

Buffer Zone Between Offshore Oil Exploration and the Environment in Belize

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Abstract

Belize has a “nature based” economy and its marine resources, particularly the Belize Barrier Reef System and its accompanying Atolls (recognized as a UNESCO World Heritage Site), serve as a major tourist attraction. Tourism is the country’s number one foreign exchange earner, however the Government of Belize has in the past granted oil concessions over significant portions of the country’s marine areas (both shallow coastal areas and offshore deepwater) without regard for national parks, marine reserves and other protected areas. Despite a recent ban on offshore oil exploration activity in Belize’s World Heritage sites - with a one kilometre buffer zone - there is still the threat that offshore oil industry activities outside the banned areas can be damaging to the environment. This paper looks at the oil spill risk that oil exploration activity poses to the environment, and determines – for Belize – a recommended buffer zone size between oil exploration activity and environmentally protected areas based on a number of factors.

Keywords

Oil, Exploration, Environment, Offshore, Buffer Zone, Drilling

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1. Introduction

1.1. Belize Oil Exploration History

Oil exploration, both onshore and offshore has taken place in Belize since 1956 [1].

The first exploration well in Belize was drilled in 1956 by Gulf Oil in the Yalbac area in Cayo District. Between 1956 and 1982, 41 exploration wells were drilled by major oil companies (including Gulf, Philips, Anschutz, Chevron, Esso and Placid). From 1982 to 1997, only nine further exploration wells were drilled by small or independent companies.

The exploration wells drilled in Belize before 1997 found some oil but there were no commercial discoveries. The majority of the offshore activity was in shallow water with the exception of the Gladden #1 well drilled in 1997 which was in 1000ft water depth.

In 2000, Belize passed the Petroleum Act into law which established the framework for opening up the Belize oil

industry to new concession holders.

Since 2004, many new oil concessions have been awarded, mainly to small newly formed oil companies, 7 in the offshore areas. Due to relinquishments there are only two remaining offshore concession holders, both with little or no relevant experience, who appear to be moving slowly ahead with plans for offshore oil exploration including seismic and drilling in the precious Belizean waters.

Belize has one main onshore oil producing field, brought online in 2005 by Belize Natural Energy Ltd. (BNE) in the Mennonite community of Spanish Lookout, which since 2009 has been in rapid decline. In 2011, BNE also completed the development of the Never Delay oilfield near Belmopan, however despite initial production rates of 300 barrels per day (bpd), this field’s production has now declined to less than 10 bpd and the field has been shut in.

Onshore exploration over the last few years in Belize has so far been unsuccessful in locating another commercial oilfield.

In addition to Belize’s onshore oil exploration activity, which

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has resulted in one rapidly declining producing field, there has been little activity offshore despite many concessions being awarded. Several offshore concessions have been relinquished over the last 5 years due to lack of oil potential or due to environmental concerns, however, there are still two offshore concession holders, both with little or no relevant experience, who appear to be moving slowly ahead with plans for offshore oil exploration including seismic and drilling in the precious waters of Belize.

Offshore activity has been limited with no additional seismic being acquired since 2004 and 2 offshore wells (1 incomplete) being drilled by Island Oil in 2007 the south of Belize off

Monkey River.

The last two offshore concessions, shown in Figure 1, were recently relinquished in Belize [3] and a ban of offshore oil exploration activity in the World Heritage Site areas – including a 1 kilometre buffer zone - was recently announced [4]. However there is still the threat that offshore oil industry activities outside these areas will damage the environment due to there being an inadequate buffer zone between oil activity and the World Heritage Site areas and other marine protected areas in Belize. This paper’s aim of determining how big a buffer zone is required between oil exploration activity and environmentally protected areas is therefore still very relevant.

