GAS FLARING AND ITS ATTENDANT IMPACT ON ILAJE LOCAL GOVERNMENT AREA OF ONDO STATE, NIGERIA

OROGBEMI, Elias Olajide
Lecturer, Department of History and International Studies,
Faculty of Humanities,
Nigeria Police Academy, Wudil, Kano State, Nigeria.
Email Address: eliasolajide@gmail.com.
Telephone Number: 07038120694, 09053878343

KEYWORDS:

multinational oil corporations,

gas flaring, environment, pollution.

ABSTRACT

The study of environmental and socio-economic effects of gas flaring in the Niger Delta region of Nigeria is not new in the literature. However, research on gas flaring in Ilaje Local Government Area of Ondo State, Nigeria, is rare. It is against this backdrop that this paper, using Ilaje as a focus, examines the environmental and socio-economic implications of gas flaring in Ondo State, Nigeria. The study uses qualitative research methodology based on the descriptive analysis of oral interviews and extant literature. Primary data for the study were obtained through a semi-structured interview schedule used to elicit information from respondents/interviewees, and also through personal observation in the field. On the other hand, secondary data were collected through journal articles, textbooks, internet materials, and other unpublished works that are relevant to the aim and objectives of this study. The findings of the study reveal that gas flaring associated with oil exploration and exploitation activities of multinational oil corporations in the oil-producing communities in Ilaje Local Government Area of Ondo State, Nigeria, impacted the environmental and socio-economic structures of Ilaje society over time.

Introduction

Gas flaring is one of the most outstanding environmental pollutions arising from oil exploration and exploitation activities of multinational oil corporations in the Niger Delta region of Nigeria (Nwokocha, Edebeatu, and Okujagu, 2015) and it has impacted negatively on the environment and also altered the existing indigenous economic activities and the social wellbeing of the inhabitants of Ilaje Local Government Area of Ondo State, Nigeria. Environmental pollution involves any direct or indirect alterations of the physical, biological, chemical, thermal, radioactive components of any part of the environment in such a way that brings about undeserved stress to the wellbeing of living species (Puhikumo, 2016). Oil spillage and drilling wastes (drill muds and cuttings) associated with oil exploration and exploitation activities of multinational oil corporations are the major causes of land and water pollution in the oil producing communities in the study area while on the other hand the air is mainly polluted due to flaring of associated gas. Air pollution could be referred to as the introduction into the environment of chemicals, particulate matter or biological materials that are harmful to humans, plants, animals, or other living things, cause damage to to the environment, property, or which negatively altered the comfortable enjoyment of life or property (Iyorakpo, and Odibikuma, 2015). Like oil spills, gas flaring activities of multinational oil corporations in the study area have adverse effects on the physical environment, which in turn results in socio-economic decline. The adverse effects of gas flaring on the environment is multifarious, and these include but not limited to air pollution; destruction of aquatic environment; pollution of rain water, surface water, and groundwater; corrosion of metal materials including roofing sheets; destruction of physical infrastructure including buildings; depletion of biodiversity; low agricultural productivity; and low fishing output (Ezenwaji, Okoye, and Otti, 2013).

The proven natural gas available in Nigeria had been estimated by earlier studies to be 5,257 billion m^3, thus making Nigeria to be the ninth country having the largest concentration of natural gas in the whole world (Nta, Jonah, and Lucas, 2016). Currently, almost 70 million m^3 of natural gas are flared in a day in the Niger Delta region of Nigeria, and therefore, this shows that Nigeria flares an estimation of 17.2 billion m^3 of natural gas annually (Seiyaboh, and Izah, 2017). This means that Nigeria is the highest gas flaring country among the members of the Organization of Petroleum Exporting Countries (OPEC) (Olukoya, 2015). Numerous studies carried out as regards gas flaring in the Niger Delta region of Nigeria estimated that gas flaring activities of multinational oil corporations release 35 million tons of carbon dioxide and 12 million tons of methane on annual basis (Emumejaye, 2012). However, in Ilaje Local Government Area of Ondo State, Nigeria, which is the study area, there are seventeen different gas flaring sites. These are Meren, Parabe, Malu, Opolo, Ewan,

Esan, Opoakaba, Bella, Omuro, Eko, Mejo, Tapa, Opuama, Obe, Okagba, Sekelewu, and Ojumole oil fields. In these seventeen different gas flaring sites located in the study area, 13,700,000 cubic metres of gas is flared annually (Mafimisebi, and Ogbonna, 2016).

About two million barrels of crude oil are produced in a day in the different oil fields located in the Niger Delta region of Nigeria, and most of the crude oil are extracted from reservoir beneath the ground in association with natural gas (Emumejaye, 2012). The natural gas that accompanied crude oil during oil exploitation are made use of while the excess are flared into the atmosphere through combustion process. Gas flaring is the use of open flare to burn off unutilized Associated Gas (AG) that are extracted in association with crude oil beneath the ground through the use of combustion, and this brings about one of the devastating effects of oil exploitation on the environment (Iyorakpo, and Odibikuma, 2015).

