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Vietnam, Factor 9: Water and Sanitation

### **Improving Vietnamese Water Quality and Solidifying its Infrastructure**

The world is constantly in a state of disagreement. Its people constantly make claims of justice and injustice, right and wrong, and what should and should not be. And yet, with all the different points from the populace of the world, people continue to maintain an uncanny ability; *to forget*. To quote, Agatha Christie's book, *Elephants Can Remember*, "Elephants can remember, but we are human beings and mercifully human beings can forget." People from anywhere around the world choose what they want to remember and can forget the rest, even forgetting the rest of the world at times. The human mind demands consistency and priority to what is in front of it and affecting it now, not from across the world. A study conducted by Gerd Thomas Waldhauser at the Swedish Lund University provides evidence to support a theory from Sigmund Freud an Austrian neurologist, that suggests human beings have the ability to forget unwanted memories in the same way we can control our motor impulses. ("Human Beings Can Control and Intentionally Forget Unwanted Memories.") Often times, while exaggerated, the majority of the populace offers little thought to those who live in developing countries, such as Vietnam, Haiti or Brazil. A poll conducted in developing countries across the globe by the Pew Research Center has shown that the people in developing countries feel that their political leaders do not care for them. The largest percentage of dissatisfied people came from Latin America, specifically in Brazil, where nine in 10 people feel that the government does not care for them. ("Many in Emerging and Developing Nations Disconnected from Politics.") However, there are people who do remember them; people who participate in micro loans (Canales) and global organizations like the World Food Prize or The World Bank. Unfortunately they are greatly outnumbered. Many developing countries are currently facing increased pollution levels due to inflation of industry, many of them lack agricultural skills or technologies to healthily sustain their population and most of their populace faces poverty. By keeping the people of the developing world front of mind, the world would find that their lives *can* be improved, and in the case of Vietnam all it might take is a field of rice and a cup of water.

Vietnam is a country located in Southeast Asia, south of China and east of Laos and Cambodia. It is a country with nearly two-thirds of its populace living rurally, most of this demographic lives off of farms and utilizes the arable land and the 10 km stretch rivers, lakes and streams. (Suwal) The Vietnamese are a highly superstitious people and would sooner follow traditions to cure ailments then go to a professional medical facility. The Vietnamese oft give charms for protection as a tradition and use several different ceremonies to try and predict obscure parts of their own lives. There is a tradition within many Vietnamese families where an expecting mother or woman of age will have a needle on a string placed on the vein on her hand. The needle would predict the gender and order of her children, interestingly enough this tradition successfully predicted my birth and those of my five sisters in perfect order. This superstitious life leads the Vietnamese to have very strong ties with home and as many of the people never leave their native villages. These ties to home make it difficult for Vietnam to create a unified society as it is not in the beliefs of many of the Vietnamese to think much farther than the reaches of their village. ("Vietnamese Spiritual Life.")

This lack of unified society impedes the development of infrastructure and Vietnam has remained a developing country. Even during the Vietnam war Vietnam was not just merely split between North and

South, it was split among many different factions with different beliefs and several peaceful towns that tried to stay away from the rising conflicts. Several other reasons add to Vietnam's status such as the low income per capita, due to the large population of 93.412 million people, ("East & Southeast Asia :: Vietnam.") its current communist government and the organization of its economy and infrastructure. The Vietnamese economy is diversified in such a way that few will be able to make as much as the average American and live in a brick and tile roof house. Most will live within bamboo and thatch houses on less than one United States Dollar (USD) per day. ("Vietnamese Family")

Despite its lack of infrastructure, Vietnam is the second largest in the production of rice around the world. Within the 80 percent of the workforce that live rurally, over two thirds of them work in agriculture. The average Vietnamese family normally has four main members and additionally there are grandparents typically continue to live with the family as well. In Vietnamese life, family is the defining part of who they are; the Vietnamese create and stay where their roots are for as long as possible because they feel attached to that place from where their ancestors came. "The Vietnamese value system is based on four basic tenets: allegiance to the family, yearning for a good name, love of learning, and respect for other people." ("The Vietnamese Value System.") A family in Vietnam typically has a home where the parents work as farmers on their own small plot of land. In some cases, the parents find employment at larger agricultural organizations and work long hours as farmers. The grandparents may help, but the Vietnamese belief is that the children will take care of parents when the parents can no longer care for themselves as a way to repay the gift of life. Young children may go to school but are expected to work after school to earn an income to survive. During harvest season they must forfeit school in order to aide in the crop. (Evdokia)

Even as a major agriculturally based country, Vietnam still faces issues with its agriculture: including slash and burn farming, where the cutting and burning of forests is used to create fields for farming. This common practice reduces much of Vietnam's natural landscape and forestry, not to mention that slash and burn farming contributes to deforestation and soil-degradation which overtime reduces the quality and quantity of crop produced. As a result, the practice effectively costing Vietnam its major export: rice.

