

The Environmental impacts of offshore oil drilling : the case of BP oil spill

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Abstract:

oil exploration, whether land-based or offshore drilling, can cause severe environmental degradation and damage. This is why the oil sector has been among the leading industries in the implementation of corporate social responsibility (CSR).

Since 1896, oil exploration has started off continental coasts using offshore oil rigs. This operation can be dangerous and risky. Even though technology has improved, oil spills happen frequently, and can be catastrophic in bad weather conditions and natural disasters. The best example is the BP (British Petroleum) oil spill in the Gulf of Mexico that occurred in 2010, which is considered the biggest accidental marine oil spill in the history of the US petroleum industry. This terrible accident has caused major environmental damage to people, communities and especially to wildlife.

The aim of this paper is to gain insight into the social responsibility of offshore oil drilling by investigating real risks and environmental issues surrounding this activity, with the BP Deepwater Horizon oil spill as an illustrative example of the potential risks associated to offshore drilling for oil.

Keywords:

Le résumé:

La prospection pétrolière, qu'il s'agit d'un forage onshore ou offshore, peut causer de grandes dégradations et dommages à l'environnement. Ce qui explique pourquoi le secteur pétrolier était parmi les premiers à adopter la responsabilité sociale des entreprises (RSE).

plate-formes offshore. Ces opérations sont extrêmement dangereuses ; malgré le recours à des

techniques très évoluées, l'écoulement du pétrole ou ce qui est appelé la 'marée noire' est devenu fréquent avec de lourdes pertes enregistrées en cas de mauvaises conditions climatiques et catastrophes naturelles. A titre d'exemple, nous pouvons citer la plus grande marée noire accidentelle, qui a eu lieu au golfe du Mexique en 2012. En effet la compagnie britannique BP a causé des dégâts catastrophiques à l'environnement, aux habitants locaux, et surtout à la faune et la flore sous-marine.

Le but de cette communication est de mettre toute la lumière sur la responsabilité sociale qui entoure le forage pétrolier offshore, à travers l'analyse des risques environnementaux liés à cette activité, en prenant comme exemple la marée noire formée suite à l'explosion de la plate-forme pétrolière de BP 'Deepwater Horizon'.

Les mots clés : la Responsabilité Sociale des Entreprises (RSE), forage pétrolier offshore, la marée noire.

Introduction

Global warming has become an ongoing dispute due to its consequences that can be seen clearly all over the globe: seasons are shifting, temperatures are climbing and sea levels are rising.

Transnational corporations (TNC's) working in oil industry are accused by most of civil society's actors to have the main responsibility of what our planet is living these last and up-coming decades.

These multinational were the target of an uncountable negative and anti-corporate campaigns unleashed by anti-capitalists, anti-globalists, greens, non-governmental organizations (NGO's), and academics focusing on their environmental practices and abuse as well as other ethical questions.

There are serious environmental issues surrounding each of the activities included in offshore drilling for oil, starting with the surveys conducted to locate oil reserve, then drilling and processing extracted oil, transportation, air pollution from refineries' emissions and oil spills.

Basing on the list cited above, which is far from being exhaustive, the oil sector has been in the center of CSR discipline. Companies working in this field of business are expected, more than never, to contribute in the societies' development and welfare through CSR plans and programs.

Our aim in this paper is to explore the environmental repercussions of offshore oil drilling by presenting a case from reality which is the case of BP oil spill, and then we will try to discuss some arguments and ideas surrounding this industry. But first we should start by discussing the meaning of CSR in oil sector.

CSR in oil industry

Corporate Social Responsibility (CSR) has emerged as a business approach for addressing the social and environmental impact of company's activities. It can be connected to globalization where all civil society's actors have free access to watch and assess each aspect of TNC's activities, for instance: human and employee's rights, environmental protection, stakeholder rights, transparency, corruption and relations with local communities.

In order to be a socially responsive company, TNC's in oil sector have to engage in a wide range of development projects aiming at solving many of the world's pressing problems such as: poverty, climate change and AIDS.

In reality, companies that embrace CSR initiatives should help in building schools and hospitals, providing scholarships and micro-credit schemes to local people and contributing in capital and technology transfer.

In some developing countries, those CSR programs are of great importance to local community because of their government's failure to fulfill people's needs and aspiration, so no wonder if some of the biggest oil companies are regarded by many as a quasi-government.

