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## Nigeria: Environmental Issues

### Introduction

Ever since the discovery of oil in Nigeria in the 1950s, the country has been suffering the negative environmental consequences of oil development. The growth of the country's oil industry, combined with a population explosion and a lack of environmental regulations, led to substantial damage to Nigeria's environment, especially in the Niger Delta region, the center of the country's oil industry. The country also faces environmental challenges from air pollution and desertification, with the encroachment of the Sahara Desert in the north and severe air pollution in overcrowded cities such as Lagos and Abuja.

The Niger Delta's main environmental challenges result from oil spills, gas flaring and deforestation. Oil spills in the Niger Delta have been a regular occurrence, and the resultant degradation of the surrounding environment has caused significant tension between the people living in the region and the multinational oil companies operating there. It is only in the the past decade that environmental groups, the Nigerian federal government, and the foreign oil companies that extract oil in the Niger Delta have begun to take steps to mitigate the damage.

### Air and Marine Pollution

The Niger Delta region remains fraught with ethnic unrest. The Ogonis, an ethnic group that predominates in the region, have protested that not only have foreign oil firms degraded the local environment, but that the Nigerian federal government also has acquiesced by not enforcing environmental laws and regulations. Clashes between tribal groups and security forces have resulted in numerous deaths, as well as periodic disruptions in oil production. Protest actions occur with regularity, with local youths seizing oil platforms or taking hostages and forcing oil companies to withdraw their staff and/or to halt oil production until their demands are met.

### Marine Pollution

These protests are the result of the environmental degradation that has occurred--and is perceived to be continuing to occur--in the region as the result of oil development by multinational oil companies. There have been over 4,000 oil spills in the Niger Delta since 1960, and gas flaring from oil extraction has resulted in serious air pollution problems in the area. One of the most visible consequences of the numerous oil spills has been the loss of mangrove trees. The mangrove was once a source of both fuelwood for the indigenous people and a habitat for the area's biodiversity, but is now unable to survive the oil toxicity of its habitat. The oil spills also had an adverse effect on marine life, which has become contaminated, in turn having negative consequences for human health from consuming contaminated seafood.

The perceived indifference of both the Nigerian federal government and the oil companies to the environment in the Niger Delta has been exacerbated by Nigeria's lack of coherent pollution control

policy. Until recently, there was little incentive for power plants to implement pollution abatement strategies or for oil companies to undertake environmental remediation efforts, as the Nigerian federal government was unwilling or unable to enforce environmental laws. However, the Nigerian federal government has indicated that it is no longer willing to tolerate oil companies absolving themselves of their responsibility to reduce pollution. Chief Ime Titus Okopido, the Minister of State in the Federal Ministry of Environment, noted that future drilling rights will be "closely determined by" companies' environmental compliance, in addition to their submission of an environmental impact assessment for the proposed site.

In July 2002, the Nigerian government ordered oil companies operating in the country to comply with the Environmental Guidelines and Standards for the Oil Industry, published by the Department of Petroleum Resources (DPR), the monitoring arm of the Nigeria National Petroleum Corporation (NNPC), or risk paying a fine. The 300-page guidelines provide rules to reduce pollution and procedures for environmental monitoring. The DPR also has been tasked with conducting regular health, safety and environment audits of the oil companies.

The Nigerian government has taken action to show it is serious about enforcing environmental regulations. In March 2003, the Nigerian subsidiary of Shell was ordered to pay \$1.5 billion to the Ijaw tribe for the company's actions in the state of Bayelsa over a 50-year period. A government committee that investigated Shell ruled that the company was responsible for a number of oil spills and environmental incidents, including an epidemic in 1993-1994 in which 1,400 people were killed that was blamed on a Shell oil spill. The government committee blamed the prevalence of cancer in the region on exposure to the company's oil spills, noting the Shell continually refused to pay compensation for these spills, and where it had, the payment was inadequate.

As a result of the more stringent environmental regulations, oil companies that operate in the Niger Delta have begun highlighting their environmental performance. ChevronTexaco said in June 2003 that it had spent \$400 million over the course of the last decade on measures to protect Nigeria's environment and population. In addition, the Nigerian government has now committed to ending the process of gas flaring from oil production by 2008. The continued process of gas flaring has not only meant that a potential energy source--and source of revenue--has gone up in smoke, but it is also a major contributor to air pollution and acid rain. The phasing-out of gas flaring has been consistently pushed back as Nigeria has focused on boosting oil exploration and production in order to generate much-needed revenue for the government, but the 2008 deadline now appears firm as infrastructure to monetize the associated gas from oil production is in place.