Slash and burn farming is mostly used by indigenous people who constantly move around a continent and follow herds of animals to allow the harvested plots to regrow and regain soil richness. In Vietnam, with its large population per square mile, this form of agriculture does nothing but harm in the long run because of its very nature. ("East & Southeast Asia :: Vietnam.")

Agriculture is not the only issue that the Vietnamese people face. Overfishing and water pollution have created a major threat to marine life. A specific example of overfishing would be the intensive brackish shrimp farming in south-east Vietnam. The article entitled "Water Pollution by Intensive Brackish Shrimp Farming in South-east Vietnam" by Pham Anh, explains a study conducted on the environmental impact of intensive brackish shrimp farming in the country and how a majority of the farms greatly exceed environmental standards. This is a significant challenge before the Vietnamese people.

The reason for the large rush and push for money by people in Vietnam like farmers is because the economy is inflated and the country has little infrastructure. People try to harvest as much as possible from the environment. They sell what they harvest in hopes that it will allow them to live comfortably and perhaps even grow rich. Due to the very nature of the saturated market it does not lead to full pockets but rather emptier ones. The Vietnamese have pulled together such a large supply of resources, where there is little demand, and continue to supply to survive and constantly press their markets down. Fishermen bring

as much shrimp and other sea animals as possible from their farms that exceed the environment's ability to replenish. Farmers bring as much rice and other food products as possible from the soil they have depleted and continue to scorch.

This rush for business, rush for money and rush to expand has allowed space for several industries and factories to pop up on nearly every single riverbank. These companies dump their untreated waste into the waters. These factories quickly create products as a means to profit while completely exploiting the natural environment of Vietnam. In 2008, there was a case; where a monosodium glutamate (MSG), a common cooking ingredient, production plant released untreated industrial waste water into the Thi Vai River and caused thousands of fish and ducks to die. Additionally, this increased the chance of disease and intestinal illnesses among the people living in the area. (Nguyen, Shiru) With continued exploitation of Vietnam's natural environment and water flow, the food from Vietnam will become tainted with pollutants, just as in the case of the Thi Vai River. Farmers will have to use water completely saturated with untreated industrial waste to grow their food crops. In turn, this will make for poor and unhealthy harvests. The rivers are close to drying up in Vietnam due to the constant abuse and the economy will further destabilize due to the lack of supply for the market.

Lacking in the knowledge needed to truly understand what the Vietnamese people were doing to their environment thanks to the current lack of infrastructure in Vietnam and the economy, they continue to create pollution. The Vietnamese throw trash directly into rivers and canals. They collect water from same rivers and canals for laundry, dish washing and bathing and return the water directly into the same water sources. To the Vietnamese water is very important, but surface water has begun to be too dangerous for consumption. As demand for clean water increased, underground water sources began to be used. Just as with the rivers and forests, the underground water sources also began to be exploited and abused. As surface groundwater began to dry up and groundwater naturally, laced with chemicals and harmful elements like arsenic, began to continually intrude at an increasing rate into the underground water supplies. Arsenic is a poison that is fatal to humans when ingested. Long term exposure leads to development of cancer in major organs, including the skin, lungs, bladder and kidneys. Increased concern over the safety of Vietnam and several professionals such as Pham Hung Viet of the Hanoi University of Science believes that over half the population of Vietnam has been affected by arsenic due to the population density of Vietnam (Bainbridge) and according to The Water Project, only 39 percent of the rural population of Vietnam has access to safe water. That is 39 percent of the 80 percent that live rurally.

The Ministry of National Resources and Environment cites that "up to 80 percent of diseases in Vietnam are caused by polluted water resources." ("80% of Diseases in Vietnam") These include waterborne and food-borne illnesses, including bacterial diarrhea, hepatitis A and typhoid fever. However, many of these diseases and pollutants in the water can be avoided and cleaned if enough time and management is put into it.

The most commonly suggested solution is the creation of several waste-water treatment plants and to secure safe sources of water. This would be a reasonable idea; however it would cost nearly 30,000 USD to create one and an additional 2,000 USD to maintain, per building. This money would most likely not be able to be brought up in enough time for effective treatment and by enough people to create enough to effectively treated water if done using micro loans. However, if this project becomes taken upon by an organization such as The World Bank or The Water Bank and they would be able to raise the funds needed or receive loans from the bank to create, the creation of the water treatment plants would be possible. Taking into consideration that the businesses would not want yet another building to take up its expansion

space this project may be very hard to accomplish, not to mention that the government will not be able to run it. The best thing to do in that situation would be to allow a third party company to take control but be sponsored by the organizations and if the project is not carried out, funding can easily be cut by the time and then reinstated to a newer more sympathetic company. Though projects such as The Water Project or grants such as the Drinking Water State Revolving Fund could provide a stepping stone for putting forward enough funding to create the beginnings of a long term project to bring forth water treatment plants into the waters of Vietnam. While this will provide safer waters for consumption, the problems of industry will still remain and the water will still be exploited beyond the international limit.

