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China, Factor 9: Water and Sanitation

### **China: *Water we to do?***

It's everywhere. In the air, in the clouds, in plants and animals, in every single one of our cells. More than half of our bodies—and two-thirds of the earth—is made up of it. It's water, and it's necessary for life. Because of its importance, one would think that this resource is widely available. Unfortunately, this isn't true: the world's most populous country, China, is struggling to find sources of sanitary water. Incredibly, half of China's population is in need of sanitary drinking water, and nearly two thirds of rural China's population use water contaminated by waste. (Hays c. Web). This is a huge environmental issue that affects not only the Chinese economy, but also the individual families that depend on this water for every aspect of their lives.

#### 1. Rural Everyday Life

Due to the one-child policy introduced in 1979, a typical Chinese family consists of three people: a mother, a father, and a child. Rural Chinese families tend to live in villages of around 1000 people of the same clan or extended family, and therefore most have the same last name (Hays a. Web). Villagers usually live in one-story courtyard houses enclosed by tall walls and flat roofs. People and other animals such as pigs, cows, and chickens compete for space inside (In. Web).

In rural China, families typically own half-acre sized farms (Hays b. Web), and commonly grow rice, wheat, and corn. In fact, China is the world's largest producer and consumer of these field crops (AgrifoodAsia. Web). Many of the agricultural practices used to farm this land have been used for thousands of years. Oxen are still used in some areas to plow the land, and rice paddies are often terraced to decrease erosion and surface runoff (Terraced. Web). Another common practice is surface irrigation (Magistad. Web), where water is dispersed over the surface of a field and directed by furrows on the land. These techniques have created a robust and reliable agricultural system. However, there are still some problems. First, surface irrigation wastes water. Moreover, the recent introduction of fertilizers and pesticides into farming practices has caused various issues. Often, these chemicals are overused while pursuing larger harvests, resulting in soil acidification and spoiled crops (Meng. Web).

#### 2. Major Barriers

Rural Chinese families practice subsistence agriculture, which is when farmers grow enough food for themselves and their families. They sell any small surpluses at local village markets, and buy other things when needed. Although they do make money from their crops, it isn't much, as average income totals at roughly \$3,200 annually (Pierson. Web). Without sufficient incomes, families struggle to afford secondary schooling and medical expenses.

Going to secondary school in rural China is exceedingly difficult. First, half of Chinese children can't attend because they are unable to pass the entrance test. Even if they do get in, many of them can't finish because the cost of schooling is simply too expensive (Kaifeng. Web).

Infrastructure is lacking in rural areas of China. For example, around 80% of medical services in China are located in its cities, often making timely healthcare inaccessible for rural families (Chelala. Web). In addition, access to other basic and essential services is scarce. One of the worst issues is a lack of water, or water scarcity, because it causes unsanitary conditions: estimates show that 20% of rural households do not have sanitary drinking water. Scarcity has

other health consequences as well: for example, without running water, houses typically contain unsanitary squat toilets, which are “dry toilets” (without flushing capacity) that do not treat human waste and are prime gathering spots for flies and other insects. As much as 80% of rural households do not have access to a sanitary lavatory (Chelala. Web)

Water scarcity has also affected the crop success of rural Chinese families, and has set off a huge chain reaction of consequences. Since surface and groundwater water levels are decreasing, and drought has increased in many regions, (Hsu. Web), crop success has decreased due to parching. With fewer crops, rural families earn less money. Without much money, families can't afford other foods at the local market, making it difficult to obtain adequate nutrition.

A nutritional Chinese diet comprises of a balance of *yin*, wet and moist, and *yang*, dry and crisp (Morris. Web). A typical meal consists of lightly steamed or stir-fried vegetables served with rice, noodles, or dumplings (Smith. Web). Unlike Western diets, the Chinese diet views vegetables as main dishes, rather than accompaniments to meat and fish (Morris. Web). Seasonings include garlic, ginger, and soy sauce. Beverages are generally served hot, and include water and tea.

### 3. The Issue

Chinese culture emphasizes clarity and refinement. The traditional Chinese *gongfu* tea ceremony is a perfect example of this emphasis (Traditional. Web). However, the water used to make this tea is anything but clear and refined.