The power of oil companies can be justified by an increasing dependence and reliance on fossil fuels. To meet the high levels of oil and energy consumption, the producing countries have witnessed a shift from land-based exploration which turned out to be less fruitful into what is known as Outer Continental Shelf (OCS) i.e. offshore oil drilling.

We will try to explore in the following section how did the activities of oil drilling emerge and develop off coasts and in oceanic territories? And what are the environmental impacts related to this kind of activities?

The shift to offshore oil drilling

Oil wells existed off continental coasts since 1986. It began precisely off the coasts of Summerfield, California, south of Santa Barbara. The first operations took place in shallow waters 1.350 feet (411 meter) from the shoreline, and 35 feet (10m) of depth using boardwalks, row narrow wooden piers. These later were replaced by steel pipes which were pounded till 455 feet (125m) below the seabed. The field produced only a modest yield, and even though it was abandoned several years later, an ecological disaster of beach blackened by oil and marred by rotting piers and derricks was left behind.

In 1947, advances in technology enabled firms to drill the first productive well beyond the sight of land, located 10.5 miles (17Km) offshore Louisiana coasts, but only in water depth of about 18 feet (5m). Operators finally succeeded to adapt land drilling methods to the under water's specific conditions, as well as they came up with sophisticated tools mainly made by steel instead of wood in order to build rigs and pipelines.

In 1950, a conflict about who has the authority to control and offer offshore leases appeared between the US Federal Government and coastal states. The absence of federal regulations in this matter led to a virtual halt of all leasing contracts on the Continental Shelf in the Gulf of Mexico, known as 'Tidelands dispute'. This dispute came to an end in 1953 by the adoption of an act that gave, from one hand, the coastal states the authority to lease up to three nautical miles from the coast, except of the States of Florida and Texas that won the right to lease up till nine nautical miles. In the other hand, US Federal Government had the authority to offer leases in coastal areas beyond states jurisdiction.

Referring to statistics, offshore oil drilling produced in 1954 only 133.000 barrels of oil per day, this production raised to reach 1.7 million barrels per day in 1971 which show the increasing development and revenues of this activity, after all legal disputes were settled.

Despite of several blowouts and incidents of different scales like the blowout in Santa Barbara channel in 1969, which was considered as the greatest accident in this new industry before BP oil spill, and other similar accidents at rigs in other counties like the one occurred in the Persian Gulf

and the Niger Delta in 1980, the North sea and the Mexican waters of Gulf of Mexico in 1979, Ronald Reagan's interior secretary James Watt assumed in 1982 that offshore oil drilling is 'America's great hope of reducing its dependency on foreign sources of petroleum'. This declaration came after the famous embargo of 1973-1974 made by the Organization of Arab Petroleum Exporting Countries (OAPEC).

Since the beginning of 1980's, the Gulf of Mexico witnessed a move from digging in shallow waters into exploration in deepwater. Deepwater usually refers to the depths of 1,000 feet (305m) or more, and the first site was discovered by Shell Company in 1975. The oil exploration and production (E&P) in deepwater was expanded using new technologies suitable to deepwater conditions, and it produced more than 10.000 barrels per day, while good wells onshore produced only few thousand barrel a day.

Oil companies competed with each other to go deeper and deeper to reach finally what is called 'ultra-deepwater' that refers to more than 5.000 (1524m) feet of depth. The amount of extracted oil increases simultaneously in this type of drilling.

In 2008 and 2009, offshore oil drilling was equipped with modern rigs, highly sophisticated and powerful, capable of lifting one million pounds or more. Working in both deep and ultra-deepwater, some of the firms were able to operate in water depths up to 12.000 feet (3658m) and drilling an additional 28.000 feet (8534m) below the seabed. This activity produced more than 200.000 barrels per day of oil and gas, and based on productivity of both onshore and offshore oil drilling, in 2009 and according to HIS-CERA (advisory and research services company), the average size of new deepwater discovery was about 150 million barrels of equivalent average of only 25 million barrels discovered in onshore fields. This can explain the boom in offshore drilling not only in the US economy, but in other countries such as : Brazil, West Africa, Russia, Norway and Canada.

Working offshore continental coasts started a century ago, and even if activities in deepwater and ultra-deepwater are still recent, we need to assess all environmental ramifications of these operations.

Environmental risks surrounding offshore oil drilling

Experts in this field have shed the light on numerous environmental problems associated to offshore drilling, but first we should know the nature of crude oil (petroleum) to really understand what it can cause to the nature.

