

# International Journal of Advanced Multidisciplinary Research (IJAMR)

ISSN: 2393-8870

www.ijarm.com

Coden: IJAMHQ(USA)

## Research Article

SOI: <http://s-o-i.org/1.15/ijarm-2-11-12>

## The dimensions of environmental damage of gas flaring in Nigeria

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### Keywords

Environment,  
Gas flaring,  
damages,

### Abstract

For over fifty years now, gas flaring has been a constant feature in the Nigeria's oil and gas industry with its concomitant effects. This paper examined the meaning, reasons and the dimensions of the resulting environmental damage and other allied effects of gas flaring in Nigerian society which should really agitate every responsible and responsible government towards effective ending. It recommended immediate positive action on the part of the stakeholders - the international oil companies and the government - to end flaring to save and secure both the environment and the human inhabitants.

## Introduction

Gas flaring has been a continuing feature in the operational practices of the International Oil companies in Nigeria. This work seeks to show the various dimensions this unethical practice occasions environmental damages and other related effects in Nigeria. This it does by explanation of relevant terms, examination or exposition of the various possible causes, and dimensions of the consequential damages. It drew a conclusion on the issue and made recommendations towards effective and positive ending of gas flaring in Nigeria.

### 1.1 Conceptual Terms and Definitions

To enhance an understanding of this discourse, relevant concepts would be defined or explained. Such concepts are 'gas flaring', 'environmental damage', and 'dimensions'.

Gas flaring is the controlled burning of natural gases trapped with oil reserves in the ground and also released with the crude oil and extracted along with the crude oil during the process of extracting crude oil from the ground (Ehighelua, 2007).

It is, indeed, a non-scientific burning and emitting of undesirable gas associated with crude oil during the process of extracting oil from underground chamber as a means of separating the pure crude oil from such associated gas.

Environmental damage connotes an act or activities that destroy or limit the natural ability of the environment to attain

its fullest utility or productivity arising from predominantly human factor and natural consequence. It involves all environmental use that is not mindful of preserving its quality and value but rather ravages and abuses the environment for essentially economic and exploitative motives. In the process, it leaves the environment less useful, less productive, less self-sustaining and eventually constitutes danger to the affected biota.

Dimension is any measurable extent or magnitude, as length, breadth, or thickness (Webster's comprehensive Dictionary, 2010). In other words, the focus shall be on the extent or scope of how the practice of gas flaring in Nigeria inflicts environmental damages on Nigerian society in relation to area, humanity, fauna and flora in terms of coverage and degree.

### 2.1 Environmental Dimensions of Damage

Gas flaring in the oil and gas industry in Nigeria has left in its trail a serious damage to the environment in the following dimensions.

#### 2.1.1 Air Pollution

The primary focus of gas flaring in consideration of environmental damages is generally the atmosphere. Air pollution arising from the gas flaring activities of the

international oil companies and their local partners is not in doubt but quite glaring and noticeable in our climate. Gas flaring thus emits pollutants into the air that negatively impacts the atmosphere that constitutes danger to both man and other living creatures. As has been noted:

It is only natural for living things to inhale oxygen and exhale carbon dioxide. But, when that oxygen becomes contaminated with air pollutants (Carbon monoxide), the danger to the health is always deadly. Carbon monoxide is a gas produced by burning any type of fuel-gas, oil, kerosene, wood, or charcoal. What makes carbon monoxide so dangerous is that when you breathe it, it replaces the oxygen in your blood. Without oxygen, cells throughout the body die, and the organs stop working. You can't see, smell, or taste carbon monoxide. But if you breathe too much of it, it can become deadly within minutes (Ramoni, 2009).

Gas flaring is one of the primary causes of global warming as it increases the air temperature and correspondingly the relative humidity of the air decreases. In addition, depletion of the Ozone layer is another effect of gas flaring as the poisonous gases released into the atmosphere destroys the Ozone layer. The depletion of the Ozone layer has some health implications on human beings and climate change. As rightly noted:

Considering the low combustion efficiency of Nigerian flares (80%), a large portion of the gas is vented mainly as methane. With particular reference to Rivers and Delta States, for example, around 12 mill. tons of methane is released into the atmosphere per year. The significance of Nigerian gas flares is therefore considerable based on the much higher global warming potentials of methane (Akaakar, 2003).