In recent years, nearby factories and mines have been dumping harmful chemicals, such as heavy metals and pollutants, into rivers, lakes, and groundwater. The results of this have been disastrous. Over half of the country's rivers are unsafe for human contact, let alone for drinking or irrigation purposes (Hsu. Web). Lakes across the country are visibly polluted, and ecosystems living in them are struggling to survive. Around 60% of groundwater testing sites were rated as either “poor” or “very poor” in water quality (Larson. Web). Evidently, the environment has steadily become more and more degraded. The pollution is severe, and it is only worsening.

Water pollution has also led to soil pollution. Contaminated groundwater has seeped into the soil and irrigation systems of farms. Now, at least one-fifth of the country's arable land is polluted with chemicals such as cadmium, nickel, and arsenic (Duggan. Web). As a result, crops and livestock are exposed to dangerous amounts of these heavy metals and pollutants, putting China's food supply at risk. For example, over 12 million tons of Chinese grains are contaminated with metals annually. Metals in contaminated grains can often lead to serious health issues. Cadmium, for instance, has been found to cause cancer (Mahr. Web).

### 4. The Need For A Solution

Water scarcity and water pollution in China are huge problems. The World Bank warns that these problems could cause “catastrophic consequences for future generations” (Hays c. Web). As China's population grows, these problems will be even harder to control. Therefore, it's crucial to solve this issue as soon as possible.

Improving this factor would benefit China greatly. It would give people more clean drinking water and clean crops, which would save thousands of lives. Every year in China, 190 million people become ill and 60,000 people die from health issues and illnesses caused by water pollution (Tao and Xin. Web). Decreased medical problems would have great economic benefits for the rural Chinese family. Instead of paying for medical bills, families could start saving money towards education, putting more children in secondary school. Also, families could take steps towards more sanitary lifestyles: for example, by purchasing “composting toilets”, dry

toilets that use decomposition and evaporation to treat human waste, and use little to no water (How. Web). The Chinese diet would also benefit greatly as well. More money would decrease dependence on subsistence farming so that families could afford more diverse, wholesome and nutritional food.

The economic benefits do not end at the family. Other countries depend on China for crops, especially rice, wheat, and corn. After all, China is the world's biggest agricultural producer (Spector and Lubin. Web). With clean water, China would be able to increase production of crops, which would be more profitable. In addition, having clean water would help China save even more money in the process: half of the \$69 billion that China loses to pollution annually is due to water pollution (Hays c. Web).

## 5. The Solution

Although bringing sanitary water back to China will be difficult, it is possible. To achieve this goal, it will be essential to implement the following threefold process:

1. Move factories away from bodies of water
2. Set water restrictions on factories and farms
3. Use more efficient and appropriate water treatment methods

First, moving factories away from bodies of water would reduce the water pollution in China notably. Since factories often dump harmful chemicals into nearby bodies of water, moving them away would ensure that water supplies would not be contaminated further. After all, one third of industrial wastewater is being released into bodies of water without receiving treatment (Refkin and Cray). Also, because the cost of moving established factories is relatively high, China's government could offer factories monetary incentives and government assistance in relocating these buildings. Once relocated, factories could continue business as usual.

Second, setting water restrictions on immovable factories would prevent water from becoming more polluted. In China, factories' environmental impacts have been fairly unregulated, and have had serious consequences (Hsu. Web). Therefore, it is necessary for the Chinese government to require water to be treated by factories that are dumping their wastewater into the environment.

Water restrictions can also be placed on the farms themselves. Restricting farms' water usage would require them to use water more efficiently, since currently, significant amounts of water used for Chinese agriculture is wasted (Magistad. Web). There are various ways to improve water efficiency. Beijing native and businessman Zhu Jun invented a system called "trace irrigation", which cuts down on pests, fungus and weeds, saves a huge amount of water, and doesn't sacrifice crop quality. Trace irrigation is a new underground irrigation system consisting of piping that provides the soil with only the water plants naturally need, and nothing more, resulting in optimum efficiency. So far, there has been great interest in this project, and it has already received several patents. Wuhan, a city in China, has offered Jun land to build a factory. Also, the province of Xinjiang, one of China's driest regions, is currently testing crops grown with this new system. (Magistad. Web). Jun's project is extremely beneficial because it conserves half of the water compared to traditional systems, doesn't use electrical power, and doesn't require a lot of human supervision.