Crude oil is a dark yellow-to-black oily liquid that is usually found in natural underground reservoirs. It was formed when the remains of animals and plants from millions of years ago were covered by layers of sand. Heat and pressure from these layers turned the remains into crude oil. This process is why crude oil is called a fossil fuel. Crude oil is extracted and used to make fuel and other petroleum products. It is a complex mixture of hydrocarbons, several minors constituents

(e.g. sulfur), and trace metals (e.g. chromium). This composition varies by the age of geologic formation from which it came. When this crude oil is released into the environment, lighter oils tend to be volatile, reactive, and highly flammable, while heavier crudes tend to be tarry and waxy and contain cancer-causing and other toxic substances.

Environmental problems in offshore oil drilling can be identified in each stage of oil E&P, and these are the most known impacts.

1. **Oil exploration- seismic surveys**

These surveys are conducted to locate and estimate the size of an offshore oil reserve by using high explosive impulses. The noise emitted from these surveys can kill fish or damage their eggs and hearing. As a result fish will find difficulties to locate prey or mates, whereas they become more susceptible to predators. The noise can also disrupt migratory patterns, and can lead to whale beaching.

2. **Drilling and processing oil**

It can be considered as the most harmful stage because it is a permanent phase unlike other possible accidents that could happen occasionally such as oil spill. In this phase, oil rigs release the wastes of oil E&P. these discharges contain mainly:

- Produced water that form 98% of the total waste. It consists of hydrocarbons that cause water toxicity and eventually aquatic toxicity.
- Drilling fluids (drilling muds) discharged during the drilling process. They contain toxic substances like: benzene, zinc, arsenic, chromium, iron, mercury, barium, and other contaminants that are used to lubricate drill bits and maintain pressure, e.g. barium acts as lubricant and increase the density of mud.

Tests have found a high concentration of these metals accumulated in the sea floor, often causing: malformation, smothering organisms, genetic damage and mortality in fish embryos.

In addition to these discharges, oil E&P release other dangerous substances among them: cutting (crushed rock), diesel emissions, and chemicals associated with operating mechanical, hydraulic, and electrical equipment such as biocides, solvent, and corrosion inhibitors.

3. **Air pollution**

Statistics have shown that over its lifespan, a single oil rig can pollute as much as 7.000 cars driving 50 miles (80Km) per day. The main polluter factor is greenhouse gases (GHG) that are generated directly by offshore rigs, and indirectly through refineries' emissions. These gases are behind climate change including: global warming, melting ice at the poles, and ocean acidification which means that ocean absorbs all CO₂ therefore carbonate become less available to marine organisms that need it to build shells and skeletal materials.

4. Oil spills

Oil spills are becoming more consistent due to different factors like : equipment failure, transportation accidents, human errors, tectonic events, and unstable weather conditions, for instance 115 platforms were destroyed and 124 spills were reported during Hurricane Katrina and Rita. Toxins within spilled oil have been related to a myriad of detrimental impacts to both marine and human life.

In aquatic ecosystem, those toxins act as hormones or anti-hormones that cause unusual phenomena such as: developmental deformations, genetic mutations, and reproductive problems. In real life, scientists revealed several abnormal facts like:

- Red crabs contain high concentration of toxins like: arsenic, barium, chromium, and mercury.
- Birds die from hypothermia as their feathers lose their waterproofing.
- Turtle die after ingesting oil-coated food.

Since toxic components bioaccumulate in fish, which represent an important food in all over the world, the threat reaches human life as well. Facts have demonstrated that people who eat fish and seafood from affected waters may experience neurological problems that can be even more severe when affecting children and fetuses causing impairment of physical and cognitive development.

Dermal contact with chemical materials of workers in the drilling sites, especially those who were victims of oil spills in addition to rescue workers, can cause among other diseases: hypokalemia, renal toxicity, respiratory distress, unconsciousness, anemia, leukemia, reproductive problem, developmental disorders, asthma attacks and cancer.

After more than a century of repeated violations and misconducts, that led to several ecological calamities, and despite the high levels of technological development and people's awareness, that can clearly be seen in behaviors of both civil society's members and stakeholders, still speaking of another offshore rig accident reflects that environmental issues aren't yet the top priority of oil firms, especially if the main responsible is a one-hundred years company.

BP oil spill: a case from reality

BP (former British Petroleum) is one among the largest companies in oil sector. Founded more than a century ago, this Anglo-Persian oil company has shown, before the last accident, an intense level of focus and commitment to establish itself as an environmentally-friendly company in spite of its previous reputation for legal and environmental transgressions and ethical misconduct.