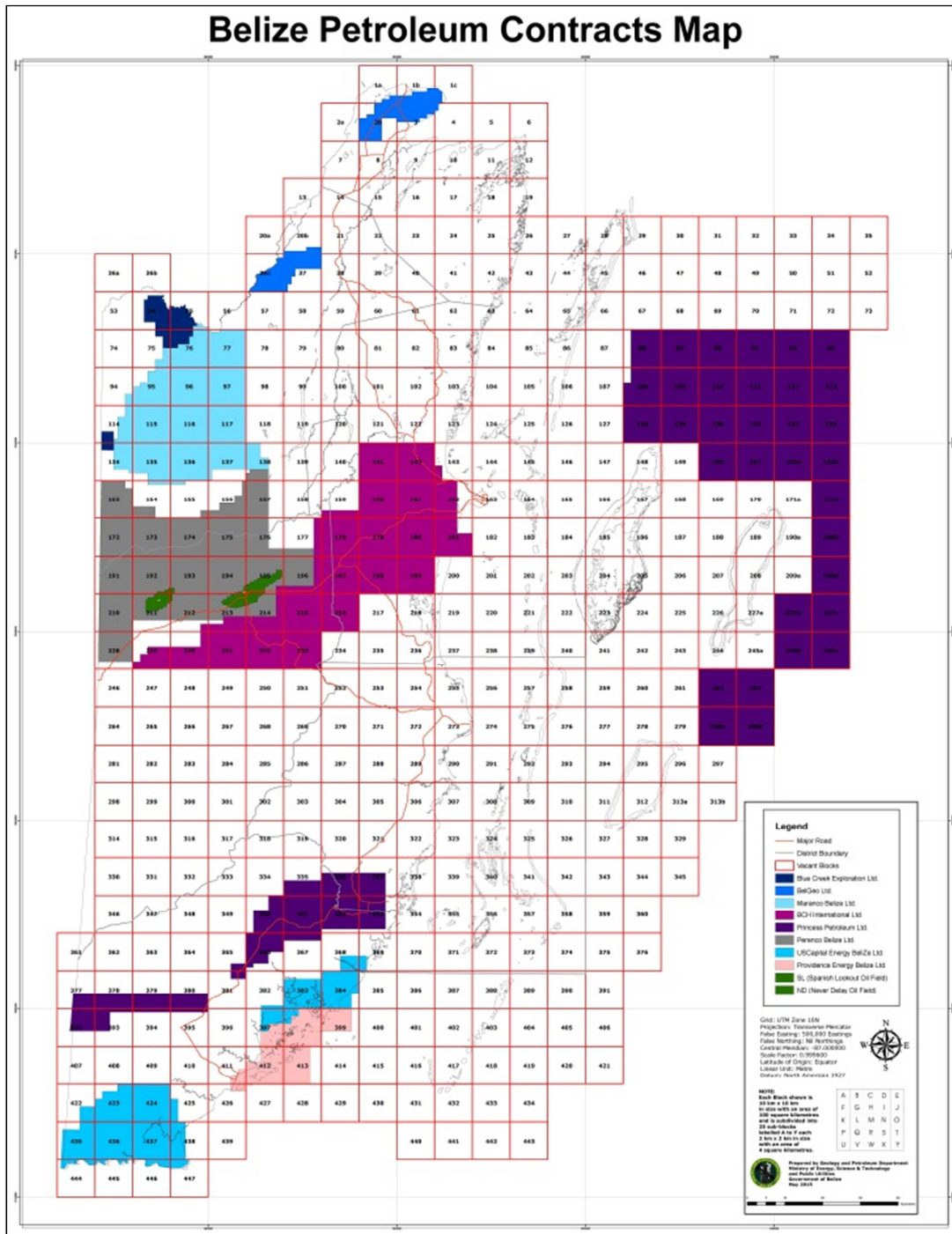


Figure 1. Map of oil concession holdings in Belize [2].

1.2. Belize’s Marine Protected Areas

The offshore oil exploration concessions in Belize, shown in Figure 1, appear to have been awarded without consideration for Belize’s marine protected areas.