### ***Air Pollution***

Nevertheless, even with the end of gas flaring, air pollution is likely to remain a problem in Nigeria, as other sources such as automobiles and diesel-fired electricity generators contribute to the choking air in cities such as Abuja and Lagos, which are plagued by daily smog shrouding the skyline of the central city. Studies carried out by the Federal Environmental Protection Agency (FEPA) show a moderate-to-high concentration of pollutants such as carbon monoxide, sulfur dioxide, nitrogen oxides, organic acids and hydrocarbons in the atmosphere, the majority of which come from automotive engines and industries. The population explosion in Lagos since the 1960s during the 1970s oil boom put tremendous pressure on city government resources, which could not keep up to manage traffic adequately.

Despite having a population estimated at 12 million, Lagos does not have a subway or intra-city rail service, leaving residents dependent on automobiles for transportation. The country's oil boom and low oil prices also have led to an influx of cars and consequent traffic congestion which continues to get worse. The government has now banned the importation of cars that are more than five years

old in an attempt to limit the number of old, polluting automobiles. At the same time, however, irregular power supply in Lagos has prompted residents to turn to diesel-fired electricity generators, which add to the air pollution with their thick, dark smoke when they start operating in the event of the frequent power cuts. Every skyscraper in the city has several standby generators contributing noxious fumes to the air, and most homes also have a generator just in case.

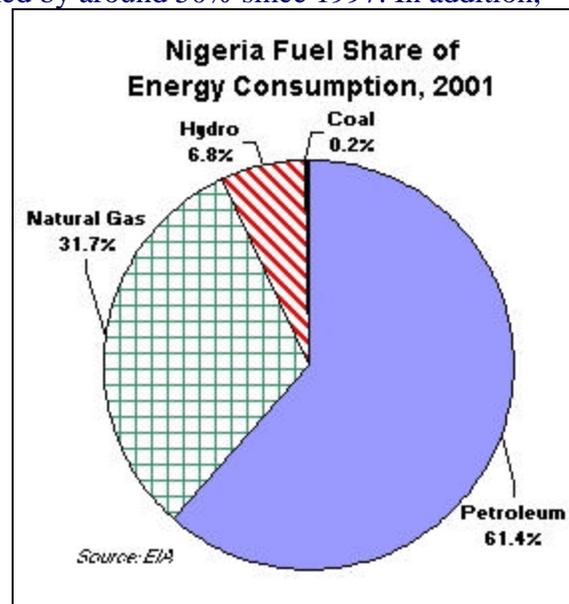
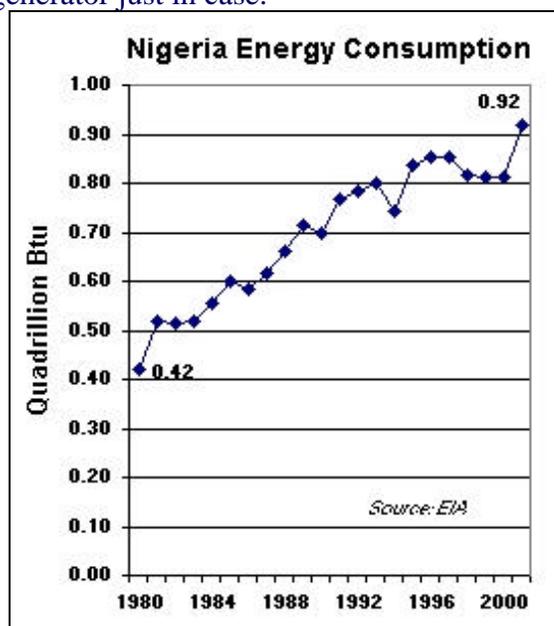
### Energy Consumption

Nigeria's total primary energy consumption has more than doubled since 1980. Owing to its continuing population boom and the further development of the country's economy (fueled by oil development), Nigeria's energy consumption has risen from just 0.42 quadrillion Btu (quads) in 1980 to approximately 0.92 quads in 2001. By way of comparison, South Africa consumed 4.6 quads in 2001, Egypt consumed 2.13 quads, Algeria consumed 1.31 quads, and Libya consumed 0.65 quads.

Petroleum consumption accounted for the lion's share of Nigeria's total energy consumption in 2001, making up 61.4% of the total. Natural gas accounted for the bulk of the remainder with 31.7%, with hydropower (6.8%) and coal (0.2%) rounding out the country's fuel mix. In recent years, natural gas has made inroads in Nigeria, up from 22% of the country's primary energy consumption in the mid-1990s to nearly 32% today. Nigeria's government is keen to expand natural gas consumption to relieve some of the pressure on native forests, which continue to be burned for fuel in many rural areas. The government's plans to end gas flaring by 2008 will not only reduce greenhouse gas emissions, but also will provide more gas for domestic consumption as well as for export via the West Africa Gas Pipeline.