BP invested in different researches aiming at diversifying its energy portfolio, especially by supporting sustainability and developing renewable energy. These efforts included: building wind farms for commercial use, solar panels to reduce greenhouse gas emissions and biofuels based on sugar cane and palm, or based on grasses and inedible plants. Moreover, BP was the first oil company to recognize the existence of global warming and to admit that it is a human-made.

All these great efforts and green image were destroyed on April 20, 2010 when the Deepwater Horizon, a floating deep-sea oil rig located forty-one miles (66Km) off the Louisiana coastline in the Gulf of Mexico, exploded and sank, killing eleven oil-rig workers and injuring seventeen, while the other workers on the rig were saved by a supply ship.

BP hired this rig from Transocean, Ltd to drill a new well a mile below the sea surface. This well was called 'Macondo' (after the name of the doomed town in Gabriel Garcia Marquez's novel 'one hundred years of solitude').

At first, the accident appeared to be only an explosion of the rig, and BP didn't seem responsible since it was not the owner, but later it turned out that 'Macondo', damaged in the explosion, started to leak thousands of gallons of crude oil in the Gulf. The well was leaking at an alarming rate and the immediate aftermath of the explosion indicated that the well spew 1000 barrels a day, then the rate began to increase; according to the department of interior, oil was leaking at rate of 20.000 to 40.000 to even 60.000 barrels per day.

By June 1 about 172.000 tons had leaked as all BP's repeated attempts to stop the spillage failed. On July 15, 2010, eighty- five days after the blowout, BP finally announced that it had found a temporary solution in a tightly fitted cap, which successfully contained the leaking oil, and it dug two relief wells to kill the damaged well. On September 21, 2010, US Federal Government declared the 'Macondo' well "dead".

After the oil leak was sealed, cleanup efforts started to reduce the damage and to prevent oil from spreading to the shoreline of coastal states. Chemical dispersants were widely used to dissipate oil slicks by breaking them up into water-soluble micelles that are rapidly diluted. The toxic toll of this event is that BP released of at least 4.9 million barrels of oil and it used at least 1.9 million gallons of dispersants to sink the oil.

Investigations to unravel the main cause of the accident didn't find anything, nevertheless, several contributing factors in the explosion were identified, among them: the well vulnerability, it seems that BP preferred 'a less costly well design because its installation was easier and costs were lower' than a safer alternative. BP was accused also of cutting short procedures and quality testing of the pipe that were meant to detect gas in the well; other partners in the project like Halliburton, Transocean and two other workers accused BP to not respect industry procedure in the pipe installations.

Environmental damage of the blowout

It may take years, if not decades, to really understand the magnitude of such ecological disaster (the second largest in the history). Two reasons can make the measure of environmental repercussions related to the spill a difficult job: the first one is that the economic system does not directly value wildlife decimated or damaged. The second one is that most environmental effects are long-term, so they can't be measured today, for instance, it took fish populations in Alaska 3 years to crash after the Exxon-Valdez spill.

Nonetheless, some ecological impacts have been already identified. According to official statistics from the US department of interior, the approximate environmental toll of the spill was:

- The death of 6.045 birds, 609 marine turtles and over 100 sea mammals.
- There have been reports of unusually large number -over 300- of bottlenose dolphins deaths, especially among very young dolphins.
- Over 1.000 miles of shoreline were heavily or moderately oiled.
- Thick oil reach sediment covering large areas of the ocean floor that appears to have smothered invertebrates, soft corals, sea fans and other things that live on the bottom.
- Large plumes of oil and gas droplets have been discovered at great depths where they stimulate growth of bacteria who depress the levels of oxygen in the water column.
- Oil and dispersants may have serious impacts on smaller ocean creatures that form the base of food chain like: plankton, floating eggs and larvae of fish, shellfish, shrimp, crabs and other wildlife in sensitive growth stages. These effects will take some time to be seen.

The ecological after-effects of BP oil spill are far from being over. Recently on April 12, 2012, Aljazeera has published an astonished report. The report indicated that the oil spill and the reckless use of dispersants led to frightening effects on sea creatures. Alarming number of deformities started to emerge like: mutated shrimp, fish with oozing sores and lesions, eyeless crabs...etc. Here's a list of deformities that Aljazeera stated in its report:

- Shrimp with tumors on their heads;
- Shrimp with defects on their gills and shells missing around their gills and head;
- Shrimp without eyes;
- Shrimp with babies still attached to them;
- Eyeless fish;
- Fish without eye-sockets;
- Fish without covers on their gills;
- Fish with large pink masses hanging off their eyes and gills;
- Clawless crabs and crabs with shells that don't have their usual spikes;
- Crabs with their shell soft instead of hard;
- Full grown crabs that are one-fifth their normal size;
- Crabs with holes on their shells;
- Crabs that are dying from within;

All these creatures were found still alive, but you open them up and they smell like they've been dead for a week.

