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Food Crisis in Haiti Due to Infestation and Overgrowth of Water Hyacinth

The world we live in is one of agricultural abundance. Until recently, better technology and a bourgeoning global economy had contributed to lower food prices world wide. Now, however, economists are noticing a different trend: "Since the spring, wheat prices have doubled and almost every crop under the sun—maize, milk, oilseeds, you name it—is at or near a peak in nominal terms. *The Economist*'s food-price index is higher today than at any time since it was created in 1845. Even in real terms, prices have jumped by 75% since 2005." (The Economist) As food prices increase at an alarming rate, consumers in every nation can feel the effects; unfortunately, those living in already impoverished nations, like Haiti, are among the hardest hit. As food prices soar, Haiti must find a way to increase their own agricultural productivity. One of the greatest barriers faced by the small-scale farmers in Haiti is water scarcity due to rampant overgrowth of the invasive plant, water hyacinth. A resolution to this problem may be found through the use of bio-control interventions to eliminate the over population of this plant in Haitian waterways and irrigation canals.

In Florida, families are sitting down to a typical breakfast: scrambled eggs, bacon, toast and a wide assortment of fruits. They are offered a choice between freshly squeezed Florida orange juice, apple juice and fresh water. Now imagine yourself just two hundred miles south in Haiti. You, on the other hand, now live in the poorest country in the Western Hemisphere with the highest unemployment rate (International Action). While the majority of the citizens in the United States have closets stuffed full of clothing, you have no shoes and only one outfit consisting of a shirt and shorts. Unlike America, education is hard to come by in Haiti. Your mother, along with half of the population of Haiti, has never received any formal education (Central Intelligence Agency). Thinking about how your mother was deprived of education reminds you of how thankful you are for the mission-based school started in your community. Now that you can read, you look forward to following your brother's footsteps and attending the University Caraibe in Port- au- Prince to study business and perhaps someday get a job in the city!

Today, it is your grandfather's birthday and since he is one of the town elders, his sixty-fifth birthday is a big event! On average, most women reach only fifty-nine years of age while the average man lives to be only fifty-five years of age, so Grandpa's relatively good health at such an advanced age makes him a local icon (Central Intelligence Agency). For the big party, you are in charge of gathering water to satisfy the guests. You run to the shallow, hand-dug community well and pull up a pail of stagnant, murky water. Pleased with your hard work, your mother reaches for the family pitcher and fills it with the water you just gathered. Unfortunately, the murky, muddy, well water contains a wide range of bacteria harmful to humans. The consequences range from cholera to chronic diarrhea, from typhoid to malaria, and from hepatitis to other intestinal infections (International Action). The town's well water contributes to the malnutrition of most of its residents. Chronic diarrhea among children under the age of five is particularly problematic. Most children of school age receive at least one meal a day—thanks to the efforts of local missionaries, and the government-sponsored school lunch program. However, the nutrients from the meal often cannot be properly absorbed due to the widespread health problems caused by contaminated water. In fact, more than half of all deaths reported in Haiti are caused by gastro-intestinal disease from drinking fecal contaminated water (International Action).

As guests arrive for the party, you reflect upon the many families who have lost young children and infants in recent years. In Haiti, due to malnutrition and lack of clean water, 71 out of 1000 live births end fatally (Global Edge). Your own mother has lost two babies during the first hours of their lives. You wonder if things would have ended differently if your mother could have been transported to the hospital,

instead of delivering the babies on the muddy floor of your tiny home. As the evening nears, the men begin to return from the fields—bearing the same disappointed look that you have come to expect. The rice crop has been water deprived due to an infestation of hyacinth in the nearby irrigation canal. This deceptive plant is beautiful in appearance but deadly in its effects. The water hyacinth plants can double its population in only two weeks. Your village water supply is threatened as water drainage canals are choked by rapidly growing vegetation (United States Department of Agriculture).

