



Oil Spillage in Nigeria's Upstream Petroleum Sector: Beyond the Legal Frameworks

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ABSTRACT

The adoption of a broad based sustainable development strategy, underpinned by prudent management of oil resources, coupled with an enduring model for conservation of the natural environment, is an imperative for the Nigerian State. Thus, the paper identifies specific gaps in Nigeria's environmental legal frameworks and shares critical international perspectives. The study entailed a descriptive legal analysis and utilizes relevant secondary sources. The paper opined that majority of oil spills in Nigeria are not usually addressed in the light of obtainable best practices, inspite of the negative environmental, health and socio-economic consequences. It emphasizes the government's overarching obligation to enforce applicable environmental laws and regulations. Also captured, is the corresponding responsibility of oil operators to ensure due compliance with their corporate obligations and by implication contributing to the achievement of fundamental environmental protection benchmarks. The paper recommends a holistic reform of relevant laws on the integral oil spillage subject matter.

Keywords: Oil Spillage, Law, Environment, Nigeria

JEL Classifications: K2, Q4, Q5

1. INTRODUCTION

The natural environment is the total aggregate of all external and tangible dimensions that affect the development of living things. These include the air we breathe, biosphere, hydrosphere the soil and the water. There are other subsystems connected to the wider eco-system that contribute to the sustenance of an interconnected global system. Oil spillage causes gross chemical and biological impairment to plants and animals; and contributes to ecological changes as a result of deleterious or toxic effects on community members (Kafada, 2012). It can promote unintended genetic effects amongst other harmful physiological and biological consequences. Also, the social economic downsides associated with oil spillage are very significant. However, it can be mitigated and prevented by a complement of policy, technological, engineering, scientific, regulatory and legal interventions.

Instructively, the Nigerian government earns majority of its foreign export revenues from crude oil sales. Notwithstanding this

fact, successive governments have been lethargic in addressing endemic oil spillage related environmental degradation. Several attempts by the stakeholders to curtail oil spillage have been fraught with corruption, capacity challenges and other systemic factors. The cleaning, restoration, reclamation and compensation efforts have also been plagued by policy inconsistencies. Multinational oil companies operating in host oil communities are usually at the centre of the oil spillage debate, and such will typically be linked with equipment failures; crude-oil bunkering, pipeline vandalization, acts of sabotage and force-majeure. These dimensions have significant impact on the ongoing remediation and cleaning efforts in selected oil producing communities (Okeowo, 2016).

The environment is adversely affected by the activities of petroleum industries operating in host communities, and this occurs majorly during oil exploration, drilling, transportation, processing and storage. Petroleum industries discharge gaseous, liquid, solid, products and wastes into the environment thereby

threatening human life; rendering farmlands and water bodies unfit for living entities (Oyewunmi and Oyewunmi, 2016). This unsustainable and hazardous industry practice; has grossly damaged the marine and surrounding environments with direct and indirect consequences.

As recent as three decades ago, oil and gas based legislations in Nigeria were not environmental centric. This posture impaired the legal capacity to effectively combat environmental degradation connected with oil development activities. However, the toxic waste incident that occurred in Koko town marked a shift in attitude towards environmental protection matters in Nigeria (Ogbodo, 2009). Consequently, Nigeria enacted several environmental protection laws to regulate oil spillages in the petroleum industry; undertook formalized regulation; generated practicable policies for natural resource preservation and conservation. Evidently, these laws appear to be inadequate and lack the deterrence effect relative to the scale of offences committed by oil operators and other groups (Aniefiok and Usenobong, 2016).

Petroleum exploration and production activities have constrained the right of Nigerians to a wholesome environment. This assertion is largely attributable to the multifaceted negative environmental consequences affecting various localities overextended periods. Ineffective government regulation and unsound environmental protection practices have promoted oil spills. In the same vein; vandalization, oil theft, and militant activities by varying groups have contributed to escalating this trend. The 1999 constitution of Nigeria specifically guarantees the right to life, and this implies that any activity that limits or contracts the inalienable right of every person to qualitative living, expressly contradicts the intendment of the constitution. It is this light that the subsequent paragraphs capture, the theoretical foundations of oil spillages; domestic oil spill incidents; specific aspects of the applicable domestic and international laws; de-risking the legal and policy impediments; recommendations and conclusion.

