECONOMICS | 300.00 INDICATORS | 196 COUNTRIES*, www.tradingeconomics.com/india/rural-population-percent-of-total-population-wb-data.html .

"Urbanization in India." *World Bank*,

www.worldbank.org/en/news/feature/2011/09/22/india-urbanization .

"Water In India - India's Water Crisis & Sanitation Issues In 2019." *Water.org*,

www.water.org/our-impact/india/.

"Waterlife: Improving Access to Safe Drinking Water in India." *The World Bank*, The World Bank, Apr.

2017,
https://openknowledge.worldbank.org/bitstream/handle/10986/27664/115133-WP-P152203-PUBLIC-17-5-2017-12-28-1-WaterlifeCaseApril.pdf?sequence=1&isAllowed=y.