Third, the choice of water cleaning techniques is very important. Currently, water is not being cleaned in China as much as it should be. Therefore, better treatment methods for polluted water need to be reintroduced in rural areas. However, to bring back sanitary water to China effectively, it will be best for China to pick the most suitable treatment methods for its rural, developing

regions. Fortunately, innovative minds around the world have devised suitable promising methods for cleaning water.

Mr. Ramakrishna Mallampati, Associate Professor Suresh Valiyaveetil, and researchers from the National University of Singapore have experimented with cheaper and more accessible water treatment techniques. They have developed a way to purify water with the peels of apples and tomatoes. After careful examinations, both tomato and apple peels have been discovered to cheaply and effectively remove different contaminants in water through natural absorption processes (NUS. Web). This is an ideal solution for contaminated water in China, as apples and tomatoes are commonly grown in China. Additionally, this treatment method would involve using peels, the waste products of fruits, for something beneficial.

Cilantro has also been identified as a water purifier by a research team led by Dr. Douglas Schauer of Ivy Tech Community College (Sifferlin. Web). This method of purification would be especially useful to China since “cilantro grows wild in vast amounts in countries that have problems with heavy metal water pollution,” according to Dr. Schauer. Indeed, cilantro is commonly grown in China, which makes it an ideal choice for detoxification.

These three detoxifying crops could be used to clean water in both small and large-scale applications. Farmers could use them in small-scale applications when simply cleaning their own water on their farms. Farmers could use them in large-scale applications, too, by creating community sites for water purification near their villages and farms. After water purification sites are created, nearby farmers could bring water to massive tubs filled with these crops. Farmers could all provide detoxifying crops, and work together to increase output of safe crops in their region. Because many farmers depend on their crops for their income, it would be in their best interest to come together as a community and cooperatively solve this important problem.

To put this solution into action successfully, it will be vital for China’s government to get involved. Shutting down factories and setting restrictions on both factories and farms will require increased government oversight, which will cost money. The government should motivate farmers and factories to treat their water by instituting tax rewards when farmers and factories treat their water. Otherwise, the government could fine those that don’t protect the environment and use that money towards cleaning water and environmental programs. It’s crucial for the government to recognize that long-term benefits will outweigh short-term costs.

This effort isn’t just about the government, though, as it’s also about the people. Communities in China could get involved, too, by rallying together and supporting this pertinent cause. They can petition factories to be closed, and start spreading awareness for this issue at local, national, and international levels. Hopefully, more people around the world would see how important of an issue China’s water pollution really is. Communities could also encourage their government to play an increasingly active role in water purification. Recently, China’s government has started to make pollution a priority (Hsu. Web.), and communities can encourage their government to continue this focus. Communities could start drawing international attention to this issue by notifying international governments and making China’s water pollution an international focus. Because this issue has the potential to affect not only China’s future, but the world also, governments and organizations around the world could help bring sanitary water back to China more quickly by working together and holding each other accountable to make positive progress.

Farmers in rural China could also get involved. Farmers would be directly involved because they would start working on water purification directly. They can immediately begin implementing better treatment methods on their farms, and transitioning to trace irrigation. Farmers would be

able to clean their water inexpensively by using crops many of them already have in their own fields. Ultimately, this will result in a surplus of crops, more profits for rural families and countless economic benefits.

Clearly, the lack of sanitary water is one of the biggest crises China is facing right now. Water pollution has disastrous consequences, including health problems, soil pollution, and a tainted food supply. Fortunately, research has shown that there are different ways to clean China's water and prevent further pollution. With clean water, living conditions in China improve immensely. More children would be going to secondary school, and families would start to lead cleaner lifestyles and afford healthier foods. Given how much of an impact water has on every single person's life, it's safe to say that water is important. Not only is water important, but it's, well, everywhere. In the air, in the clouds, in plants and animals, in every single one of our cells. And after following the proposed threefold process, it will soon be in China... sanitarily.

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