2. THEORETICAL FOUNDATIONS: AN OVERVIEW

It is important to provide some theoretical perspective on the social, economic and regulatory dimensions underpinning the subject matter of this paper. The oil spillage theme is primarily an environmental issue, but with far reaching tentacles that brings to the fore significant questions of; economic resource management, sustainable development, transparent community relations and corporate responsibility. Thus, the following captures the essence of these interconnected issues, whilst noting that each has its own dominant characteristics, and is subject to the peculiarities of the context under consideration.

Resource management has been and is still at the Centre of ongoing investigation in the sphere of social and political scientists (Tahvonen, 2000). Essentially, a country's long term socio-economic posture is dependent on the innovative development of non-renewable and renewable resources, coupled with significant contributions of the factors of knowledge and labour which

guarantees innovative and sustained value creation. A complement of this perspective is the cornucopian theory which emphasized the creative power of technology and free-markets to find substitutes for scarce resources. In similar respects, the neo-Malthusian school explored the scarcity of critical environmental resources and importance of regulating or controlling economic growth and population (Steiner et al., 2000).

It is also necessary to highlight the relevance of the "resource curse" theory as it emphasizes to certain degrees that; mineral resource abundance in less developed economies tends to generate negative development outcomes such as; high levels of corruption, ineffective governance institutions and significant incidents of political instability and violence (Jonathan, 2010). Instructively, many research findings have established a historically positive relationship between resource abundance and industrial growth in several of the currently developed economies (Innis, 1930; Watkins, 1963; Findlay and Lundahi, 1999). This clearly indicates that there are fundamental lessons for the undeveloped economies of today, especially in view of evident contraction of natural resources. However, there are other underlying factors such as technology penetration, policy preferences, long-term trans-regional security and stability, which may significantly vary the contextual outcomes.

The long-term sustainability and viability of any corporate entity depends to a large extent on how efficiently it manages the diverse range of accessible resources. This proposition is applicable to the public and private sector based organizations irrespective of the size classification. This outlook validates the contextual specifics or fundamentals of the economic based resource management theories, coupled with underlying policy and governance preferences that are responsible for varying institutional outcomes.

Importantly, efficient resource management portends the development of adaptable or innovative models that reflect both sustainable resource use and limit to the barest minimum, the negative direct and indirect environmental consequences. The central role of preserving the sanctity of the environment is instructive, as all forms of economic activity are connected to the environment in one or more respects. Hence, upon recognition of the requisite phases or layers of interaction, it lies upon the various stakeholders to collaborate to ensure that socio-economic development is achieved equitably. This dimension is critical as it promotes an approach that protects and secures the well-being of present and future generations.

The widely ratified Rio Declaration of 1992 aptly depicts the various aspects that need to be integrated into any productive discussion on resource management; especially in terms of the evolving economic, social, and environmental dynamics. However, specific components can be adopted or adapted in strategic economic sectors depending on the human and material configuration of the contexts. These theories, especially the salient narratives are applicable to Nigeria's oil spillage debacle as there are evidences of oil and gas resource wastages, poor accountability culture in the upstream sector; weak governance

structures; intense competition for material and non-material resources; institutional deficiencies and the added challenges associated with a maturing regulatory environment. The requisite adjustments and interventions need to be made based on an objective assessment of the existing and emerging issues connected with oil spillage in Nigeria.

3. OIL SPILLAGE INCIDENTS IN NIGERIA'S UPSTREAM PETROLEUM SECTOR

Mobil Producing Nigeria Unlimited was fined Ten Million Naira by National Oil Spill, Detection and Response Agency for infringement of the provisions of Oil Spill Recovery, Clean Up, Remediation and Damage Assessment Regulations 2011 and for failure to clean up the oil spill incidence that occurred at Qua Iboe Terminal in 2015. In the Bonga oil field coast of the Niger Delta, about 40,000 barrels leaked along the coast of the Niger delta. Shell claims that the escape stopped and eviscerated before getting to the shore. However, National Oil Spill, Detection and Response Agency confirmed that the spillage affected the offshore ecosystem. The penalty awarded to Shell was not adequate considering the adverse effects of the spillage on the environment. One would have expected application of stiffer penalties on Shell to serve as a firm deterrence to future infractions.