The Nigerian government also is looking to promote the use of coal for domestic consumption and industrial uses as a means of combating deforestation and over-reliance on oil. However, the country has limited coal reserves, much of which are lignite and subbituminous, and Nigeria's coal production--never very high to begin with--has declined by around 50% since 1997. In addition, environmentalists are concerned that a renewed emphasis on coal mining will not only lead to environmental degradation, but they fear that using coal as a replacement for oil and fuelwood also will lead to increased carbon emissions.

Nigeria's comparatively low level of energy consumption vis-à-vis other major African states is borne out in its per capita energy consumption. In 2001, the country's per capita energy consumption stood at 7.8 million Btu, a decrease from a high of 8.7 million Btu per person registered in 1991 but an increase over the 5.2 million Btu per person consumed in 1980. In relation to Africa's most populous state, the continent's other major energy producers are all higher per capita energy consumers, with Egypt's 2001 per capita energy



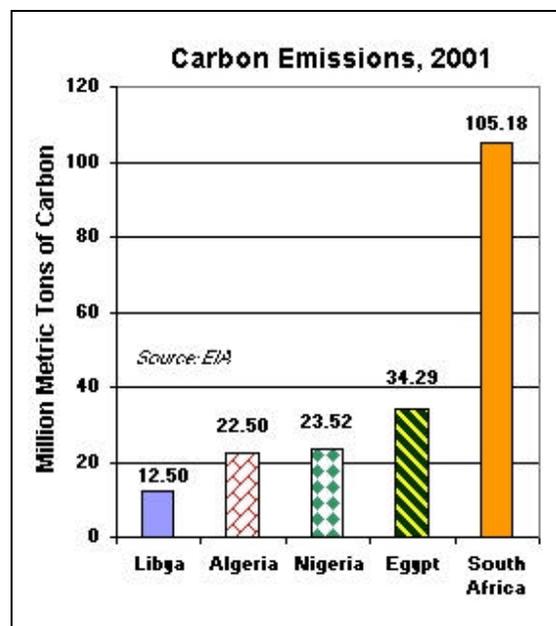
consumption standing at 31.4 million Btu, Algeria at 41.2 million Btu, and Libya at 120.1 million Btu. However, these figures may not only reflect merely a higher level of per capita energy usage in these countries, but perhaps also the lack of energy production available for domestic consumption in Nigeria, where much of the country still is not connected to the power grid and electricity supplies are inconsistent.

### Carbon Emissions

In 2001, Nigeria emitted 23.5 million metric tons of carbon, slightly down from a high of 27.7 million metric tons of carbon emitted in 1996 but still an overall increase since 1980, when the same figure was 18.9 million. Emissions from natural gas accounted for 12.5 million metric tons (53.3%) of that total, with oil emissions making up 11.0 million metric tons (46.6%) coal for the remaining 0.04 (0.1%). The rampant flaring of natural gas in the Niger Delta during oil production is the main culprit making natural gas the main source of carbon emissions in Nigeria, but the government's pledge to end the practice by 2008 should help reduce the country's carbon emissions from this fuel source.

Despite the gas flaring by the NNPC and international oil companies operating in the Niger Delta, Nigeria's per capita carbon emissions, which in 2001 stood at 0.20 metric tons of carbon equivalent, remain lower than Africa's other major energy-producing states. Libya's per capita carbon emissions for the same year were 2.31 million metric tons of carbon equivalent, while Algeria (0.71), Egypt (0.51), and Angola (0.27) all registered higher rates. Nigeria's per capita carbon emissions have fluctuated over the past 20 years, but generally have stood at or near 0.20 metric tons of carbon equivalent, ranking the country the lowest among OPEC members. By way of comparison, Saudi Arabia's per capita carbon emissions in 2001 were 4.02 million metric tons of carbon equivalent, while Venezuela's totaled 1.57, Iran were at 1.40, and Indonesia's ranked second-lowest in OPEC at 0.41 million metric tons of carbon equivalent.

Nigeria is a non-Annex I country under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The country signed the Convention on June 13, 1992, and subsequently ratified it on August 29, 1994. Nigeria could be one of the main beneficiaries of the Kyoto Protocol, if it is implemented, since foreign direct investment likely would flow into the country as part of the Clean Development Mechanism (CDM), a market-based mechanism that will assist developing countries in achieving sustainable development and developed countries in meeting the emission reduction requirements under the Protocol. However, to qualify for CDM, countries must have ratified the Kyoto Protocol and established a national authority that would monitor and coordinate the activities of the private sector. Nigeria is not a signatory to the Protocol, nor has the country ratified the agreement.



### Energy and Carbon Intensity

Since 1981, Nigeria's energy intensity (energy consumption per dollar of gross domestic product, according to 1995\$) has remained relatively stable at around 8,500 Btu. In 2001, the country's energy intensity stood at 8,315 Btu per 1995\$, lower than the high of 10,113 Btu per 1995\$ that

Nigeria registered in 1984 but above the low of 7,680 Btu per 1995\$ recorded by the country in 2000. Compared to other large African states, Nigeria's energy intensity is at the lower end; in 2001, South Africa's energy intensity was 26,153 Btu per 1995\$, while Egypt's was 26,394 Btu, Algeria's was 24,746 Btu, and Libya's was 19,067 Btu per 1995\$. Nigeria's energy intensity in 2001 also was the lowest among OPEC members and therefore well below the OPEC average.