Belize’s Protected Areas are critically important to Belize’s environment and the country’s main industry which is tourism are shown in Figure 2.

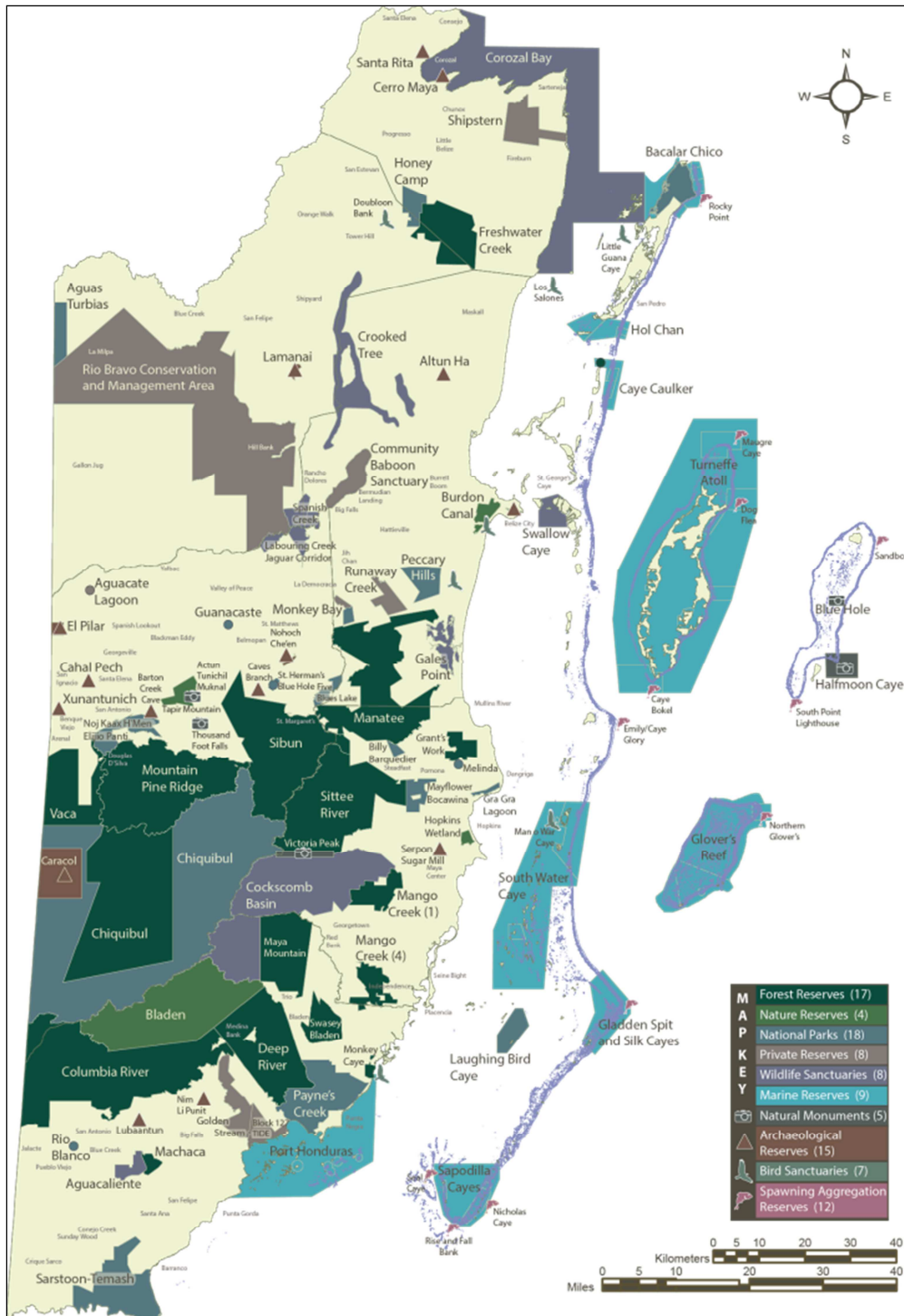


Figure 2. Map of Protected Areas in Belize [5].