The burning of associated natural gas that accompanied crude oil during oil exploitation is carried out through the top of a pipe or stack where the burner and igniters are situated (Anomoharan, 2012). Associated gas is flared into the environment through vertical and horizontal flaring stack. A gas flare, also been referred to as flare stack, is an elevated vertical or horizontal stack found on oil wells or oil rigs, natural gas plants, refineries, chemical plants, and landfills (Atuma, and Ojeh, 2013). They are utilized for the burning of gas that are not needed through pressure relief valves for the purpose of ensuring the safety of equipment being used during oil exploitation (Orji, Egboka, Asheshe, and Dio, 2015).

Moreover, unutilized associated gas is constantly flared during crude oil processing and production since the discovery of oil in commercial quantity in the Niger Delta region of Nigeria. Research earlier carried out as regards the negative impact of gas flaring on the environment showed that air pollution caused by gas flaring is a continual threat to the environment, quality of life, and health of the residents of the areas where gas flaring is being carried out. However, negative effects associated with gas flaring are not only borne in the oil producing communities with flare stacks, but also in the adjoining communities without flare stacks, through trans-boundary effects (Ologunorisa, 2001).

Prior to the discovery and commencement of oil exploration and exploitation by multinational oil corporations in Ilaje Local Government Area of Ondo State, Nigeria, in November, 1968, the inhabitants of the local government rely so much on the natural resources available in their environment for their human existence (Bamijoko, 2018). They made both ends meet by exploiting the endowment resources in their land and water. They were so attached to their environment because of the vital role it plays in sustaining their human existence. During that period, fishing and other economic activities such as lumbering,

farming, hunting, weaving, canoe building, which the inhabitants of the study area engaged themselves helped a lot in improving their social and economic wellbeing (Ajuesi, 2018). However, due to the negative effects associated with gas flaring, the inhabitants of the local government have been experiencing a drastic reduction in their environmental and socio-economic well-being (Afiwajoye, 2018).

All negative effects associated with gas flaring started with effects on the biophysical environment. Biophysical environment could be referred to as the physical part of the environment (water, soil, and air) in association with the biological activities within it (Puhikumo, 2016). This study cannot proceed directly to the socio-economic effects of gas flaring without first of all discussing the adverse effects of gas flaring on the biophysical environment. This is imperative as a result of the fact that it is from the effects on the biophysical environment that socio-economic effects arise, especially effects on agriculture, fishing, roofing sheets, textile materials, building structures, metallic materials, rain water, surface water, groundwater, lumbering, and weaving.

Due to the fact above, the study is of the view that without first of all discuss how gas flaring negatively affects the environment, it would not be convincing enough to subscribe to how gas flaring brought about socio-economic decline in Ilaje Local Government Area of Ondo State, Nigeria. Gas flaring commences its negative impact on the socio-economic wellbeing of the inhabitants of the study area by first destroying their biophysical environment.

Impact could be defined as a change in a variable of interest caused by change in another variable related explicitly to some aspect of the impacting development under investigation. These impacts may be adverse, beneficial, temporary, permanent, long-term, short-term, medium, reversible or irreversible (Duinker, 1989). This study adopts the adverse aspect of impacts.

Statement of the Problem

Oil exploration and exploitation in Nigeria are solely being carried out in the Niger Delta region which the Ilaje Local Government Area of Ondo State is located. In fact, Ilaje Local Government Area of Ondo State is the only local government in the entire southwest geopolitical zone where oil exploration and exploitation are being carried out by multinational oil corporations. Moreover, gas flaring which is associated with oil exploration and exploitation activities of multinational oil corporations that commenced in Ilaje local government in November 1968, has impacted the environmental and socio-economic wellbeing of the inhabitants of the local government.

Methodology

This study uses qualitative research methodology, and leans on both primary and secondary sources of data generation for actualizing its aim and objectives. Primary data for the study were obtained through

semi-structured interview schedule used to elicit information from interviewees and also through personal observation on the study area. On the other hand, secondary data were obtained from journal articles, textbooks, internet materials, and other unpublished works that are relevant to the issues being investigated.

Environment

Before moving further to bring into focus how gas flaring activities of multinational oil corporations impacted negatively on the environment of the study area, the researcher considers it necessary to expatiate on what the environment means. The word 'environment' was earlier defined as the total surrounding which includes natural and biological resources. However, with the current trend of sustainable development, the definition of the environment has been widened to accommodate natural and human resources and their interaction with one another. In view of this development, environment could be referred to as the natural and social conditions that shape human existence and the incoming generations that would inhabit such environment (Emmanuel, and Alakinde, 2006).