### **2.1.2 Water Pollution**

Marine or water pollution often results from the activity of gas flaring in the oil and gas industry. It also causes acid rain which has corrosive effects on metals and building materials. Findings in Obelle town of Rivers State, Nigeria have shown that:

Gas flaring caused the black colour, very poignant smell and bad taste of rain water in the area. The contamination of rainwater caused quick and rampant corrosion of pipes and roofing sheets (Awalla, 2012).

There is no gainsaying the fact that gas flaring as a form of pollution causes environmental damages to the marine aspects of our composite environment.

### **2.1.3 Land and Vegetation**

Gas flaring also imposes environmental damage in the areas of land and vegetation. This generally disables the areas of productive capabilities and consequently devalues and destroys any eventual outgrowth.

The effect of environmental damages through gas flaring is quite critical on land and crops or vegetation generally. This much has been noted as follows:

On crops, gas flaring causes reduced light intensity and the consequences that follow- e.g, oxides of nitrogen and sulphur and the inevitable severe effect on crops, crop yields and wild life in the affected environment (Yalaju, 1999).

Empirical researches have proved the authenticity of this view as shown under:

These consequences, and including others, especially of flaring, have been validated by results of studies carried out in the Niger Delta and through Remote Sensing applications in the oil pollution surveys (Yalagu, 1999).

Other research findings have equally revealed a catastrophic effect of gas flaring on land and vegetation as a form of environmental damage. Accordingly, it has been reported that: The air pollutants like sulphur dioxide, and nitrous oxide etc affect the structures of leaves on the trees (Kukkola et al 1997). This causes the stunt growth of most trees and sparse distribution of vegetations in the area, because as these gaseous pollutants enter through the stomata of the leaves they cause changes in extra cellular aqueous phase and in cell membrane and intercellular structures. The dust or particulate matter in the atmosphere when deposited on the leaf surfaces negatively affects the wax structure of leaf cuticles. Forliage damage and deterioration are caused by the uncontrollable deposition of sulphur and heavy metals on leaves which led to inadequate nutrient supply to nourish the normal and robust growth of the plants. Vegetation can be used as an index for sulphur dioxide pollution (Mckee and Biederdorf, 1960 ). They used the leaves loss and brown blotches as classic symptoms of sulphurdioxide to delineate the pollution around gas flaring zone (Awalla, 2012).

On the specific effect of gas flaring on soil fertility, the following findings reveal its devastating effect thus:

The air temperature is most often higher within the gas flaring environment than outside the gas flaring environment. Thus, outside the gas flaring environment the temperature ranged from 26.00 – 27.75°C, but within the gas flaring environment, temperature ranged from 33.50 – 36.00°C.

Thus, atmospheric temperature is most often very high within gas flaring site ... Soil temperature within and outside gas flaring site ranged respectively from 25.40-34.75°C and 22.30°C-26.40°C ... The increase in temperature in soil within the gas flaring site could be due to leaching effects and flow rate/resident time of soil nutrients (Awalla, 2012).

The above shows the damaging effect on land and vegetation by the practice of gas flaring on the environment.

## **3.1 Human/Health Dimension**

The Practice of gas flaring in Nigeria has its human or health dimensions in occasioning serious damage to human health. This may arise through inhaling polluted and poisoned air; impairment of important organs of the body, outright fatality and some others.

### 3.1.1 Impairment of Good Health

During the process of gas flaring, poisonous and deadly metals and gases are emitted into the atmosphere and when inhaled by human being, unarguably affects the person's health. The degree of danger posed may depend on the volume of such polluted air inhaled by the individual.