Seven of Belize’s marine protected areas also make up the Belize Barrier Reef Reserve System World Heritage Site which was inscribed in 1996 and recognised as a “Site in Danger” in 2009 [6]. This characterisation makes it even more important to ensure that there is sufficient separation between oil exploration activity and marine protected areas in Belize. The marine protected areas that are included in the Belize Barrier Reef Reserve System World Heritage Site are shown in Figure 3.

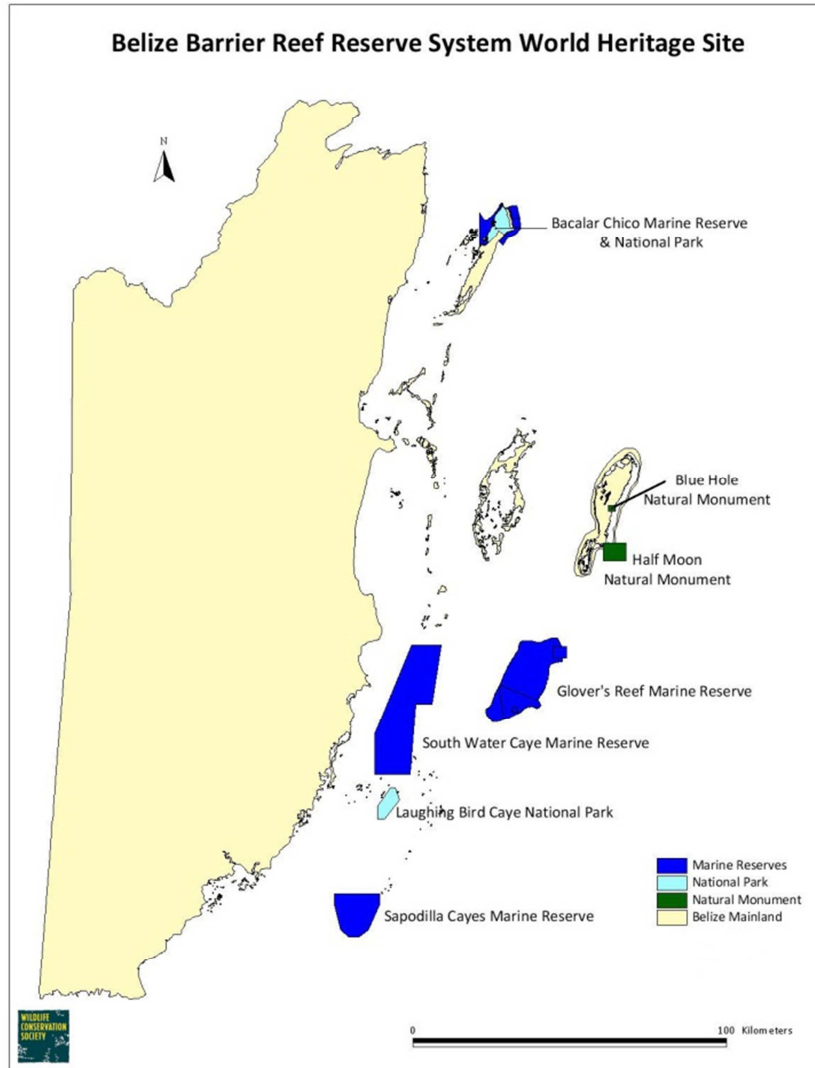


Figure 3. Map of Belize Barrier Reef Reserve System World Heritage Site [7].

1.3. The Importance of Tourism to the Belize Economy

Tourism is Belize’s number one foreign exchange earner with Belize rightfully earning its label as “Mother Nature’s Best Kept Secret”.

Table 1. Belize Economy Imports and Exports in 2014.