A more effective means of purifying the water for consumption would be with using something as simple as rice. Rice is a product that Vietnam has an abundance of and the rice plant has a very defining characteristic. It loves water. Rice is a type of plant that grows quickly and does not threaten other plants which made it the perfect choice for a study conducted by research collaboration between the U.S. Department of Agriculture's Research Service and the University of Mississippi. (Edwards) This study was conducted to see initially if rice would reduce the amount of pollutants and pesticides within water. The fruits of the study came out later in the Gulf of Mexico Initiative where the Natural Resources Conservation Service began helping Louisiana farmers by using rice fields to filter water before sending it to the Gulf of Mexico. ("Filtering Water with Rice," "Louisiana.") This method of using rice fields as a natural purifier is proven to work, and the situation in the Gulf mirrors the problems facing Viet Nam. The method used in the Gulf of Mexico Initiative was to make a rice field and use a series of pipes to artificially create a flow for water to be filtered. An advantage Vietnam has over the Gulf is nearly all rice fields already have naturally created flows due to the time and place they were created. Flow must be established in order for the rice filtration system to work properly. From one end to the other, water polluted and unpolluted will flow on the created paths in between the rice plants and the rice plants theoretically are supposed to pick up and remove the levels of pollution in the water, effectively filtering it. This rice filtration idea is reminiscent of natural filtering by the earth, where rocks and moss are used and set by either a small stream or a trickle of water and as water comes out the other side it is more pure than when it entered.

A term to define this would be bio-remediation, or the use of organisms to clear away pollution. ("Coupling Cost-effective Fluid Designs and Optimized Treatment," Cury) The rice fields within in Vietnam that are situated around water resources will be used as medians for water to pass through, by digging a separate waterway from the water source to rice field and then applying a mesh or membrane to keep solid items and animals out of the new water channel, the polluted water from the source will flow into the rice field and create a flow through it, eventually flooding the rice field and allowing the crop to grow and drink up the water and pollutants from it. On the opposite side of the field there will be another water channel which will lead back into a water source, effectively recycling water through to create a less densely polluted water system and provide a safer more usable water source for the people in the area. ("Technology to Detoxicate Herbicides/ Dioxin Infected Soil by Bioremediation.") If this step was taken for all rice fields near water, the pollution levels will dramatically fall. Less polluted waters will change the ratio of pure water to pollutants and the local people will now have a means to get fresh water without pulling from underground water sources. In time, with the right guidance, this could lead into a rice revolution where people would band together in an effort to push industry into a more economically friendly direction and to find ways to remove the waste from the waterways. This can be done by means of chemical treatment and by travelling in boats with nets to fish out solid waste product.

This method of purifying rice does not come without concerns. The harvest-able rice and the rice plant will remain and could potentially be dangerous for human consumption. There are many different options that can be used to utilize the leftovers from the rice crop used to purify the water for everyday life in Vietnam. These include several different options that don't involve consumption. The stem of the rice plant is able to be refined into fibers or what is known as a rice straw fiber. This fiber can be used to strengthen a polypropylene matrix and can be used as an alternative to wood fibers and be further reformed into boards for construction (Pan, Sudhakar). However the possibilities do not stop there, bricks have been made using a mixture of clay, sand and rice husk ash that are able to be used in load bearing walls (Rahman, Görhan). Using the rice fibers and rice bricks will employ a cheaper more accessible means of construction materials and diversity for the Vietnamese local population and aide in the improvement for the economy. Green fuel can also be made from rice residue which is leftover from harvests, most farmers burn rice residue left over from the harvests and release methane gas, contributing to the large air pollution in Vietnam, however several researchers from International Rice Research Institute conducted a study to reveal that rice residue can be used as an alternative green energy source while not affecting soil quality (Ferrer, Choi).

It should also be considered there is still the need to give people the knowledge of what is going on with the water and attempt to pressure the government and industries into either creating a more sustainable economy to then allow room to enforce policies or to make the industries utilize safer policies for the people. Another item to consider would be the lack of water several people may face during the solution due to the demand being so high, a solution for this would be to either create a plant to treat water and try to meet demand without forcing the environment and water flow to change or bring in water from foreign aid. A final thing to consider will be the stubbornness of the businesses and industries that will not wish to relinquish any property of theirs under the name of good will, these few will be looking to make profits, either explaining a long-term or giving them a short term investment will most likely have to be in order.

The developing country Vietnam is facing major problems, it has a huge risk for disease, the environment is slowly dying from pollution and their water is too dangerous for general consumption but with some time, knowledge and utilization of rice filters, the environment in Vietnam could be brought back to its original state.

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