Dispersants and chemicals used in the cleanup were the cause for creating these deformities, and they are known to be toxic to humans too. For instance, tests on oysters have shown elevated levels of nickel and vanadium. So eventually the cure may have been as bad as the disease. One of local people declared (in Aljazeera report): "we're continuing to pull up oil on our nets That is exactly what happens when someone spills oil and spray dispersants on it. People who live here know better than to swim in or eat what comes out of waters".

An important question has to be asked: if offshore drilling is so risky and cause more environmental harm than good, why policy-makers and governments, especially the US government after the 2010's disaster, didn't stop or at least reduce these activities?

There are several points and arguments that should be considered before answering this question, thus we will try in the following analysis to compare the benefits of this industry with its risks in order to come out with a whole picture before making any decisions.

Offshore drilling: costs VS benefits

The BP oil spill in 2010 has heated up the debate whether offshore drilling activities should be banned or should be allowed. Several arguments have been presented to justify the non-stop of operations; however, there is another side for each of these arguments. Our aim here is to convey the debate because obviously the decision is complex and not easy to make.

1. Economic damage

Drilling offshore may impact economic activities, especially in case of oil spill. Many industries like: fishing, tourism and recreation could be disrupted which can lead to high levels of unemployment because nearly 75% of jobs in coastal states are related to tourism and fishing.

2. Energy independence

Developed countries rely on this industry to wean up itself off 'foreign oil' to decrease its vulnerability to any sanctions imposed by unfriendly nations, like what happened during the 1973 oil embargo. 'Foreign oil' usually refers to oil that comes from Middle East or OPEC nations. Many of these countries have unstable governments, are prone to invasions, civil war, or acts of terrorism, especially during what is known the 'Arab Spring'.

3. High fuel prices

Most people think that expanding offshore drilling activities will reduce the price of gasoline at the pump; however, those prices are determined on the international markets, and they are

continuing to climb with countries like China and India are becoming more industrialized. In addition, the US energy information administration stated: "...drilling in the Pacific, Atlantic, and eastern Gulf regions would not have a significant impact on oil prices before 2030". So while waiting for price reduction, more economic and environmental damage is caused by drilling.

4. Renewable energy is not ready

The transition to full use of renewable energy will take some time and billions, if not trillions, of dollars. Therefore countries have to continue in offshore drilling, until other sources of energy are fully developed.

5. Oil spill

Facts have shown that spillage from offshore drilling rigs is rare comparing to tanker spills; over the last sixty years, there have been ten offshore drilling accidents and seventy-two oil spills from tanker accidents, i.e. for every offshore drilling accident, there are seven major tanker spills. Usually most tanker spills are larger in magnitude than offshore drilling accidents, and both are decreasing which reflects changes in shipping and offshore drilling technology.

Another argument in favor of offshore drilling is that studies of NAS, 2003 (National Academy of Sciences) have shown that 'releases from extraction and transportation of petroleum represent less than 10 percent of inputs from human activity'. For instance, some estimate that the amount of oil-based products Americans pour down their household drains exceeds 300 million gallons (or about 1 million ton, much more oil than the spillage from the Deepwater Horizon).

6. Ecosystem resiliency

Ocean ecosystem tend to have faster recovery times than either freshwater or land ecosystems because the area available for the dilution and dispersal of spilled oil droplets is so vast, because turbulence in the ocean helps aerate the water and because it is relatively easy for areas to be repopulated from adjacent areas once the disturbance has stopped, often within one to four years while it can take more than forty years for forestlands to recover from deforestation or fire.

Conclusion

Offshore oil drilling is taking an important share in CSR discussions and debates. This activity is becoming almost inevitable to developed economies and it continues to expand despite all halts and moratoria, and despite all severe damage that can cause to our ecosystem and planet.

Policy-makers, civil society's actors as well as media should consider different aspects and arguments before coming to any opinion or decision. CSR programs may also help to reduce the

environmental risks and to prevent similar accidents from happening in the future. Even though another debate can be opened here whether CSR programs are a real engagement with tangible impacts in real world, or they are just good intentions invented by politicians and oil companies' leaders to buy a short spell of peace.

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