Belize 2014 Exports (SBz Million)	Belize 2014 Imports (SBz Million)
Tourism 775	Machinery and Transportation Equipment 391
Sugar and Molasses 118	Manufactured Goods 368
Marine Exports 112	Mineral Fuels and Lubricants 332
Petroleum 102	Food Beverages and Tobacco 280
Bananas 101	Commercial Freezone 223
Citrus 79	Export Processing Zone 219
Papaya 13	Oil Fats and Chemicals 187
Other 79	Electricity 42
	Other Goods 7
Total Exports 1379	Total Imports 2050

Sources of information:
 Central Bank of Belize data [8] used for all industries except tourism.
 World Travel and Tourism Council data [9] used for tourism.
 2 Belize Dollars (SBz) = 1 US Dollar (SUS)

The Belize economy, in terms balance of payments, comparing Foreign Currency Earnings (Exports) and Foreign Currency Expenditure (Imports), are presented in Table 1 - in order of contribution.

The above data shows that Tourism, at 56% of Belize’s foreign currency earnings, is more than all the other industries combined, this illustrates how critical this industry is to the economy of Belize.

The above data also shows that the monetary value of imports significantly exceeds exports, meaning that Belize has to continue borrowing and getting further into debt to keep the economy afloat.

2. Determination of Recommended Buffer Zone Size

This paper sets out to determine the size of a recommended buffer zone between oil industry activity and environmentally protected areas in Belize.

The oil industry worldwide is aware that all oil drilling operations in marine areas carries the risk, however small, of an oil spill occurring as the result of a loss of well control. In exploration wells this threat is higher than in development wells as the oil company doing the drilling does not know what rock formations and underground pressures it will encounter.

Oil companies take a number of measures to minimise the risk of a blowout and oil spill, however BP's recent experience in the Gulf of Mexico [10] has shown that even experienced internationally recognised operators can lose control of an oil well and experience a blowout and resulting oil spill with significant environmental consequences.

One major mitigation measure planned by oil companies around the globe is oil spill containment and clean-up to be prepared in the event that an oil spill does occur. These mitigation measures would involve the deployment of booms and dispersants in an attempt to contain and disperse the oil spill before it reaches environmentally sensitive areas.

In many countries around the world, government legislation dictates how close to sensitive environmental areas oil companies are allowed to operate in order to protect the environment. At this time there is no such guidance in Belize. Therefore the concept of working out how fast an oil spill may travel and how long it would take to mobilise containment and dispersal equipment can give very effective guidance in Belize for the minimum buffer zone for oil drilling activity. This logic is set out below.

Based on the logic set out here it is recommended that a Buffer Zone of between 91 to 210 miles between oil industry activity and environmentally protected areas in marine areas offshore Belize is adopted by the Government of Belize when considering what areas to open to offshore oil exploration.

In addition to applying a buffer zone, it is also recommended that all oil companies operating in Belize become members of Clean Caribbean and Americas for the duration of their drilling (and development) activity.

The logic and recommendations for the recommended Buffer Zone are set out below.

(1) Oil Spills Will Be Driven by Ocean Currents

It is assumed that oil spills would move with ocean currents. In response to a query by OCEANA Belize, John Borland the Commandant of the Belize Coastguard advised [11] that:

"The currents in the inner channel generally flow southward at 1-2 knots while currents along the atolls generally flow south east at 2 knots but eventually sweep out west. Currents outside the main reef tend to flow south east and sweep out west into the Gulf of Honduras around 2 knots or a little more."

While the direction of the currents will depend on many factors including location, time of day, weather and time of year, what is clear from the Commandant's advice is that oil spills driven by ocean currents would move at 1-2 knots.

(2) Time from Incident to the Deployment of Booms and Start of Dispersant Spraying

Due to the absence of suitable equipment to contain offshore oil spills in Belize [12] it is assumed that an oil spill in Belize waters would have to be handled using equipment supplied by Clean Caribbean and Americas based in Florida, United States of America [13].

Booms are used to protect shallow water environmentally sensitive areas and dispersant is sprayed on oil spills in deeper water to prevent oil reaching to prevent oil reaching them.

