Assignment #2

PSC 313 - Mr. Kevin Redding

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Pre-Salt Drilling in the Santos Basin

The water of the Bacia de Santos (Santos Basin) has been targeted for drilling since the discovery in 2007 of large oil reserves in the earth[2]. In this region of the Atlantic, the pre-salt strata of ocean floor has an estimated 50 billion barrels of oil that,[1] if extracted and exported, would place Brazil in the top ten exporters of oil in the world. Since then, the Brazilian government has been providing incentives for private companies, particularly Petrobras, to invest in establishing the structures for manifesting their development dream. However, the reservoir in question is a geological difficulty that may have unprecedented negative environmental and social impacts should any accidents occur.

The shifting of tectonic plates during the mesozoic period is what produced oil in this layer of earth[3]. The difference between oil from the pre-salt layer versus the post-salt layer is that because post-salt rests on top of the pre-salt, it is less likely to have as much gas in the mix with the oil. Waisberg's article delineates the numerous challenges to the Santos Basin pre-salt layer exploration, including "ultra-deep water, deep carbonate reservoirs spread over very large areas, with high gas-oil ratio, CO2 content, high pressure and low pressure, laying below a thick salt layer, location around 300km from the coast and often severe oceanic conditions" [4]. When Petrobras initiated this high-risk operation, the public as well as the administrators involved (public and private) insisted that the procedures and machinery need to and will be of the utmost

safety and quality. A Petrobras Cenpes centre guide conceded, though, that the technology being utilized for oil extraction resembles that of the Macondo field technology, known for the largest yet oil spill in 2010[5]. Whereas that spill caused eleven deaths, there has already occurred a Petrobras-led incident which consisted of nine deaths [6].

Aside from the operation-induced deaths, corruption and even murder has occurred relating to the Santos Basin and Guanabara Bay. In fact, the Mensalão trials concluding in 2013 were directly intertwined with Petrobras profits that were supposed to go towards local and state investment in public programs such as those for education and poverty related issues [7].[1N] The environmental concerns of drilling so deep within the earth is due to the vacuum effect that may occur if the extraction tools mistake their measurements, if the turbulence proves too strenuous, or if otherwise any unforeseeable accidents occur. More and more protests and movements are manifesting in response to the extensive lengths to which Petrobras and the Brazilian government are going in order to secure the financial benefits of these oil reserves.

There are concurrent (1) environmental, (2) economic, and (3) social damages resulting from Petrobras-conducted, government-condoned oil drilling. The environmental risk of Brazil's oil production is difficult to discern because they have declined to release the records of their oil-spill measurements and regulations to the press [8]. In order to comprehend the degree of risk that is the Santos Basin oil drilling, we must first reflect on the Deepwater Horizon incident of 2010. An explosion of the oil rig caused a spill that lasted for nearly five months, killed eleven people, and millions of barrels of oil were discharged into the ocean [10]. This particular rig was drilling at approximately 5,000ft deep [11]. In contrast, the entire sum of the Santos Basin depth including the water and salt layer is more than 10,000ft deep [16].[2N] On a separate occasion, an

explosion also located in the Gulf of Mexico occurred when "a bubble of explosive gas raced up the well, pushing ahead of it heavy drilling fluid and knocking out of place a two-ton piece of metal" [12]. Recall that not only has Petrobras employees reported that the technologies between these operations were similar, but also that the ratio of gas to oil is extremely high in the pre-salt layer, higher than in the post-salt layer, at which many other operations occur. Deep-water drilling may have varying degrees of risk according to the depth at which the rig is drilling, the ratio of gas-oil within the surface, and the quality and maintenance of the technology used. Last point aside, both depth and high levels of gas within the pre-salt layer in the Santos Basin are shown here to be extreme risk factors for the current oil drilling operations there.

The economic risks include expenses associated with building the structures for oil drilling operations, the loss of funds when accidents occur that result in the destruction of said property, and the insecurity of this investment in a wavering and competitive market. According to The Guardian's 2015 article, pre-salt wells can cost $300 million to drill [13]. The operations require floating storage and offloading vessels (FPSOs) which can cost up to $2 billion each. Due to a specific law in private-to-public mingling revolving the Santos Basin, an approximate $11 billion was paid to the government for exploration permissions [18].[3N] A Reuters article from 2016 reported that the Deepwater Horizon incident, for example, cost the BP p.l.c. approximately $55 billion [14]. This is $15 billion more than their original loss estimates in 2010 [15]. More recently in 2019, Offshore Engineer reported that the national operator has cited more than $150 billion in investments for exploration, production, transport, marketing, gas and petrochemicals, and renewable resources [16]. In that same article, the proposed return is cited at less than $150 billion.[4N] It is either their reports or their calculations that are incorrect, otherwise, it appears that

the investments will not generate proportional profits. In addition to being vague, these numbers do not address the profitability of the oil barrels in themselves. Proposed business plans seem to limit themselves to five years, but even in that time the market for oils, fossil fuels, and energy overall may shift in accordance with newer technologies and efficient energy interests, spill incidents, or government scandals. The Guardian discusses how the difference in selling barrels at $40 versus $130 apiece is the factor that is not able to be quantified in advance, rendering the previously mentioned projected earnings nearly unsubstantiated. Another unaccounted for factor is that increasing global efforts to reduce carbon emissions may lead to carbon taxes. They obtained an ironic quote from a former Petrobras director who now works for the Sao Paulo University's Institute of Energy and Environment: "I would prefer renewable. I work with biodiesel, ethanol and wind. But I have to look at the world as it is. Between the internal logic of the economic system and the speeches of those who want a cleaner system, the gap is too big to be breached... I don't like it, but that's how it is" [17]. The world as it is, indeed: these inconsistencies in business and product data are reflective of Brazil's economic instability which produces and reproduces conditions for government failure and the national populace's poor life conditions.

