Oil in Brazil:

Economic Pressure

Versus

Environmental Sustainability

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Introduction:

Over the course of history, the story oil industry has been that of: greediness, money, and power, in that order; the greedier one was, the more money they would accumulate, and thus the more power one would have. As a result of this egocentricity, up until the 1960's, there was little to no notion of ecological protection or sustainability of the environment. In 1998, the price of a barrel of oil was less than the equivalent of $20, now compare this to 2008, when the price exceeded $140 a barrel, seven years later, in 2015, the price proceeded to fall below $50 (McMahon, 2014). This rapid expansion, and collapse, in price has given oil the capability to make or break nations financially. It gives poor countries, with access to petroleum supplies, the capability to explode financially. An example of this being Brazil, which has always been an impoverished nation, yet their access to oil has caused them to fall under oil's gamble. However, this venture has been both a blessing and a curse for Brazil. It has driven the country have the seventh largest Gross Domestic Product (GDP), and has also allowed for the potential to become an even larger economic superpower. On the other hand, it has also led to significant national dilemmas, namely the destruction of the Brazilian ecology and environment.

Sustainability Issues in Brazil:

Water Pollution:

Brazil has become notorious for its continuous struggle with the levels of pollution in its environments, the most notable ecosystem being their waters, especially those near major population densities. Two of the primary causes of Brazil's polluted waters being: petroleum, and humans. The petroleum concern being the accidents that occur from oil related incidents, circumstances like the oil spills that happened in the Guanabara Bay. Meanwhile, the problem humans is mainly the direct result of human waste; for example, population focal points, such as São Paulo and Rio de Janeiro, have a waste production of almost 2 lbs per capita per day, much of which is not handled appropriately.

The Tietê River:

The Tietê River, is a major river that cuts inland approximately 715, and through the most populated city in Brazil, São Paulo, housing more than 20 million people in the metropolitan area. Records show that in 1990, there was a level of 0 mg/L of dissolved oxygen in Tietê River (Russell, 2001). According to Vijay P. Singh, Chair of Water Studies at Texas

A&M University, when "…the dissolved oxygen level drops below 3.0-4.0 mg/L, the organisms will become stressed … If dissolved oxygen drops below 1.0-2.0 mg/L, it will result in a fish kill" (Singh, 2005). This hypoxia, or lack of dissolved oxygen in the water, is caused by increased levels of unregulated sewage, phosphorus, and ammonia nitrogen discharged into the water supplies.

An example of this is in 1992 the greater São Paulo are implemented a water purification plan, aptly called "the Tietê Project", whose objective was to increase the level of wastewater collected and treated, thus reducing the organic load discharged into the river. Prior to its implementation in 1992, no more than 20% of the refuse was collected and treated, in 2004, it had increased to 63%. This 43% increase over the course of 12 years is a step in the right direction, the levels of sewage, and thus the level of dissolved oxygen, in the water is still far below the desired and necessary levels.

The Guanabara Bay:

Another illustration of Brazil's water pollution issue is Guanabara Bay, where the city of Rio de Janeiro, home to more than 10 million inhabitants, second only in population to São Paulo, stands. Similarly to the Tietê River, the Guanabara Bay is subject to extensive levels of pollution, mainly due to the lack of sanitation facilities necessary for such a large population. Of

the per capita production of household waste per day in Rio de Janeiro (~2 lbs) almost 70% is spilled raw into the waters of Guanabara Bay (Gutberlet, 2008, p. 24).

Aside from the waste-flow into the Bay, there have been various major oil spills that occurred there. Given Brazil's nearly unfettered access to massive coastal oil fields, combined with lenient laws and restrictions regarding the proper retrieval and transportation methods, makes it easy to see how Brazil has issues with petroleum pollution; especially with the involvement of an oil corporation, Petrobras, run by the national government. Due to Petrobras' support by the government, it produces a disproportionate amount of the energy supplies produced in Brazil. In 2014, Brazil consumed more than 3 million barrels of fuel a day, and in turn produced roughly 2.7 million, of that Petrobras produces more than 1.9 million barrels (USEIA, 2014).

Petrobras was responsible for a 1.3 million liter oil spill that happened in Guanabara Bay in 2000. As a result of this spill, not only had roughly 10,800 barrels of crude oil poured into the Bay, which cost $40 a barrel on average. This spill killed a countless amount of fish in the bay, as well as many of the mangroves that grew there as well; this loss of plant life, as well as the spreading of oil across the Bay, had aided in the creation of the Guanabara Bay pollution issues that exists 15 years later (Harvard Business Review, 2011).

This excess of pollutants has led to a remarkable disparity in the dissolved oxygen present in areas under 10 meters deep in the Bay. The surface (0-5 meters deep) has oxygen

values reaching up to 300% oversaturation (roughly 9-10 mg/L), meanwhile bottom (5-10 meters deep) has concentrations that may stay below 1 mg/L (Rebello et al., 1990). When fish are exposed to hyperoxia, which is anywhere from 140%-300% oxygen oversaturation in the water, it has a similar effect to that of hypoxia. With continuous exposure to high levels of dissolved oxygen, fish may achieve suboptimal growth, and have a reduction in gill efficiency. As a result of both of these alterations, the bloodstream of the fish becomes contaminated by large bubbles of oxygen, which can cause "…death [to occur] rapidly as a result of blockage of the major arteries…" (Svobodova et al., 1993).