Environment could also be treated within the purview of natural surroundings and activities that are in existence within it, which include biophysical components and processes of natural environment of land, water, and air. It also covers all layers in the atmosphere, inorganic and organic matters (both living and non-living), socio-economic components and processes of the human environment. These components and processes cover social, economic, technological, administrative, cultural, historical, and archaeological components and processes. Land and associated resources, structures, sites, human health, nutrition and safety are also inclusive (Olujimi, Adewunmi, and Odunwole, 2011). In the above context, the environment is seen as the natural habitat of man with numerous components, within which series and various levels of activities and processes take place. These components and activities or processes, in most cases, show the level of development in the environment that needs to be protected in all ramifications.

Moreover, the relevance of the environment to human existence cannot be overemphasized. The environment of man can also be referred to as his immediate family as a result of the fact that the environment of man is so close and useful to him just like his immediate family (Mba, Mba, Ogbuabor, and Araza, 2019). The environment we inhabit provides us with the necessary assistance such as air, water, and land as well as the materials we need in accomplishing our heart desires. In spite of the fact that the environment we live in plays significant role in dictating the type of activities we involve ourselves, human beings in their own wisdom have made the environment more productive and useful to them by manipulating their environment to be of great relevance to their human existence. In other words, humans have altered and continue to alter their

environment to suit their purposes. This laudable feat was made possible by humans as a result of an unprecedented level of scientific and technological power at their command (Nta, Usoh, and James, 2017). However, in the course of advancing on the utilization of the environment for meaningful benefit, the environment of man has been negatively altered by man himself. Thes alterations have occasioned myriad of negative effects which in turn impacted negatively on environmental components and their associated biota, and also the socio-economic wellbeing of the people living in the environment that had been negatively altered (Seiyaboh, and Izah, 2017).

Furthermore, in the late twentieth century, especially after the June 1972 Stockholm Conference held in Sweden, there have been numerous global calls for the need to maintain a quality and healthy environment. The main focus of the June 1972 Stockholm Conference was to educate and appeal to countries in the world that if human beings want to continue and sustain their living in the world, they have to see it as a matter of necessity to maintain and improve the quality of the environment they reside. The conference emphasized that human beings have at their disposal what they need in shaping and transforming their environment. As such, people should reduce if not eradicate air, water, and land pollution (Baghebo, Samuel, and Nwagbara, 2012).

Composition of Natural Gas

However, for a better understanding in this study, two categories of natural gas reserves in the oil fields in Nigeria are discussed. Natural gas generated in Nigeria comes in two different forms, and these are Dry Gas (Non-Associated Gas) and Wet Gas (Associated Gas). Dry Gas which is often referred to as non-associated natural gas is a gas in isolated well (Iminabo, and Iminabo, 2018). Unlike Wet Gas (Associate Gas), it occurs when natural gas is not dissolved in crude oil but exists on its own, and this accounts for why it is also been referred to as Free Gas. On the other hand, Wet Gas (Associated Gas) is discovered in association with crude oil, and it dissolved in crude oil in the underground reservoirs. This explains why it is being referred to as Associated Gas or Wet Gas (Ayobami, 2017).

Nigeria has one of the ten largest gas reserves in the world, and approximately fifty percent of the natural gas deposits in the country are discovered in conjunction with crude oil. In other words, the two sources of natural gas found in Nigeria exist in almost the same quantity. Dry Gas (Non-Associated Gas) can be left untapped beneath the ground until it is needed, but Wet Gas (Associated Gas) is lifted in association with crude oil when it is pumped out from the ground (Iminabo, and Iminabo, 2018). Associated Gas is either utilized or flared as unwanted by-product. Associated Gas is routinely flared in the oil fields in the oil producing communities in the Niger Delta region of Nigeria, and the resultant

effects of this is the unwarranted hardship it brought to the inhabitants of this region.

Components of the Gases Flared

During gas flaring, numerous components of natural gas flared into the environment include benzene, toluene, ethylbenzene, xylene, ethylene, butylenes, aliphatic and polycyclic aromatic hydrocarbons, carbon dioxide, methane, propane, butane, nitrogen oxides, sulphur dioxide, hydrogen sulphides, benzapyrene, dioxins, and water vapour (Uzoekwe, 2019). Poor inefficiency in the flare chambers when crude oil is being combusted produces different types of pollutants mentioned above, which are usually released into the atmosphere (Ite, and Ibok, 2013). The pollutant gases released into the environment are harmful to ecosystems and biodiversity with environmental and socio-economic implications. These pollutant gases are not friendly to human health (Chuwah, and Santillo, 2017).