Speaking on the danger of inhaling poisonous gas in the air especially Carbon monoxide, **Dr. Akin Lateef Owolabi**, the Medical Director of Plato Hospital, Shogunle, Lagos, Nigeria said:

When inhaled, the effect of carbon monoxide is very fatal. We breathe in oxygen, ordinarily. If we breathe in carbon-monoxide, it will combine with our hemoglobin. The end result will be very fatal to the lungs. The carbon-monoxide is poisonous to the body and it can cause a fatal health to anybody that inhales it ... The early symptom of carbon-monoxide's effect is that the individual will feel headache, dizziness and nausea. Carbon-monoxide poisoning can occur suddenly or over a long period of time. Breathing low levels of carbon-monoxide over a long period can cause severe heart problems and brain damages (Ramoni, 2009).

The likelihood of impairing human health through inhaling polluted air with poisonous gases has become of wider knowledge. As rightly noted:

Gas flaring causes respiratory problems like cardiac vascular respiratory problems and asphyxiation in man and animal (Awalla, 2012).

Also speaking on the impact of gas flaring on human health, one noted that:

The health impact of gas flaring is alarming. Gas flaring allegedly causes asthma, bronchitis, skin diseases and respiratory problems in the populace living in the flare impacted areas (Akaakar, 2003).

### 3.1.2 Causes Eye problems/blindness

Another distinct health impact of gas flaring is the causation of eye problems like irritation, itching and even leading to outright blindness.

Regular and prolonged exposure of persons living in the areas of flare site could eventually degenerate to serious eye problems until blindness sets in. Two different towns/communities whose indigenes suffer eye problems attributed to gas flaring activities by the operations of the oil companies clearly stand out. They are the Obelle community in Rivers State and the Izombe community, Imo state.

Concerning the eye-related problems of gas flaring in Obelle community, Awalla had this to report:

There exists atmospheric warmth that causes untimely still birth and high infants mortality rate, and many causes of eye problems and blindness (Awalla, 2012).

**Writing under the caption:** "Residents going blind over alleged gas flaring in Imo Community – 3 monarchs affected", it was reported thus:

Izombe in Oguta Local Government Area of Imo State is an Oil and gas bearing community. The community which has more than 20 villages is known for its annual cultural festival known as Okorocho. However, the people of the area are suffering following the oil exploration and gas flaring activities, identified as a major cause of blindness in the area. At the Free Health Care exercise organized in the area recently, it was discovered that three traditional rulers from Izombe has become blind as a result of gas flaring activities in the community. The three traditional rulers who were introduced as Eze Pius Muforo, the Abor I of Abrshi Autonomous community; Eze Boniface Nwauwa, Obiukwu I of Ndiulokwu Autonomous community and Eze Oliver Okorowu, Obi I of Obeabor Autonomous community were introduced at the Federal Medical Centre, Owerri (Comprehensive Outreach Centre) Izombe, where the event took place (Alozie, 2014).

Introducing them when the Niger Delta Development Commission, NDDC, led by a commissioner in Imo State, Mr. Kyrian Uchegbu visited Izombe to monitor the exercise organized by the NDDC, one of the community leaders from the area, Chief Maraus Nnannah said:

We have suffered so much. Izombe people cannot be proud of their natural resources. It has caused more harm than good. Look at our three traditional rulers, they cannot see because of the gas flaring activities in our area. We cannot dethrone them, rather we want you people to restore their sights before they go blind completely, please (Alozie, 2014).

Reacting to the information, the leader of the NDDC delegation, Mr. Uchegbu promised that a special presentation will be made to the leadership of the commission in respect to the health conditions of the traditional rulers.

He specifically said:

I am touched by the condition of these our fathers. I promise to take immediate action by making request to NDDC for special treatment (Alozie, 2014).

Also speaking, the Managing Director of NDDC, Dan Abia, represented by George Uzowanne said that the commission was committed to ensuring that the people of Izombe do not regret having oil in their soil; and added: "We will make sure that these three traditional rulers get full medical attention" (Alozie, 2014).

### 3.1.3 Causes still births/Infant mortality

Another dimension of environmental damage arising from the gas flaring activities is the incidence of precipitating still births among women and also infants' mortality by residents within the flare sites.

Studies and researches have shown that such development do result from the effect of air pollution following sustained gas flaring activities in an area.