At the Chevron North Apoi Gas Rig in Southern Ijaw in Bayelsa state; a blowout took place on January 16, 2012. It caused severe gas fire and accidental spillage which continued for over 46 days, causing critical damage to the ecosystem. The oil spills that have occurred from upstream petroleum operations have remained largely un-remedied due to weak enforcement of environmental laws and regulations (Olujobi, 2017). Evidently, there are recurring questions about the fulfilment of contractual obligations on the issue of effective cleaning up of oil spillages and the restoration of affected localities back to conducive states. Due to the poor transparency record attributable to Nigeria's upstream sector, other incidents will probably come to the light and will further lend credence to the scale and scope of this environmental hazard.

4. ENVIRONMENTAL PROTECTION IN NIGERIA: A REVIEW OF SELECTED LAWS

Nigeria has enacted several laws to regulate oil spillages amongst other environmental issues connected with oil and gas activities. In spite of the statutory variety in this legal/policy sphere, the vibrancy and contributions of the enabling laws are indeed questionable. Hence, the following sub-headings provide an exposition on the essence of selected laws on the broad subject of environmental protection as well as its implications for oil spillage prevention and mitigation.

1. The 1999 Constitution of the Federal Republic of Nigeria (As Amended). Chapter two and specifically Section 20 of the constitution guarantee the right to a healthy environment. It expressly states the obligations of the government on protection of the ecosystem, preservation of water, air, land, flora and fauna in Nigeria. However, the constitutional provisions stated above are non-justiciable in the Nigerian courts. This singular point is a major setback to environmental protection efforts in general and oil spillage in particular. It is opined, that necessary interfaces such as industry practices, legal interpretation and due enforcement must be developed to bring forth the intendment of the guaranteed express rights. A contrary posture in all reasonable estimation jeopardizes the socio-economic wellbeing of the primary, secondary and tertiary stakeholders.
2. National Environmental Standards and Regulations Enforcement Agency Act, 2011. The Act established a statutory body saddled with the obligations of enforcing ecological laws and regulations. However, the enforcement of environmental laws and regulations in the upstream petroleum sector is totally outside scope of the authority of the agency (Adeyemo, 2008). This constitutes an operational lacuna in the act, as it diminishes the potential for capacity deployment which comes at a high premium in the upstream sector. Hence, requisite amendments must be made to increase the scope of the agency in this significant aspect. It further brings to the light the systemic malaise in Nigeria where parallel agencies are established to perform similar functions, ultimately escalating the culture of redundancy and resource waste.
3. National Oil Spill Detection and Response Agency Act, 2006. The primary purpose of the Act is to ensure standardization of procedures for recovery of oil spills, clean up and restoration of impacted areas to their original status. Also, the enabling agency administers the procedure for assessment of damage for settling compensation claims. Section 39 of the Act also requires the owners of oil production facilities to comply with specific statutory obligations such as; carrying out the necessary clean-up operations and to furnish reports to the environmental agency. It is noteworthy that the agency manages the execution of Federal Government's policies on National Oil Spill Contingency plan. This outlook is consistent with that of the International Convention on Oil Pollution Preparedness Response and Cooperation. Furthermore, there are attached penalties for breach of obligations, even as such overtime does not seem to have delivered the necessary deterrent effect in the upstream sector. Thus, it has become imperative in view of the critical states of affected communities to deploy more innovative and enduring options to punish non-compliant operators. Perhaps a composite of mechanisms should be applied in ensuring application of sanctions at different levels depending on the degree of the infractions.
4. Environmental Impact Assessment Act, 1992. The Act principally provides for compulsory impact assessment of all public and private projects at the commencement stage. It promotes knowledge sharing on how to address the environmental impact of projects especially as the long-term wellbeing of community members are primal in the overall estimation. However, disregard for ethical standards, poor data collation, unsophisticated monitoring practices and

corrupt tendencies have been major challenges to practical assessment various categories of projects. The Ministry of Environment is culpable in this regard by not leveraging on the spread of its state counterparts to aggregate, deploy and reappraise environmental impact assessment undertakings.