Failure of the government directly coincides with Brazil's poverty and/or crime.[5N] In order to summarize these effects, I will employ two examples of causal relationships between policy or institutional decisions harming the local or national populace. Namely, that of the Mensalao trials, and that of the Guanabara Bay. The Guardian article referred to this without its name when it said "it has been revealed that almost $2bn [has] been siphoned off by [the] ruling Workers Party" and that "more than 40 politicians have been arrested or questioned" [19].

Beginning in 2005 and concluding only in 2012, indeed more than 40 politicians were found to have been direct or indirect participants of a money-laundering scandal which used funds from unknown origins in order to "purchase" votes in the legislative parliaments of government [20C]. Without knowing an exact amount, the court cases revealed that Petrobras profits definitively took part in this scandal. Evidently, theft of government funds is harmful to the national populace because they are meant to be directed at public services or social welfare programs, and are instead squandered on political squabbles. On a local level, Guanabara Bay has been converted over the course of nearly 60 years into 'Petrobras Bay' [21]. Guanabara Bay is located within the coast some 200km from the oil fields in the Santos Basin, and it is the destination for many companies' oil dropoff [22]. The immense amount of oil involvement in the bay -- "at least two refineries, four terminals, four shipyards, [and] countless storage tanks, support ships, service factories and underwater pipelines" -- has impacted the local fisheries, recreation (the water is no longer suitable for swimming), and employment [23]. Alexandre Anderson, a Guanabara Bay environmental activist leader, experiences threats to his life for his protests. He, his friends, and his fellow union members have been murdered or experienced attempts thereof, arrested or have otherwise had charges filed against them, some instances of which Anderson has connected to Petrobras itself, which denies any involvement.[6N] That there have been murders of coincidentally many anti-Petrobras activists with no clear investigative explanations reveals the ineptness of the local police to address crime. Between crime and poverty, national money-laundering and incapacitated police forces, Brazil is so desperate for a solution that they turn to a questionable industry with overwhelming nationalist support. Indeed, when the reservoirs were discovered, former President Lula was quoted saying that "God is giving Brazil another chance" [24].

It was in this same line of thinking that the private sector agreed to explore the oil reserves in a limited manner, with proportional compensation to the government. These compensations amounted to the aforementioned $11 billion paid to the public sector for permission to access and drill in the Santos Basin before the end of the first decade in this century [25]. Part of the reason for this was to attempt to minimize foreign investors to benefit from the oil reserves before the Brazilian economy could. They hoped to generate an influx of dollars by exporting to the U.S., Canada, the U.K., Australia, and Norway. The influx would supposedly increase the value of the Brazilian real (BRL). In reality, their national currency has deteriorated from these investments. In 2009, the conversion rate was about 50% from BRL to USD. Today, the BRL is worth less than 25% of the USD [26].

The Santos Basin is currently being drilled, 300km from the shore. Guanabara Bay is being used as a transport hub. The population continues to be poor and crime-ridden. The government continues to neglect their populace and invest in exports. The market continues shifting, sometimes predictably, and sometimes unexpectedly. However, the most significant continuation is that the environment will continue to deteriorate, for every oil spill and for every bay transformed for Petrobras-purposes. Carbon dioxide will continue to leak from the extremely dangerous activities of drilling and climate change will, even if only in the longer interim, inevitably see its effects. Whether the benefits will reveal themselves soon, the country of Brazil may not know; but that they will continue to drain the reservoirs until there isn't a drop left of 50 billion barrels or more of oil, we can be certain.

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*Endnotes **

1N. The Mensalao trials were a sticky and unclear situation. Whether or not the $2 billion were actually meant to be invested in social welfare programs is debatable, but former President Dilma Rousseff did promise it at some point or another.

2N. This is a sum of only the water depth and the “thick salt layer” to which Waisberg refers. However, there is also the 5,000m depth of the carbonate reservoirs that I did not add because its depth depends on each drilling operation. I used the Google converter for meter-to-feet measurements.

3N. For the $11 billion, I took the “R$22 billion” cited and used an online currency converter to discover the ratio of the earliest record they happened to have in 2009 (I did not find a 2008) to determine that the ratio was about 1 BRL to 0.5 USD.

4N. The $150 billion quotes are summed and then rounded down for expenditures and up for profits.

5N. In a previous paper, I personally studied “The Weakness of Democracy in Brazil”, drawing connections between the corruption of the government and the criminal organizations with relation to the poverty of the populace.

6N. Based on personal experience/comprehension of Brazilian employment, markets, and industries: those individuals employed in jobs that do not require degrees, such as fisheries or oil companies, are most typically (and statistically) classified as poor. However, in my prior research, crime occurs mostly from poor individuals towards wealthier individuals, rendering the murders of Anderson’s acquaintances as particularly suspicious of political involvement.

** In order to differentiate between Endnotes and in-text Citations, I have numbered the endnotes with the letter 'N' following the number.*

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*Citations ***

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14. Schaps, Karolin and Bousso, Ron (2016)
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26. CurrencyConverter (2020)

** *These were numbered and listed for reading convenience. Because they are mostly data, they are rather repetitive and I did not constitute the necessity for in-text citations.*

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