Impact of Global Mega-Events:

Over the course of the last five years, Brazil has been in the public eye regarding global sporting mega-events, such as the upcoming 2016 Olympic Games, hosted in Rio de Janeiro, and the 2014 World Cup, hosted across the country. Following the 1994 Winter Games in Lillehammer, Norway, which was the first environmentally conscious Olympic Games, the International Olympic Committee (IOC) wanted to continue the tradition of a "green" Olympics, and thus establish a precedent regarding the ecological impact of sporting mega-events (Meisegeier, 1995). Therefore, in order to help establish this paradigm, prior to the 2000 Summer Olympic Games held in Sydney, Australia, the IOC and the United Nations

Environment Programme (UNEP) signed a document which would "serve as a useful reference tool for the sports community at all levels in the protection of the environment and enhancement of sustainable development." (IOC, 1999). The Brazilian World Cup and Olympics are no exception to Agenda 21. Yet, because of this prominent example set by both the Olympic Committee and the United Nations, Brazil has received much ridicule, for both its results after the '14 Cup, and now going into the '16 Olympics.

2016 Olympic Games:

Looking towards the upcoming Olympic Games in Rio de Janeiro, many of the countries are concerned with Brazils' levels of pollution, and how that will impact the Games themselves. As previously mentioned, Brazil has concerns with the quality of water near Rio, but these worries are no longer solely domestic. Whether it be, the effects of the 2000 Oil Spill, or the influx of waste into the Bay in droves, many of the nations participating in the Games have grown concerned with Brazil's and its environmental agenda.

In order to win the bid to host the Olympics, in October of 2009, the city of Rio de Janeiro pledged to decrease the flow of sewage into Guanabara Bay by 80%, despite this being an admirable objective, it requires more than seven years to achieve such a lofty goal. As a result of the pledge, there have been continuous tests run on the waters and soil of Olympic event

locations, and the surrounding areas. These tests resulted in the discovery of a drug resistant "superbug" which is most likely the result of the copious amount of sewage that pours into the Bay from the city (BBC News, 2014). Even with this new development, many of the Olympic and Brazilian officials refused to comment on either the superbug as the result of these terrible environmental conditions, or what they plan to do to over the upcoming year in order to try and improve both situations.

2014 World Cup:

While water quality and Guanabara Bay is the environmental focus of leading up to the 2016 Olympics, World Cup 2014 was the focus of much economic and environmental scrutiny. Going into the World Cup, Brazil had highly publicized their aspirations for this being a green event, and in an endeavor to achieve this goal, attempted to enact radical policies. But without the appropriate economic backing, these changes in policy were going to be, at best, short lived, and idyllic passing possibilities. Brazil had spent a total of US$14 billion on the World Cup, $3.6 billion of which went towards the renovation and construction of the 12 stadiums across the country (ESPN, 2014). Despite their ambition to host an environmentally sound event, much of this money was allocated to the renovation and construction of less green stadiums. This spending led to a series of serious protests in opposition to the use of public funds for the financing of the World Cup, when much of the country lacks basic infrastructure and support.

Not only did the Brazilian government have neither the necessary funding, nor the support, to continue the aspirations of environmental sustainability, quite the opposite happened, not only was it not green, but it was the most polluting World Cup in history. Due to the attraction of attending the World Cup in Brazil, the national carbon footprint was nearly double that of the South Africa World Cup, four years prior. In 2010, the South African World Cup produced roughly 1.65 million metric tonnes of CO2, meanwhile the Brazilian World Cup produced almost 2.72 million metric tonnes of CO2 (Foster, 2013). If you look at the 2006 Germany World Cup, which was the most eco-friendly mega-event in history, they had managed to produce only 343,750 metric tonnes of CO2, a little less than ⅛ the emissions in 2010, and a more than a whopping 1/7 of the the 2014 Brazil World Cup.

Oil Industry in Brazil:

While the oil industry does quite a few environmental drawbacks, it also has a lot of economic pluses. In 2006 & 2007, not only did Brazil manage to achieve oil independence, but in 2012, they produced roughly 2.654 million barrels a day, while only consuming 2.594 million barrels a day, which nets to an export of nearly 100,000 barrels of oil a day (CIA, 2012). Not only does Brazil produce an amount to give them independence, but the revenue provided by the Oil & Gas sector provided a total of 13% of the nations GDP in 2012.

Conclusion:

I think Ralph Waldo Emerson had one of the best quotes about society and sustainability, "What you do speaks so loud that I cannot hear what you say." Most everything that any human society does is generally the repetition of another societies successful actions. In this case it is Brazil's destruction of its natural environment, in order to achieve economic advancement. This is almost the same as what we Americans have done in the past, and to a certain extent still do to this day. How can we expect other, less powerful, and less fortunate, countries to follow our lead, when our words and our actions contradict each other. The only way to bring about the sustainable changes that humanity wants to see, is for a country like America to step forward and lead that charge.

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