5. The Petroleum Act, 2004.

Section 9 (1) (b) (iii) of the Act provides for the preclusion of pollution of water. Similarly, the petroleum drilling and production regulations, regulation 25 provide for deterrence of contamination of internal waters, waterways by oil, mud other fluid materials which may pollute or trigger harm to fresh water. The above provision imposes vague legal duties even as all operators in the oil sector are to required take urgent measures to stop effluence. The act prohibits destruction of economic trees, unauthorized interference with water and fishing rights. In essence, it seeks to safe guard the life styles and socio-economic well-being of community members which further amplifies the significance of the oil spillage debate. The provisions of the Act appear to be out of tune with global oil spillage regimes and industry prevention methods. This is instructive especially as the emphasis needs to shift towards more sustainable exploration and oil development practices. Also, the Act failed to stipulate penal sanctions for environmental control and preservation for petroleum industries' operations. This affirms the importance of closing the gap amongst industries, policy makers and communities affected in varying respects by oil spillage.

6. Oil in Navigable Waters Act, 2004.

The legislation contains provisions for the prevention of pollution of the sea relative to the oil product. The Oil in Navigable Waters Act, a replica of 1968 compilation, is relatively behind the times and does not mirror modern trends geared at reducing the incidence of oil spillage. Specifically, the punitive measures imposed by oil in navigable waters act are completely insufficient because the fines imposed are exceedingly low and do not reflect the widespread and long-term cost implications associated with oil spillage. There are evident gaps in terms of provisions; compelling the liable party for oil spillage to clean up the water after the spill or to provide funds to clean up the affected areas. This omission further negates the significance and integral role of oil resources to Nigeria's social-economic development. The culpable parties should thus be held accountable having been vested with the contractual latitude to explore for oil resources.

7. The Oil Pollution Act, 2004.

This law specifically deals with matters of oil spillage prevention and control and provides the requisite guidelines for the both public and private interests. Beyond the stipulated penalties that have not significantly addressed the oil spillage dilemma; there is an urgent need to devise collective solutions that will effectively address the hydra-headed problem of oil spillage. This dimension is instructive as there are many culpable actors that have been linked directly or indirectly to various oil spillage incidents.

8. Oil Pipeline Act, 2004.

The Act provides for issuance of licenses for and production and maintenance of oil pipelines. Pipeline infrastructure is central to the transportation of crude as well as refined oil

to designated locations. Hence, the applicable laws must accommodate industry processes that promote best industry practices to ensure optimal growth and sustainability of this important phase in the oil and gas value chain. Instructively, the act should be harmonized with the proposed petroleum industry governance bill to serve an omnibus legal frame work for the oil and gas sector (Olujobi and Oyewunmi, 2017). Undoubtedly, vandalization of pipelines in Nigeria contributes its own fair share to the significant quantities of oil spillage. Thus, it is necessary to capture this dimension in terms of pipeline design and deployment.

9. Criminal Code Act, 2004.

By virtue of Section 245 of the criminal code; it is a crime for anyone to pollute the water of any spring, stream, well tank, lake or place to contaminate and make it unhealthy for the intended or designated purposes. The section has not been duly enforced by the Nigerian police owing to institutional lapses and other operational deficiencies. The code provides a viable legal platform to emphasize the importance of environmental protection. There are severable verifiable incidents both at the corporate and individual levels that can serve as precedents for future cases that Centre on this sub-theme linked to oil spillage. The elevated standard of proof required in criminal matters might however constitute a disincentive to adopt this legal option, coupled with the capacity and financial costs of securing successful prosecutions.

5. ENVIRONMENTAL PROTECTION: THE INTERNATIONAL OUTLOOK

The international perspective provides a veritable benchmark to assess the practicalities of Nigeria's domestic statutes and regulations. This approach is deployed with due circumspect taking due cognizance of contextual variations and underlying policy considerations in various specific jurisdictions.

1. Vienna Convention for the Protection of the Ozone Layer, 1985.

The convention constitutes an international, multilateral environmental agreement which has been ratified by about 197 United Nations Member States. It entails a broad framework geared at protecting and mitigating depletion of the ozone layer. However, it falls short of setting legally binding reduction targets for utilizing CFCs, which have been established as a major ozone layer damaging chemical component. Importantly, the Montreal Protocol on Substances that Deplete the Ozone Layer, 1987 seeks to remedy this omission. Nigeria acceded to this agreement in 1988 and thus has a legal and moral obligation to integrate the set standards into specific oil and gas operations, particularly in the light of the direct and indirect impacts of such on the shared global environment.