Expected time from incident until booms are deployed or the start of dispersant spraying is based on:

a) Time from incident to call out of oil spill response. This is assumed to be 48 hours, based on actual timings from the Deepwater Horizon incident, taking into account the date and time of that incident [10] and the reported time of initiation of response [14].

[This will be significantly longer than this if the oil company drilling in Belize is not a member of Clean Caribbean and Americas. It is recommended that all oil companies operating in Belize become members of Clean Caribbean and Americas for the duration of their drilling (and development) activity, in order to enhance their response and reduce the response times in the event of an oil spill incident.]

b) Time from call out to arrival of equipment in Belize is estimated as 24 to 30 hours [15].

c) Time to deploy the offshore equipment (boom, skimmers temporary storage) will depend on the time to unload, clear customs and truck the equipment to the seaport, availability of personnel and vessels, weather and the distance offshore to the spill site [15]. This is the most uncertain timing of the overall estimate, but an attempt is made here to estimate the shortest time for this.

- Time to unload the equipment from the aeroplane, clear customs, truck the equipment to the seaport and load it onto vessels is estimated as 12 hours.

- For this estimate, it is assumed that personnel and vehicles will be waiting at the seaport when the equipment arrives in the country, the company / government of Belize will have had 24 to 30 hours to mobilise these from the time of the equipment call out from Clean Caribbean and Americas.

- For this analysis it is assumed that oil spill containment equipment (booms) have to be transported by tug and barge and deployed at the mid-point of one of the two offshore concessions, those being 50 miles (in deep water offshore - a similar distance away to Lighthouse Reef Atoll) or 103 miles (in Port Honduras Marine Reserve) sailing distance from Belize City. Estimated sailing time is therefore between 7 and 15 hours based on a tug and barge travelling at 7 knots.

Estimated time for deployment of containment booms is

therefore between 19 and 27 hours. This estimate is highly approximate, actual time to deploy will depend on availability of suitable planes and boats for these tasks and could be much longer than this.

d) Based on the above, the time before oil spill control equipment (booms and dispersant) can be deployed is given by:

Time before oil spill control equipment can be deployed =
Time from incident to call out of oil spill response + Time from call out to arrival of equipment in Belize + Time for deployment of booms at location

Therefore, based on a), b) and c) above;

Time before oil spill control equipment can be deployed = 48 + (24 to 30) + (19 to 27) = 91 to 105 hours

It would take between 91 and 105 hours between the time of a marine oil spill incident in Belize and the start of deployment of containment equipment. 91 hours is equivalent to approximately 4 days.

(3) How Far Oil Could Travel Before Containment and Dispersal Equipment is Deployed

Based on the 91 and 105 hours elapsed time between a marine oil spill incident in Belize and the start of boom deployment and dispersant spraying as calculated in section 2d above and the coastguard's advice about the 1-2 knot speed of ocean currents offshore Belize in section 1 above, it can be calculated that oil from an oil spill would travel a minimum of 91 miles and a maximum of 210 miles from a spill before containment equipment or dispersant is deployed.

In order to protect environmentally sensitive areas in offshore Belize from the potential impacts of an oil spill, the recommended size of the Buffer Zone between oil industry activity and protected areas is 91 to 210 miles (146 to 338 kilometres).

3. Conclusions and Recommendations

Based on the technical analysis set out above, the conclusions and recommendations of this paper with regard to the buffer zone required between oil exploration activity and the environment in Belize are as follows.

To allow sufficient time to contain an oil spill resulting from oil exploration drilling, it is recommended that a Buffer Zone of between 91 and 210 miles (146 to 338 kilometres) between oil drilling activity and marine protected areas offshore Belize is adopted by the Government of Belize immediately.

It is also recommended that the Government of Belize stipulate that all oil companies operating in Belize become members of Clean Caribbean and Americas for the duration of their drilling (and development) activity.

Acknowledgement

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