This scenario illustrates the importance of timely intervention to recover one of Haiti's most precious natural resources: water. Without doubt, one of the primary causes of the widespread poverty in Haiti is centered on water scarcity. While there are many factors which contribute to this problem, one important cause is the overpopulation of a rapidly growing and very invasive plant called water hyacinth. Water hyacinth plants can grow up to two meters thick and proliferate rapidly in sub tropical and tropical climates. The water hyacinth has no natural predators in Haiti, as it was only recently introduced to the environment. Much of the widespread overgrowth of this plant occurs in waterways and drainage canals. Accumulation of this plant causes oxygen concentration in the water to plummet, making the roots of the nearby crops being cultivated by the subsistence farmers rot (Practical Answers). The overpopulation of the water hyacinth makes pure, oxygenated water a resource the Haitian subsistence farmers are unable to attain. Not only does crop irrigation become impossible, but water hyacinth overgrowth makes waterways clogged and unusable for transportation. The small farmer's trip to market becomes even more grueling.

Another adverse environmental impact of the water hyacinth is increased evapo-transpiration, resulting in significant water loss. Evapo-transpiration is the combined water loss to the atmosphere via both plant transpiration and water evaporation. The accelerated evapo-transpiration rate can be nearly twice as great as the rate of evaporation on an open body of water (Practical Answers). Furthermore, the water hyacinth plant itself is a habitat for many diseases, one of which is malaria. The women and children that gather this water unsuspectingly expose themselves to deadly diseases.

If water hyacinth growth remains unchecked, the water scarcity issues could push Haiti into further turmoil. Ironically, the water hyacinth will continue to thrive while the people of Haiti will continue on a rapid decline. As food prices climb worldwide, the people of Haiti seem to be among some of the hardest hit. Already Haitians are struggling to buy "mud cookies" to keep hunger from becoming so severe. Unfortunately, even this nutrition-deprived hunger remedy is something not all people in Haiti can afford. Haiti has become the "World Hunger Poster Child" (Lendman). The water scarcity which faces the Haitian population will exacerbate hunger and disease.

If, however, Haitian waterways could be cleared of this pernicious plant, then water availability would be greatly enhanced. The population group that would be most immediately uplifted is small scale farmers in rural areas, who would then be able to irrigate their farms and travel to market with their goods. Once food becomes locally produced and marketed, Haitian dependency on other countries will be minimized and the mounting food crisis could be alleviated. As Haitians become less reliant on other nations such as the United States for their food, the small subsistence farmers will be able to provide not only for their families but perhaps even make a living by selling crops such as rice or tomatoes at city marketplaces. This internal trade will help Haiti rise out of the economic slum that it has been in for decades.

To ensure better economic activity and the livelihood of the Haitians, the water hyacinth must be eradicated. One proposal to rid Haitian waterways of water hyacinth is to examine the pathway to successful eradication of the plant taken by other countries and regions with similar concerns. Water hyacinth overpopulation has been noted in the United States and Africa. Africa's story of water hyacinth eradication offers hope to countries like Haiti. In 1989, water hyacinth was observed in Africa's Lake Victoria. In less than ten years, the plant had swept across the lake's shoreline. A research team led by

Dr. James Ogwang went to Lake Victoria and found an efficient and environmentally friendly way to eradicate the overgrowth of the water hyacinth. In South America there are several native predators to the water hyacinth: a variety of weevils, fungi and moths (Malakata). Dr. Ogwang's team introduced two weevils to Africa's Lake Victoria and saw amazing results. The weevils, both adult and larvae, prey on the leaves of the water hyacinth causing the plant to drift downward in the water where a number of natural bacteria and fungi aid in the decomposition of the hyacinth plant. After the water hyacinth had been broken down by these natural means, the team used machinery and hand power to remove the plant remnants. By the year 2000, ninety percent of the water hyacinth had been removed from Lake Victoria (Hyps). The success in Africa has garnered attention from the global community. "The defeat of water hyacinth on Lake Victoria is now emerging as one of the world's great biological control successes and a rare humanitarian triumph (Collis)."