The non-binding dimension of this international agreement is an indicator to the varying prospects on the sustainability of future alternative energy sources. Thus, oil and gas production, coupled with the numerous distillates in the value chain, still contribute in significant respects to the global CO₂ emissions. This clearly

affirms that oil based sources are still the leading source of energy underpinning economic growth processes. It also implies that domestic policies will be designed to harness the greatest economic benefits even at the expense of global environmental standards. At the least, available historical evidences support such a trend and culture. Moreover, dominant global economies have either sustained emission levels or have devised other means to justify and compensate for relatively high emissions attributable to their various jurisdictions.

2. Convention on Biological Diversity, 1993.

This international agreement is very important in terms of its cross-disciplinary characteristics which covers international law, environmental law, international relations and sustainable resources development. It asserts in fundamental respects the undeniable contributions of marine life and environment to the sustenance of humanity. Hence, the corresponding obligation to protect and preserve the sanctity of the marine and aquatic environment as well as the vital resources of its harbours. Subsequent to the law coming into force in 1993, it was ratified by about 180 countries. In furtherance of the underlying significance of the issues raised by the law; international sessions have been organized to mobilize the requisite scientific, technical and financial capabilities.

The implications of this law are evident for Nigeria that has awarded many oil licenses covering identifiable areas in the offshore. Importantly, the responsibility to protect the marine life and the socio-economic lifestyles of the host communities in the concerned areas is sacrosanct. The well documented ecological damage resulting from oil spillages and the attendant civil unrest in the affected localities; further attests to the interconnectedness of human activity to the preservation of the natural environment. However, there seems to be a renewed commitment to address this anomaly. This is in the light of recent governmental actions and initiatives to commence cleaning up efforts in the Niger-delta, an aquatic region, which has since become a "basket case" for oil related environmental degradation.

3. Rio Declaration on Environment and Development, 1992.

The Rio declaration on environment and development has its historical antecedents in the United Nations Conference on Human Environment, adopted at Stockholm in 1972. The principles captured in this law are futuristic, as it affirms amongst others the inalienable rights of people to development, whilst also stipulating corresponding obligations to protect a shared and common environment. Essentially, it restates the role of identifiable actors in developing new models and arrangements that prioritize environmental and development objectives.

Specifically, it recognizes the central role of human beings in sustainable development undertakings, notes the importance of equitable balancing of environmental and development objectives taking due cognizance of present and future generations; establishes the nexus between eradication of poverty and sustainable development, as well as the essence of active collaborations, affirms the fundamental role of environmental legislations and the necessary adjustments and highlights the

significance of environmental protection ideals in times of warfare.

The tenets of the Rio declaration are apt for the Nigerian context in many substantive respects. It is well-established that Nigeria is still heavily dependent on oil and gas revenues, which suggests that collateral environmental damage must be mitigated to the minimum. As global and domestic energy diversification efforts unfold; the aftermath of oil and gas dependency must be deliberately fashioned to usher in an era of economic sustainability and social well-being. The indicators do not bode well at this time, especially against the backdrop of weak global oil prices, widening of the poverty gap, local and global security concerns and lowering of the environmental agendas in certain forums. However, there is no alternative to this long-term project which guarantees the viability of human existence.

4. Ramsar Convention on Wetlands, 1971.

The Ramsar convention has evolved from covering a limited scope of environmental matters to being more inclusive in outlook. Hence, it seeks to address evolving environmental trends and concepts involving sustainable use of a cocktail of wetland resources. There are specific obligations for the contracting parties to this international convention, whilst noting that it is not classified as a component of the United Nations and United Nations Educational, Scientific and Cultural Organization (UNESCO) system of environment conventions and agreements. However, it seems to have a broad subscription of member states totalling about 158 as at 2009, whilst highlighting that non-compliance with the provision of the convention do not attract any punitive sanctions apart from the moral weight that is usually implicit upon aligning with the collective assent or adoption.

Nigeria is a signatory to this international convention, but in spite of the relevance to the demographic dynamics; socio-economic characteristics and development goals; there has been a lack of concerted efforts at optimizing the agenda captured by the fundamentals of the conventions. Specifically, there are opportunities for Nigeria in terms of express provisions on, matching of listing criteria for local wetlands; benchmarks for wise use commonly referred to as sustainable use; establishment of wetlands reserves and training for sustainable management and promotion of international collaborations particularly in cases of shared or trans-boundary wetlands.