Gas flaring causes a reduction in visibility. Visibility reduction occurs in the course of scattering of light rays from the surface of airborne particles (Ajugwo, 2013). Hydrogen sulphide is a poisonous gas, and its presence in air usually brings about decolouration of paints as a result of its reaction with a metallic pigment (Nta, Jonah, and Lucas, 2016). Sulphur oxides cause temporary or permanent respiratory ailment, and sulphur oxides smog affects plants and crops adversely. Particulate matters also have adverse effects on human health, such as respiratory problems and the development of lung cancer (Webb, Hays, Dyrszka, Rodriguez, Cox, Huffling, and Bush-Bedient, 2016). Oxides of nitrogen (nitric oxide, nitrous oxide, and nitrogen oxide) have toxic effects on plants, animals and humans, which in turn led to deleterious effects on the practice of agriculture, and the socio-economic wellbeing of the people including their properties (Ologunorisa, 2001).

Furthermore, numerous studies have asserted that climate change occurred as a result of the presence of enormous quantities of methane and carbon dioxide in the atmosphere. The recurrence of gas flaring in the oil-producing communities in the Niger Delta region of Nigeria produces methane and carbon dioxide, which accumulate in a larger quantity, which in turn have devastating effects on the weather pattern, which occasioned drought, coastal erosion, deforestation and flooding (Adewale and Mustapha, 2015). The various components of the gases flared into the atmosphere of the oil-producing communities in the study area have negatively altered the existing environmental and socio-economic well-being of the inhabitants.

The Impact of Gas Flaring on Vegetation and Agricultural Activities

Recurrence of gas flaring in the oil-producing communities in Ilaje Local Government Area of Ondo State, Nigeria as a result of oil exploitation activities of multinational oil corporations, has impacted negatively on vegetation and agricultural productivity by destroying the vegetation

and destabilizing the ecosystem, and also making farmlands infertile and unproductive. Consequently, gas flaring has adverse effects on the indigenous economy by destroying the vegetation, mangrove forests, vegetal density, food and cash crops, and soil fertility which brings about reduction in food production (Odjugo, andOsemwenkhae, 2009). One of the basic components that provides effective and efficient functioning for flora, fauna, man and agricultural productivity in the ecosystem is soil. The presence of nitrogen, phosphorous, potassium, and other nutrient elements in the soil increase soil fertility (Atuma, and Ojeh, 2013). However, the main effect of gas flaring on the chemistry of soil is the increase in soil acidity. High soil acidity brings about chemical and biological situations which are inimical to plants and soil microorganisms (Anomohanran, 2012).

Gas flaring negatively changes the parameters of soil quality which include physico-chemical and microbial features. The alteration in the physico-chemical and microbial components of soil brings about soil infertility and low productivity of both food and cash crops (Seiyaboh, and Izah, 2017). Ilaje Local Government Area of Ondo State, Nigeria is not spared of the negative effects occasioned by gas flaring. For instance, soils in the study area no longer enhance plant growth because the presence of gases released in the air negatively affect photosynthetic process which hinders the growth of plants and crops (Omomowo, 2018).

Gas flaring illuminates the environment during the day and night, and this hinders photosynthesis (Uzoekwe, 2019). Some meaningful soil quality parameters such as temperature, soil moisture, soil microbial population are negatively affected as a result of recurrence gas flaring in the oil producing communities. Undoubtedly, microbes play pivotal role in nutrient and biogeochemical cycling (Seiyaboh, and Izah, 2017). Gas flaring has negative effects on vegetation which serves ecological role by guarding against soil erosion. Vegetation is very useful for many purposes. For instance, vegetation also serves as a source of food for omnivorous animals which include but not limited to cow, goat, grasscutter, sheep, antelope, rabbits. Vegetation cover serves as a habitat to numerous wildlife species. One of the main sources of nutrients necessary for body building is plant. Plant provides carbohydrate, protein and other necessary minerals and vitamin needed by both man and animal (Seiyaboh, and Izah, 2017)

The change in vegetation as a result of altered hydrology and topography occasioned by acidification, has powerful effects on the biological production, and led to impoverishment of biodiversity and loss of many tree and plant species with their potential economic and pharmaceutical values (Aghalino, 2009). It is a well known fact that plants possess both pharmacological and bioactive composition. The composition of the bioactive influences the effectiveness and efficiency of their medicinal properties. Gas flaring also has deleterious effect on the nutritional and

bioactive component of vegetation, by altering the anti-nutrient compositions (alkaloid, phytate, oxalate, saponin, tannin, and cyanogenic glycosides) in many vegetables such as scent leaf, bitter leaf, water leaf, and fluted pumpkin leaf that are usually consumed by the inhabitants of the oil producing communities (Seiyaboh, and Izah, 2017). The extinction of biodiversity (flora and fauna), destruction and contamination of soil, and air pollution in the oil-producing communities in the study area have worsened the environmental conditions prevailing in these areas.