The decision to use environmentally friendly bio-control methods was not without controversy. Organizations in Europe sent machinery to this African area of crisis in 1998, and the World Bank also donated 9.3 million dollars to fund removal of the water hyacinth. The African government intended to use expensive chemicals and heavy machinery with the notion that these tools would be more effective and powerful than natural methods. When the idea of utilizing natural predators such as weevils to eradicate the plant was introduced by scientists, it was not taken as a serious, effective or long lasting solution to the problem. However, a group of scientists including Dr. Ogwang of Uganda, Dr. Mic Julien of Australia, and others persisted in advocating for bio-control, and African authorities began to reconsider. (Collis) Many local Africans whose lives were centered around exports, such as fish, from Lake Victoria much preferred the natural eradication: they had feared the potentially adverse effects of spraying pesticides on their lake. In 1997, prominent scientists launched the biological attack on the shores of the lake as the harvesters commenced their machine-powered tools for eradication. The harvesters were able to remove about 300 hectares, but because of the plant's ability to proliferate at extreme rates, the plant replaced itself and desired positive outcome was not achieved, just as scientists had expected. In time, the African government realized the importance of utilizing bio-control methods to rid its major ports and waterways of the devastating plant. Bio-control provided safe, inexpensive, sustainable and environmentally friendly means of eradicating the pernicious plant.

Closer in proximity to Haiti is the success story of water hyacinth eradication in Florida. A few years ago, nearly 125,000 acres of Floridian waterways were covered by this invasive hyacinth. When natural resource management teams introduced the weevil predators to the congested waterways, similar successful eradication of the plants was observed. However, even small plant remnants can potentially start a new infestation. When removing the plants by hand, extra precaution must be taken not to break the plant in the process (Batcher). With this knowledge and awareness, Floridians and other southern states in America have successfully maintained a close control over these noxious yet beautiful plants.

For poor countries like Haiti and Africa, the use of bio-control seems a preferred method over mechanical removal of the plant due to fuel and machine expenses. An approach similar to the one taken in Africa and in the United States should be utilized to attack the water hyacinth infestation in Haiti. A collaborative effort combining both public and private sectors should immediately begin the consideration of bio-control methods for Haitian waterways. Dr. Ogwang, one of the lead scientists in the research team in the Lake Victoria case, is an entomologist with a concentration specifically in bio-control methods and works for the Ugandan National Agriculture Research Organization. Similarly, Dr Mic Julien is employed by the Commonwealth Scientific and Industrial Research Organization's (CSIRO) Division of Entomology working in and near Australia. Similar organizations should be called upon to establish research teams which would take action to help Haiti revert to implement bio-control methods for their clogged waterways. These efforts will require time, skills and capital to eradicate the infestation of water hyacinth that plagues Haitian waterways today. Cooperation between individual philanthropists, specialized organizations, and governmental agencies will work to rid Haiti's countryside of this

devastating, invasive plant, water hyacinth. Based on the successes observed in other countries, Haiti should be confident that bio-control will make a lasting difference in its water resource quality.

Imagine yourself in Haiti, fifteen years from now. It is the year 2023 and you have now graduated from the University Caraibe in the top 10-percent of your class! You majored in agricultural development and you plan on going back to your village to research better farming technologies to help your father and other local farmers achieve the highest percent yield. Now that clean, pure, and oxygenated water is readily available, your father, along with many other farmers in Haiti, has become successful once again. Because the water hyacinth was removed from the waterways and irrigation canals, farmers like your father are now able to irrigate and care for their fields in ways they never could before. Water is now a resource to which all Haitians have access. The benefits of clean water are being realized in terms of increased crop production. The positive consequences of the water hyacinth eradication have impacted a wide variety of areas ranging from fewer still-born babies, prolonged lifespan for the population, and healthier, smarter youth, such as yourself! The children growing up in this Haiti know a world of opportunity, self-reliance, and health. The children in this future Haiti don't have to worry about contracting intestinal diseases from the water they drink or from the "mud cookies" they eat. In a Haiti where water hyacinth has been eradicated and farming has been promoted and made prosperous, the children can focus on education and making a future for themselves.

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