Relying on his empirical as well as other researches, Awalla concluded on the concomitant effects of gas flaring in Obelle Community thus:

Gas flaring causes respiratory problems like cardiac vascular respiratory problems and asphyxiation in man and animals. It can lead to spontaneous and/or instant abortion in pregnant women. Generally, gas flaring causes climate change and global warming (Awalla, 2012).

#### **4.1 Psychological Dimensions**

Environmental damage and pollution, arising from operations in the oil industry including gas flaring can cause psychological problems among victims of such occurrence. Such psychological problems may manifest especially in the areas as hereunder discussed:

##### **4.1.1 Psychological Distress/Fears**

An environmental damage brought upon any community as a result of human activity in oil operations, and if left unattended for fairly long period may create psychological fears and distress amongst the victims, especially where sources of livelihood are affected.

The victims would naturally feel neglected, rejected and abandoned and regard the passive actions of the relevant stakeholders-the oil companies and the government – as amounting to man’s inhumanity to man. In such a situation, mere mention of the name of the operators in the oil industry as well as the government that ought to protect the interest of her citizens excites fear, anger and even hatred.

Specifically among the Ogonis of Rivers State of Nigeria, this situation is most true. Recounting his experience over the devastation of their environment by Shell BD’s Oil operations, a Bodo indigene of Ogoniland, Mr. Emmanuel Kuru, an ex-fisherman was reported as saying:

He has been running away to visit the site since the incident (massive oil spill) occurred in 2008 because he didn’t want the site to remind him of his past.” I don’t want to die on time, that is why I have been avoiding a visit to Sivibilagbara River where my boats and fish ponds were destroyed by shell facilities. I collapsed and became frustrated the day I heard that crude oil has polluted the water and killed all the fishes at the River. This unexpected situation forced me out of business with nothing to fall back on since 2008 when the first oil spillage occurred; with another spillage taking place in December 2009 and destroying my family means of livelihood (Dikewoha, 2012).

This kind of psychological distress may even degenerate to a serious health challenge if such situate persist much longer.

##### **4.1.2 Emotional Trauma**

Another psychological disorder consequent upon environmental damage that may befall an individual or group is emotional trauma and pain. Disillusionment, helplessness and hopelessness over a devastated environment that resulted in impoverishment of a people can trigger depression and emotional trauma amongst the victims. Under such a state, a weak-willed individual may even contemplate suicide, and in extreme cases, actual commission of suicide on an understanding to end a miserable life conditioned by callousness and insensitivity on the part of relevant authorities.

Again, Mr. Emmanuel Kuru is one out of many others suffering from this kind of problem. He is quoted as saying:

If it is in his power to send foreigners away from Nigeria, by now the name shell would have been history. “I hate shell with passion, they are very lucky that life has placed me where I cannot have the power or authority to send them packing. If not, their activities in Nigeria would have been history. Infact, each time I hear the word shell or I am passing and I see people discussing about shell, that day I will be unhappy. If I tune my radio and a newscaster or presenter mentions the word shell, I will immediately change to the next station because I don’t want to hear anything about them”. (Dikewoha, 2012).

#### **5.1 Economic Dimension**

It is quite obvious that continued gas flaring in Nigeria entails economics waste of potential source of wealth creation in terms of revenue generation. Gas flaring is resorted to especially in Nigeria by the Oil majors as it is viewed as cheaper in terms of financial costs than harnessing and re-injecting it into the reservoir. In the process, potential huge revenue generation is simply wasted and burnt away.

This view is shown below in concrete terms:

##### **5.1.1 Waste of Potential Source of Revenue**

Gas flaring is simply a waste of potential wealth and revenue generation. It is the act of deliberate burning away of the associated gas rather than separating and utilizing it for other purposes on account of the costly nature.