The Impact of Acid Rain Occasioned by Gas Flaring

Gas flaring contributes to air pollution and acid rain (Uzoma, Akhionbare, Dike, Uche, and Akhionbare, 2015). Acid rain is one of the main environmental problems ravaging the oil producing communities in the study area. Acid rain occurs when the gases flared into the environment during combustion combine with atmospheric moisture (Iminabo, and Iminabo, 2018). Acidifying gases that contribute to acid rain include carbon dioxide, sulphur dioxide, chlorides, and nitrogen dioxide (Uzoma, Akhionbare, Dike, Uche, and Akhionbare, 2015). Carbon dioxide released into the environment during combustion combined with rain water to form trioxocarbonate iv acid, which later causes acid rain (Nta, Jonah, and Lucas, 2016). Also, acid rain takes place when sulphur dioxide mixed with other atmospheric components especially oxygen (Iyorakpo, and Odibikuma, 2015). Flared gas released into the environment from both the onshore and offshore oil and gas installations is the major source of air pollution (Nwankwo, and Ogagarue, 2011).

Previous scholarly studies have proved that acid rain not only altered the existing microclimate but also impacted negatively on the physico-chemical properties of soil in the oil-producing communities (Odjugo, and Osemwenkhae, 2009). Acid rain brought about socio-economic decline for the fact that it negatively impacted agricultural productivity. In other words, gas flaring causes acid rain, which in turn adversely affects agricultural productivity and the general ecology. During rainfall, the gaseous pollutants released into the environment combine with the atmospheric moisture to form acid rain, which affects the soil thereafter. The resultant effect of this can be seen in the decline in productivity of food crops like yams, cassava, cocoyam, sweet potato, maize, melon, okro, banana, and plantain since important nutrients needed by crops to grow have been depleted as a result of constant acid rain on them (Seiyaboh and Izah, 2017).

Furthermore, there is an additional economic implication of acid rain as it causes corrosion to roofing sheets which in turn reduces their durability (Nta, Jonah, and Lucas, 2016). The roofing sheets that normally last for over forty years before, currently last for just only five years due to the adverse effect of acid rain caused by gas flaring. As a result of the negative effects of acid rain on these roofing sheets, the owners of the houses negatively affected by acid

rain are forced to change the corroded and damaged roofing sheets at regular intervals since they cannot afford to buy the aluminum roofing sheets that are highly resistant to acid rain because they are very expensive to buy (Onuwaje, 2018).

Moreover, acid rain also causes decolouration of paints of building, and bleaching or fading of clothes and textile materials when they are exposed to it (Olukoya, 2015). The United States Environmental Protection Agency affirmed that acid rain has deleterious effect on vegetation, soil fertility, building materials, agricultural productivity, metallic materials, paints, and water quality (Uzoma, Akhionbare, Dike, Uche, and Akhionbare, 2015). When acid rain constantly fall on leave of plants, it wears away the protective waxing coating in them, and the resultant effect of this is decline in photosynthesis in plants (Ite, and Ibok, 2013).

In addition, the importance of water to human, animal, and plant development and sustenance cannot be jettisoned. Humans use water for many purposes such as drinking, bathing, washing, and cooking. In addition, water provides place of abode for numerous biodiversity such as fish, bird, mammal, aquatic reptile, and frog. However, water quality parameters of surface water, ground water, and rain water in the oil producing communities have been adversely affected by acid rain. Some of the water quality parameters that are negatively altered as a result of acid rain include nitrate, lead, sulphate, and carbonate (Seiyaboh, and Izah, 2017). When acid rain falls on the surface of the earth, it causes corrosion of metals materials, buildings, and roofing sheets among others. The frequent corrosion of roofing sheets that are prevalent in the oil producing communities in the study area has been attributed to the recurrence of acid rain (Onuwaje, 2018).

The Impact of Increase in Temperature Caused by Gas Flaring

One of the resultant effects of gas flaring is excessive heat produced during the cause of gas flaring. Gas flaring in the oil producing communities in the study area causes serious heat, which in turn causes thermal pollution. In Ilaje Local Government Area of Ondo State, one of the major causes of thermal pollution is gas flaring which takes place throughout the twenty-four hours of the day (Ayeni, 2018). The heat emanating from gas flaring has adverse effects on microclimate and surrounding environment by destroying vegetation, mangrove, swamps and salt marsh, and equally causes soil degradation which in turn brings about low agricultural productivity. In other words, the excessive heat emanating from gas flaring largely shapes both microclimate and soil nutrient needed for meaningful agricultural productivity (Baghebo, Samuel, and Nwagbara, 2012).