Nigeria's carbon intensity (carbon emissions per thousand dollars of GDP, according to 1995\$) in 2001 was also the lowest in OPEC. In fact, Nigeria's level of carbon intensity has declined by 30% since 1996, the result of a reduction in gas flaring. In 2001, Nigeria's carbon intensity level was 0.21 metric tons of carbon equivalent per thousand 1995\$, down from 0.30 metric tons in 1996 and lower than at any time since the 1970s. Nigeria's carbon intensity is low compared to other African states as well, with South Africa's carbon intensity in 2001 standing at 0.60 metric tons of carbon equivalent per thousand 1995\$, while Libya's was 0.37, and both Algeria's and Egypt's was 0.42 metric tons.

### **Renewable Energy**

The utilization of renewable energy sources in Nigeria remains quite limited. Although use of solid biomass, such as fuelwood, is prevalent and constitutes a major energy source for rural Nigerians, these traditional resources are not being consumed sustainably, as the fuelwood that is being supplied for domestic energy consumption needs is resulting in deforestation. During the 1990s, for instance, Nigeria lost nearly 500 square miles of forested land annually, in part due to fuelwood consumption.

Nigeria's usage of hydropower, geothermal, and solar energy is still small, although there is a realization that the renewable energy sector must grow in order for the country to develop sustainably. Hydropower output, which has more than doubled since 1980, nonetheless accounted for just 6.8% (0.06 quads) of the country's 0.92 quads' worth of energy consumption in 2001, and unfortunately, the seasonal nature of Nigerian rainfall limits hydropower from increasing in importance. Nevertheless, in May 2003, the Nigerian government approved the construction of a \$6 billion, 3,960-MW hydroelectric power project on the Mambila Plateau in northeast Nigeria.

Solar power is being promoted as a method to improve electricity service to rural villages not collected to the country's electric power grid. In June 2003, Solar Electric Fund, a U.S.-based non-governmental organization, provided a N40 million grant to the Nigerian state of Jigawa to aid in the supply of solar power to some selected areas of the state. The solar project is geared to provide power to villages in an effort to improve socioeconomic conditions.

There are also increased efforts to boost the renewable energy sector as a whole in Nigeria. In May 2003, a new Nigerian NGO, the Centre for Renewable Energy Development in Nigeria (CREDN), called on the Nigerian government to take added steps to boost the use of renewable energy sources and thereby diversify the country's energy consumption from petroleum. CREDN has emphasized the fact that, despite Nigeria's vast oil wealth, much of the country's citizens do not have access to uninterrupted supplies of electricity. The group is pushing the increased use of renewable energy sources such as solar, biomass, wind and geothermal sources in order to supplement the country's power production and provide a constant supply of electricity to all Nigerians.

### **Environmental Outlook**

Oil has been an integral part of the Nigerian economy since vast reserves of petroleum were found in the country in the 1950s, but exploration and development of that oil has had severe environmental impacts and human consequences. Nigeria continues to suffer the detrimental effects

on marine life and human health from constant oil spills, as well as from air pollution that results from the flaring of associated gas that occurs during the production of oil.

The Nigerian government has indicated a desire to change this situation, and in recent years, it has taken actual measures to effect this change. While the Nigerian government in the past has been reactive, attempting to clean up oil spills and to deal with environmental damage after it occurs, it realizes the importance of taking a proactive approach. In this regard, the government is promoting the performance of environmental risk assessments, prior to project initiation. Tighter regulation and better enforcement of existing environmental laws should help stem the degradation of the environment and prevent the same type of problems in the future.

One of Nigeria's main challenges, similar to many other developing countries, is how to provide energy to a rapidly growing population in a sustainable manner. The energy choices that Nigeria makes, whether to increase oil exploration, develop its coal resources or move towards development of renewable energy resources, will have a significant impact on Nigeria's environment in the future. The end of gas flaring by 2008 should have a threefold positive effect, with a reduction in air pollution from carbon emissions, an increase in natural gas available for domestic consumption and export, and an added source of revenue for the Nigerian government from the sale of the natural gas that will be produced rather than flared.

With the country's oil production slated to rise and the country's population--already the largest in Africa--continuing to increase, the pressure on Nigeria's environment is likely to continue. As such, the Nigerian federal government, nongovernmental organizations, and international oil companies will have to work together to slow the degradation of Nigeria's environment and take steps to mitigate the problems that a half-century's worth of oil production already has caused.

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