However, whatever the cost of separating associated gas from oil, for the purpose of utilization pales into nothing when compared with the expected earnings exporting such wasted gas for sale, and even in our local environment. Nigeria’s gas flaring habit has been documented with the consequential financial loss running into billions of dollars. This is shown below;

- In 1975 90% of the gas produced was flared;
- In 1982 more than 11,000 million cubic metres (mcm) flared us compared with 85 (mcm) which was re-injected and 200mcm, which was used as fuel for oil operations;

- In 1992 the equivalent of about 400,000 b/d of oil was flared daily;
- In 1994 the total emission of Co<sub>2</sub> from gas flaring in the Niger Delta amounted to an estimated of 35 mill. tons yr (Akaakar, 2003).
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The Special Adviser to Bayelsa State Governor on power, Engr Olice Dickson Kemenanabo also stated that the flared gas has cost the country a lot in terms of revenue losses, among other things when he stated:

Ever since Nigeria struck oil in commercial quantity at Oloibiri in Bayelsa State in 1956, gas flares have continued to be an associated part of life in the Niger Delta area. Besides the attendant environmental consequences, I believe the unharnessed gas from 1956 till now can only be imagined in terms of wealth creation and employment generation. We simply burnt away a huge chunk both the directly accruable revenue and the regenerative potentials of that revenue (Ugwuanyi, 2013).

Engr. O.D Kemenanabo continued:

Kolo creek, where the first and largest independent power project by any state government is sited, flared about 80 million standard cubic feet of gas daily from 1962 until the recent past when it was harnessed and gathered by shell at the Gbarain- Ubie gas gathering facility. From that time (45 years now) till the wake-up call for gas utilization, Kolo creek alone has wasted a whopping sum of N39.42 trillion through gas venting (Ugwuanyi, 2013).

## 6.1 Social Security Dimension

Resort to gas flaring in Nigeria's oil and gas industry has exposed a good number of our citizens to social security risks, principally job opportunities.

### 6.1.1 Loss of Employment Opportunity

There is no doubt that if the major operators, the international oil companies, in Nigeria's oil and gas industry have opted for harnessing and utilization of the associated gas from the earliest of times, that would have provided thousands of employment opportunities to our deeming army of unemployed, especially among the youths- both graduates and non-graduates.

As earlier noted by Engr. O.D kemenanabo, and rightly so, when he said that;

"I believe the unharnessed gas from 1956 till now can only be imagined in terms of wealth creation and employment generation".

This is a fact and represents the stark reality.

However, the reverse is the case with gas flaring firmly entrenched as a routine practice in Nigeria. This practice effectively shut out avenues for job creation as such working environment is not in place.

The consequence of the resulting many unemployed populace might not be unconnected with resort to militancy, pipeline

vandalism and oil bunkering, illegal refining of crude oil, kidnapping and other anti-social activities that have created the social upheaval mainly in the Niger Delta region.

### 6.1.2 Loss of wealth creation opportunity

Where citizens are employed, they earn salaries and make savings. From such savings, they can establish their own small scale businesses and employ their own staff. They can as well invest in shares and other securities; and can even empower some less fortunate ones in society by giving such people little sum of money to start up in life.

The overall effect of all these is wealth creation and wealth redistribution which will ultimately enhance the per capita income and living standard of the citizenry.

Under such social setting and standing, the citizens feel socially secure and this generally minimizes breeding of social miscreants. The end result is a more organized, civilized and ordered society that lays the foundation for meaningful economic, political and social development based on the rule of law and social justice.

## 7.1 Fundamental Rights Dimension

The range of damage occasioned by gas flaring extents to fundamental human rights of the citizens, especially right to life, by insidiously undermining such right.

Section 33 (1) of the 1999 Constitution of the Federal Republic of Nigeria (as amended), states as follows:

Every person has a right to life, and no one shall be deprived intentionally of his life save in execution of the sentence of a court in respect of a criminal offence of which he has been found guilty in Nigeria.

Right from time, there has been no judicial determination and pronouncement on the legality or otherwise of gas flaring in Nigeria or the human rights of persons affected by such activity until quite recently.