Moreover, excessive heat produced during gas flaring prevents both nitrogen formation and formation of organic matter (Olukoya, 2015). The heat generated during gas flaring brings about increase in temperature which negatively affect useful

bacterial that aid human existence and soil fertility (Anomoharan, 2012). Thermal pollution also brings about dehydration of the vegetation, human and animals, including the ecosystem and the food chain, as well as flora and fauna (Isiche, and Sanford, 1976). Metallic materials and building structures in the oil producing communities are also negatively affected due excessive increase in temperature. Temperature plays vital role in shaping the development and growth of plants. However, excessive increase in temperature caused by gas flaring has adverse effects on the development and growth of plants (Anomoharan, 2012).

In the course of direct observation at the different flaring sites in Ilaje Local Government Area of Ondo State during the field study, the researcher observed that the vegetation around the flare locations lack the basic nutrients needed by plants for effective growth because the physical and chemical properties of the soil such as nitrogen, phosphorous, potassium, that supply all the necessary mineral elements required for soil fertility have been negatively altered as a result of high temperature occasioned by gas flaring.

The Impact of Noise Pollution Emanating from Gas Flaring

Noise pollution emanating from gas flaring impacted negatively on the hearing capacity because of the roaring noise associated with gas flare. One of the major pollutants associated with gas flaring is the noise dispersion emanating from gas flaring sites in the oil producing communities, with resultant adverse effects on man and animals. Noise produced as a result of gas flares travels long distances, and both marine and terrestrial habitats that rely on sound for their information, effective communication, and likewise feeding are negatively affected by the sound pollution (Iduk, and Samson, 2015). Noise pollution also has made many marine and terrestrial species to migrate from where there is recurrence noise pollution caused by gas flaring. Equally, noise pollution occasioned by gas flaring has led to the displacement of inhabitants of some oil producing communities in the study area to other areas that are not prone to noise pollution. Noise pollution has also made some animals to migrate to areas which are free from continual noise pollution in the study area (Onuwaje, 2018).

The Impact of Gas Flaring on Ozone Layer

Gas flaring in Nigeria contributes immensely to the presence of greenhouse gases in the atmosphere, especially in the oil-producing communities. Consequently, the presence of greenhouse gases in the atmosphere brings about ozone layer depletion. Ozone layer depletion allows the infiltration of ultraviolet radiation to the surface of the Earth. The greenhouse effect could be referred to as the heating up of the surface of the Earth. This facilitates the increase in the level of concentration of carbon dioxide in the atmosphere. When the ozone layer is depleted, the protection between the earth and the sun is outrightly

no longer in existence (Olukoya, 2015). The implication of this situation is that, the rate at which the sun has direct contact with the earth increases, and this brings about global warming (Anomoharan, 2012). Currently, climate change has become a topical issue at both national and international level because of its attendant negative effects.

The Impact of Gas Flaring on Metallic Objects and Buildings

Gas flaring impacted negatively on buildings by weakening the strength of concrete used in the buildings. Also, metallic objects including roofing sheets are constantly corroded. Paints on buildings and other materials are adversely affected as a result of recurrence of gas flaring in the oil producing communities (Uzoekwe, 2019). Gases that were flared into the environment contain strong pollutants that aid the corrosion of roofing sheets, and the decolouration of paints on the walls (Nwokocha, Mbuka, Nwoko, and Nwachi, 2017). Gas flaring aids the rate at which corrosion takes place in the oil-producing communities in Ilaje Local Government Area of Ondo State, Nigeria (Obayemi, 2018).

Corrosion of metallic materials became noticeable in the study area when multinational oil corporations began their oil exploration and exploitation activities in 1968 (Ogunbiyi, 2018). Corrosion is the gradual destruction of materials, especially metallic objects, as a result of chemical and electro-chemical reaction with the environment. In other words, corrosion is the electrochemical oxidation of metal in reaction with an oxidant such as oxygen or sulphur. Rusting which could be referred to as the formation of iron oxides, is a notable example of electrochemical corrosion (Iminabo, and Iminabo, 2018). The corrosion of metallic materials in the oil producing communities in the study area remains intractable due to continual gas flaring (Elebiju, 2018). Majority of metallic materials get corroded when they have direct contact with water and moisture in the air, acids, salts, bases, oil, and other solid and liquid chemicals. When metal materials are exposed to gaseous materials such as acid vapour, formaldehyde gas, ammonia gas, and sulphur containing gases, they are usually corroded (Iminabo, and Iminabo, 2018). The adverse impact of gas on buildings, metallic materials including roofing sheets, and paints in Ilaje Local Government Area of Ondo State, Nigeria is not a mere abstraction, but can be evidently linked with empirical realities

Conclusion

Conclusively, the cumulative adverse effects of gas flaring include air pollution, pollution of water quality, destruction of vegetation, loss of biodiversity, deforestation, low agricultural productivity, reduction in soil fertility, acid rain, increase in temperature, noise pollution, corrosion of metallic materials including roofing sheets, decolouration of paints, destruction of buildings, fading of textile materials exposed to it, and ozone layer depletion.