6. DE-RISKING THE LEGAL AND POLICY IMPEDIMENTS

A principal factor militating against effectiveness of Nigeria's oil spillage legal regime; is the persistent overlap that subsists in the delivery of regulatory functions. Duplication of ecological guidelines, policies and responsibilities amongst statutory agencies hamper optimal performance. Also, perennial delays in the budgetary appropriation and release of funds for the execution of environmental policies in Nigeria have serious implications for achievement of environmental management objectives (Aniefiok and Usenobong, 2016).

Administrative bottlenecks and poor environmental governance are other major challenges to optimizing Nigeria's oil spillage legal regime (Emiri and Deinduomo, 2009). Furthermore, inadequate awareness on integral issues of environmental protection, conservation, management, biodiversity and sustainable development; further escalate the complexities of mitigating the direct and indirect consequences of oil spillage (Orhioghene, 2011). Inconsistent and untimely access to oil spillage data and poor access to environmental degradation activities in the upstream sector also hinder the implementation of environmental laws by the agencies.

The above contribute in several respects to impairing an already ailing sector that has been plagued for extended periods by layers of mal-governance and corruption. Thus, the simplification of the layers of legislation is central to the re-engineering of policies to positively impact on the various operating environments. This end will not be easily attained, especially as the oil majors have the advantage in exploiting technical and governance gaps to the detriment of the larger society. Perhaps, an integrated and collaborative approach amongst the identifiable stakeholders is non-negotiable in delivering the requisite outcomes over the short to the long term.

7. RECOMMENDATIONS

The need for comprehensive review of existing environmental laws and regulations is imperative to reflect current environmental methodologies, trends and evolutions. This is indicative of practical approaches aimed at closing the gaps between research efforts and industry requirements. The need for establishment of environmental courts vested with special powers and jurisdiction to enforce breach of environmental laws is long overdue, in the light of the social and economic costs attached to uncertainties and delays in several ongoing civil and criminal cases. Another option may be to refine the current judicial arrangement to expedite this class of cases, owing to the far-reaching implications that may jeopardize the quality of human existence.

There is need to strengthen the regulatory agencies for improved efficiency, coupled with the aspect of role streamlining for enhanced collaborations. For instance, in the latter case; enforcement of Environmental Impact Assessment Act is being executed by both the Federal Ministry of Environment and the Department of Petroleum Resources. This arrangement is not sustainable in terms capacity utilization and resource management. There is also need for the institution of non-judicial grievance strategies such as; oil spillage self-monitoring mechanisms by the upstream operators, debarment from participating in public contracts and director disqualification should be deployed as required. However, criminal and civil sanctions must be judiciously applied to deter oil spillage in the sector. The underlying issue being that the applicable sanctions should measure comparatively and quantitatively with proven infractions or offences. This will promote transparency, fairness and equity, all of which constitute fundamental elements that are being eroded in Nigeria's oil and gas industry.

8. CONCLUSION

To some extents, Nigeria's legal regime on environmental protection has contributed to mitigating oil spillage and other associated environmental problems. However, a holistic review of the legal framework is necessary to minimize statutory inconsistencies; help to control implementation costs and lower administrative redundancies. Although there are some lacunas in the applicable laws, a strong political will and increased commitment across levels of government will promote environmentally sustainable practices. There should be valid interventions on the part of regulatory agencies which should be distinguished from random interferences with legitimate corporate activities. This will help to ensure fair and transparent engagement towards deescalating apparent and non-apparent grievances.

The paper revealed some gaps in the existing laws and the need to establish a veritable balance amongst the public and private actors in the oil and gas industry. The writers further emphasized that optimizing the diverse environmental legal regime is fundamental for combating the multifaceted oil spillage dilemma. Thus, effective implementation of environmental laws and complementary regulations is sine qua non for sustainability of the environment, whilst taking due cognizance of the rapid technological advancements in the industry.

The roles of legal regimes in regulating oil spillage and other environmental challenges in Nigeria for achieving sustainable development cannot be overemphasized. Law as an effective tool to control and manage social problems and economic growth and exigencies should not be sacrificed on the altar of healthy environmental protection to promote environmental sustainability. After all, law is essentially an instrument of social re-engineering, so that in this instance it can be deployed in specific respects to entrench ethical corporate practices; promote societal well-being and longevity and reject practices that undermine and repugnant to legitimate global standards and values.

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