That was the case of **Mr. Jonah Gbemre V. Shell Petroleum Development Company Nigeria Ltd; Nigerian National Petroleum Corporation and Attorney General of the Federation** (Atsegbua .L. et al, 2010)

This case was filed on the 21<sup>st</sup> of July, 2005, by communities from across the Niger Delta, in the Federal High Court of Benin city, Nigeria against shell, ExxonMobil, Chevron Texaco, Total FinaElf and Agip Joint Venture companies, the NNPC and the Nigeria Government, to stop gas flaring. However, because of the copious unwieldy list of members, the court granted leave to the applicant (Mr. Jonah Gbemre) – to commence the proceedings for himself and as representing the other members, individuals and residents of Iwherakan Community in Delta State of Nigeria (Atesegbua, L et al 2010).

At the conclusion of arguments by lawyers to both parties, **Justice C.V Nwokorie** in his judgment, among others, declared:

- a. That Mr. Jonah Gbemre has authority to represent himself and the community;
- b. That the fundamental rights to life and dignity of the human person as guaranteed by sections 33 and 34, respectively, of the 1999 constitution inevitably includes the rights to clean, poison free, pollution free healthy environment;
- c. That the respondents' continuous acts of gas flaring amounted to a gross violation of their (the communities) fundamental rights to life (including healthy environment) and dignity of human person as enshrined in the constitution (Atsegbua, L et al 2010).
- d.

**Justice C.V Nwokorie** also put a restraint upon the respondents, their servants or workers, from engaging in further flaring of gas in the appellant's community and stated that they were to take immediate steps to stop further flaring of gas in that community. (Atsegbua, L. et al, 2010).

The judge dismissed the case put forward by the 1<sup>st</sup> and 2<sup>nd</sup> respondents, as well as their various preliminary objections, and declared that they lacked merit (Atsegbua, L, 2010). Nevertheless, Shell has,

Filed a Notice of Appeal challenging the ruling and jurisdiction of the Federal high Court, Benin ... The Notice of Appeal filed by Shell and NNPC does not however affect the judgment of the Federal High court, which remains valid until overturned by a higher court. At present, there has been no major progress with shell and NNPC's appeal at the Court of Appeal, and the substantive judgment of the Federal High Court still stands (Atsegbua, L, 2010)

The implication of the above judicial decision is that gas flaring is not only illegal but unconstitutional as it amounts to a violation of the basis of enjoyment of all other fundamentals rights- the right to life.

### 8.1 Reasons for Gas flaring

During the course of oil drilling and production operations, associated gas is encountered together with oil. In such situations, oil companies have three options of handling it, first, to separate and utilize the associated gas; second, to re-inject it back into the underground chamber or reservoir; and third, simply to flare or burn it away.

The first option above which is to separate the associated gas from the crude oil for purpose of utilizing it is quite costly and prohibitive for the oil companies to undertake. The separation process is quite complex and complicated, requiring the installation and usage of very powerful compressors for the channeling or transmission of the gas onward.

Since it is very expensive to procure these industrial machineries for function, the oil companies often view this option as unwise and unprofitable businesswise. This makes it unattractive.

The second alternative which requires re-injecting the associated gas back into the reservoir is equally costly, and

indeed, requires much skill, care and diligence in handling. Perhaps, the cost of getting the relevant experts with the appropriate skills and the time factor needed combine to also make it unattractive to the oil companies.

Consequently, the last option which is to flare the associate gas is embraced, since it is easier, very cheap and quicker means of handling the issue when compared with the earlier two options. This option is equally boosted with very weak and complaint environmental regulatory bodies in Nigeria's oil and gas industry.

In other words, the major reason for continued gas flaring in Nigeria is because of its comparatively cheap financial cost even as it is easier and quicker means of getting around the problem.

### Concluding Remarks

We have x-rayed the various ways and extent of environmental damage arising from gas flaring, and have shown that gas flaring does a lot of harm in Nigerian Society. Equally the basis of the continued flaring of gas is purely for cutting down cost and not that it represents international best practices in the oil and gas industry globally. The authors, therefore, strongly urge the relevant regulatory bodies in Nigeria to positively ensure that the international oil companies comply with the international best practices even as obtainable in their home countries immediately. This is premised on the need to save humanity from further harm and also the environment from worse damage and degradation.

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