References

Adewale, O.O., and Mustapha, U. (2015), *The Impact of Gas Flaring in Nigeria,* International Journal of Science, Technology and Society, 3(2).

Afiwajoye, L.M. (2018), Interview with Mr. afiwajoye, 76 years, a Retired Teacher at Igbokoda, Ilaje Local Government Area of Ondo State, Nigeria, on 2nd December, 2018.

Aghalino, S.O. (2009), *Gas Flaring, Environmental Pollution and Abatement Measures in Nigeria, 1969-2001,* Journal of Sustainable Development in Africa, 11(4).

Ajuesi, B.O. (2018), Inrterview with Mrs. Ajuesi, 77 years, a Trader at Igbokoda, Ilaje Local Government Area of Ondo State, Nigeria, on 2nd December, 2018.

Ajugwo, A.O. (2013), *Negative Effects of Gas Flaring: The Nigerian Experience,* Journal of Environmental Pollution and Human Health, 1(1).

Anomoharan, O. (2012), *Thermal Effect of Gas Flaring at Ebedei Area of Delta State, Nigeria,* The Pacific Journal of Science and Technology, 13(2).

Atuma, M.I., and Ojeh, V.N. (2013), *Effect of Gas Flaring on Soil and Cassava Productivity in Ebedei, Ukwuani Local Government Area, Delta State, Nigeria,* Journal of Environmental Protection, 1054.

Ayeni, A.A. (2018), Interview with Mr. Ayeni, 76 years, a Retired Teacher at Igbokoda, Ilaje Local Government Area of Ondo State, Nigeria, on 10th November, 2018.

Ayobami, A.O. (2017), *Environmental and Economic Implications of Gas Development and Flaring in the Niger Delta Region of Nigeria,* Akure: Ibikunle Press.

Baghebo, M, Samuel, U.P., and Nwagbara, E.N. (2012), *Environmental Damage Caused by the Activities of Multinational Oil Giants in the Niger Delta Region of Nigeria,* IOSR Journal of Humanities and Social Science (JHSS), 5(6).

Bamijoko, J.I. (2018), Interview, with Mrs. Bamijoko, 75 years, a Trade at Igbokoda, Ilaje Local Government Area of Ondo State, Nigeria, on 2nd December, 2018

Chuwah, C., and Santillo, D (2017), *Air Pollution due to Gas Flaring in the Niger Delta: A Review of Current State of Knowledge,* Greenpeace Research Laboratories Technical Report, School of Biosciences, University of Exeter, U.K.

Duinker, P.N. (1989), *Ecological Effects Monitoring in Environmental Impact Assessment: What Can it Accomplish?* Environmental Management, 13(6).

Elebiju, S.E. (2018), Interview with Mr. Elebiju, 80 years, a Retired Teacher at Igbokoda, Ilaje Local Government Area of Ondo State, Nigeria, on 25th November, 2018.

Emmanuel, A.A., and Alakinde, M.K. (2006), *Nature of Environmental Science,* Monograph of the Department of Urban and Regional Planning, Federal University of Technology, Akure, Ondo State, Nigeria.

Emumejaye, K. (2012), *Effects of Gas Flaring on Surface and Ground Water in Irri Town and Environs, Niger-Delta, Nigeria,* IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT), 1(5).

Ezenwaji, E.E., Okoye, A.C., and Otti, V.I. (2013), *Effects of Gas Flaring on Rainwater Quality in Bayelsa State, Eastern Niger Delta Region, Nigeria,* Journal of Toxicology and Environmental Health Science, 5(6).

Iminabo, J.T., and Iminabo, M. (2018), *Corrosive Effect of Gas Flaring on Metals in Egi Kingdom: Galvanized Iron and Brass,* International Research Journal of Advanced Engineering and Science, 3(2).

Isiche, A.O., and Sanford, W.W. (1976), *The Effects of Waste Gas Flared on the Surrounding Vegetations of South Eastern Nigeria,* Journal of Applied Ecology, 13.

Ite, A.E., and Ibok, U.J. (2013), *Gas Flaring and Venting Associated with Petroleum Exploration and Production in the Nigeria's Niger Delta,* American Journal of Environmental Protection, 1(4).

Iyorakpo, J., and Odibikuma, P.W. (2015), *Impact of Gas Flaring on the Built Environment: The Case of Ogba/Egbema/Ndoni Local Government Area, Rivers State, Nigeria,* European Scientific Journal, 2(26).

Mafimisebi, O.P., and Ogbonna, O.C. (2016), *Environmental Risk of Gas Flaring in Nigeria: Lessons from Chevron Nigeria and Ilaje Crisis,* Journal of Environment and Earth Science, 6(3).

Mba, I.C., Mba, E.I., Ogbuabor, J.E., and Araza, W.O. (2019), *Causes and Terrain of Oil Spillage in the Niger Delta Region of Nigeria: The Analysis of Variance Approach,* International Journal of Energy Economic and Policy, 9(2).

Nta, S.A., Jonah, G.O., and Lucas, E.B. (2016). *Adverse Effects of Gas Flaring on Galvanized Roofing Sheets and Some Agricultural Crops at Mkpanak, Ibeno Local Government Area of Akwa Ibom State, Nigeria,* International Journal of Scientific and Engineering Research, 7(10).

Nta, S.A., Usoh, G.A., and James, U.S. (2017), *Impact of Gas Flaring on Agricultural Production of Edo Esit-Eket Local Government Area, Akwa Ibom State, Nigeria,* International Journal of Research in Agriculture and Forestry, 4(12).

Nwankwo, C.N., Ogagarue, D.O. (2011), *Effects of Gas Flaring on Surface and Ground Waters in Delta State, Nigeria,* Journal of Geology and Minig Research, 3(5).

Nwokocha, C.O., Edebeatu, C.C., and Okujagu, C.U. (2015), *Measurement, Survey and Assessment of Air Quality in Port Harcourt, South-South, Nigeria,* International Journal of Advanced Research in Physical Science (IJARPS), 2(7).

Nwokocha, E.E., Mbuka, I.E., Nwoko, C.O., and Nwachi, C.C. (2017), *Effect of Gas Flaring on the Environmental Quality of Bonny Island, Rivers State, Nigeria,* US Open Environmental Protection Journal, 1(1).

Obayemi, S.O. (2018), Interview with Mr. Obayemi, 69 years, a Retired Teacher at Igbokoda, Ilaje Local Government Area of Ondo State, Nigeria, on 10th November, 2018.

Odjugo, P.A.O., and Osemwenkhae, E.J. (2009), *Natural Gas Flaring Affects Microclimate and Reduces Maize Yields,* International Journal of Agriculture and Biology, 11(4).

Ogunbiyi, A.A. (2018), Interview with Mr. Ogunbiyi, 76 years, a Retired Teacher at Igbokoda, Ilaje Local Government Area of Ondo State, Nigeria, on 25th November, 2018.

Ologunorisa, T.E. (2001), *A Review of the Effects of Gas Flaring on the Niger Delta Environment,* The International Journal of Sustainable Development and World Ecology, 8(3).

Olujimi, J.A.B., Adewunmi, E.A., and Odunwole, S. (2011), *Environmental Implications of Oil Exploration and Exploitation in the Coastal Region of Ondo State, Nigeria: A Regional Planning Appraisal,* Journal of Geography and Regional Planning, 4(3).

Olukoya, O.A.P. (2015), *Negative Effects of Gas Flaring on Buildings and Public Health in Oil Producing Communities: The Ogbia Community, Bayelsa State Case,* International Journal of Environmental Monitoring and Protection, 2(5).

Omomowo, B.O. (2018), Interview with Mr. Omomowo, 70 years, a Retired Teacher at Igbokoda, Ilaje Local Government Area of Ondo State, Nigeria, on 2nd December, 2018.

Onuwaje, T.O. (2018), Interview with Mr. Onuwaje, 69 years, a Driver at Igbokoda, Ilaje Local Government

Area of Ondo State, Nigeria, on 10th November, 2018.

Orji, E.O., Egboka, B.C.E., Asheshe, U.S., and Dio, B.A. (2015), *Influence of Gas Flaring on Some Physical Properties of Soil in Kwale, Delta State, Nigeria,* IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT), 9(8).

Puhikumo, A.J. (2016), *Effects of Oil Exploration and Exploitation on the Environment in the Niger Delta Region of Nigeria,* Port Harcourt: Jeremiah and Sons Publishers.

Seiyaboh, E.I., and Izah, S.C. (2017), *A Review of Impacts of Gas Flaring on Vegetation and Water Resources in the Niger Delta Region of Nigeria,* International Journal of Economy, Energy and Environment, 2(4).

Uzoekwe, S.A. (2019), *Impacts of Gas Flaring on the Fertility Status of Agricultural Soil in Oil and Gas Host Community in the Niger Delta Region of Nigeria,* Annals of Ecology and Environmental Science, 3(4).

Uzoma, H.C., Akhionbare, S.M.O., Dike, M.U., Uche, C.C., and Akhionbare, W.N. (2015), *Response of Roof Materials to Acidified Precipitation in a Rural Community in Rivers State, Nigeria,* IIARD International Journal of Geography and Environmental Management, 1(8).

Webb, E., Hays, J., Dyrszka, L., Rodriguez, B., Cox, C, Huffling, K., and Bush-Bedient, S. (2016), *Potential Hazards of Air Pollutant Emissions from Unconventional Oil and Natural Gas Operations in the Respiratory Health of Children and Infants,* Reviews on Environmental Health, 31(2).