HOMEF

HEALTH OF MOTHER EARTH FOUNDATION (HOMEF)

COMMUNITY GUIDE

TO ENVIRONMENTAL MONITORING AND REPORTING

HOMEF'S COMMUNITY GUIDE TO ENVIRONMENTAL MONITORING & REPORTING

DEDICATION

This handbook is dedicated to the memory of Oronto Douglas and to Comrade Che Ibegwura whose consistency in community ecological defence has been a source of great inspiration.

Published by Health of Mother Earth Foundation (HOMEF)
Top Floor, #214 Uselu-Lagos Road, Ugbowo, P.O.Box 10577, Benin City, Nigeria
e-mail: home@homef.org
www.homef.org

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ABBREVIATIONS AND ACRONYMS

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AIRORG - Akwa Ibom Information and Research Organisation
API - American Petroleum Institute
CD - Community Dialogue
CEDAC - Community Ecological Defence and Action Committee
CEHRD - Centre for Environment, Human and Development
CFCs - Chlorofluorocarbons.
DPR - Department of Petroleum Resources
EIA - Environmental Impact Assessment
EGASPIN - Environmental Guidelines and Standards for the Petroleum Industry in Nigeria
EMP- Environmental Management Plan
EPA – Environmental Protection Agency
ERA/FoEN - Environmental Rights Action/Friends of the Earth Nigeria
FMoE - Federal Ministry of Environment
HOMEF- Health of Mother Earth Foundation
IEA- International Energy Agency
JIV- Joint Investigation

NEITI- **Nigerian Extractive Industries Transparency Initiative**
NESREA- National Environmental Standards and Regulations Enforcement Agency
NGO - Non Governmental Organisation

NOSDRA- National Oil Spill Detection and Response Agency
NNDB - Niger Delta Development Board
NNDC - Niger Delta Development Commission
OMPADEC - Oil mineral producing area Development Commission
OSF - Ogoni Solidarity Forum
UNDP - United Nations Development Program
WHO - World Health Organisation

FOREWORD

FOREWORD

This monitoring guide or manual has been prepared for use by community ecological defenders. It is prepared in a simple format to ensure that it is easy to understand and to use. It is also hoped that community environmental monitors will find the guide useful for training others and by so doing build a strong defence for our fragile and heavily degraded environments. Although it is written with oil field communities in mind, the reporting format should readily find application in the areas of solid minerals extraction. The format of this Guide allows ample margins so that monitors can write or sketch in their observations. We encourage community monitors to bring up areas that need improvements based on their field experiences.

Environmental monitoring cannot be effective if the monitors do not have good knowledge of the state of their local environment and of the changes occurring there. In addition, where community people do not have an idea of the harmful nature of pollutants in their environment they are not able to take adequate precaution against exposing themselves to the toxic elements. We have outlined some of the basic information that would guide monitors in their tasks and also arm them for advocacy as well. In preparing this guide we have relied on information in Hesperian's publication **A Community Guide to Environmental Health**. For community environmental monitors working on oil and related pollutants jeopardising community health we strongly recommend this Hesperian book.

Engaged Communities

Before preparing this manual, HOMEF conducted diagnostic Community Environmental Dialogues in selected communities in the Niger Delta. The **Community Dialogues (CD)** provided space for community members to go down memory lane, review the environmental situation of their communities and identify areas where actions are inescapable if they are to restore, preserve and defend their heritage. The Dialogues were community driven exercises and participating communities set areas of priority action after the initial diagnostic conversations using a guiding document that communities are free to adopt and/or adapt. We add the guide to the Dialogues as an appendix to this publication.

It is our hope that this Guide would empower communities to further review the state of their environments with particular attention to health impacts as well as the overall quality of the biodiversity in their territories.

Nnimmo Bassey
Director, HOMEF

FOREWORD

Introduction

Monitoring our Environment

Although we do know that the environment affects everything we do in life, including how we live and die, we often think that it does not matter what we do to the Planet. Demands for stewardship in relation to how we relate to the gifts of Nature are sometimes regarded as affront to political power wielders and corporate entities that claim ownership of our lands, waters and the several gifts that Nature has endowed us with.

Politicians speak of *transformation* and/or *change*. We have seen change. We are living in change. Our waters have been *changed* into polluted and heavily toxic soups. Our air hangs heavy with noxious fumes. Frantz Fanon famously said: "We revolt simply because, for many reasons, we can no longer breathe." The truth is that we have got to the point where we can hardly breathe.

Our lands have been transformed into mishmash of toxic dumps. In some places our environment has been almost irreversibly changed from what Nature generously gave to us. Our effort today is to prepare platforms for demanding and for building the real change that we need.

In line with our conviction that the environment is our life Health of Mother Earth Foundation (HOMEF) is collaborating with our communities in conducting organised conversations on our environment and our environmental re-sources. We salute the resilience of our people as they carry on living in heavily impaired environments and their resolution to tackle the challenges foisted on them by factors that are external to their communities. In keeping with our tradition we stand at one with our people in their struggles to catch at least a whiff of fresh air.

As we monitor our environment we keep in mind the basic principles of Re-Source Democracy as captured in our document of the same title[ii]:

Re-source democracy hinges on the recognition that a natural 'resource' fundamentally belongs to Nature and secondly to communities of species and peoples who live in the territory or have traditionally held the territory where the 'resource' such as forests, rivers or grazing lands exists. Re-source democracy is about stewardship that recognises the right of citizens to establish

rules and to act in line with traditional as well as best available knowledge to safeguard the soil, trees, crops, water and wildlife first as gifts of Nature and secondly to enjoy the gifts as necessary provisions that support their lives and livelihoods as well as those of future generations. Re-source democracy calls on us to re-source, to re-connect with Earth – our source of life – and to respect her as a living being with inherent rights, and not just a 'resource' to be exploited.

It hinges on pragmatic politics and wisdom that our relations with nature cannot be left to speculators and manipulators of market forces whose drive is to commodify Nature. It ensures the right (and demands a responsibility) to participate in decisions that determine our access to, and enjoyment of nature's gifts and removes the obstacles erected by the politics of access while providing process for redress. It demands that certain places must be off limits to extractive activities especially when such re-sources are found in fragile ecosystems or in locations of high cultural, religious or social significance in order to support the higher objectives of clean and safe environments to ensure citizens' wellbeing.

A clear understanding that Mother Earth has the right to regenerate her natural cycles without disruption by third parties should place a burden of protection on all humans. Taking up the defence of our ecology is a mark of enlightened self-interest because when we destroy, or permit the destruction of our environment, we invariably diminish ourselves.

1.0 Module ONE: The Environment

1.1 Reviewing the State of our Environment

The focus of this training is timely for our communities on the frontline of oil pollution and other negative impacts from the petroleum resources extractive sector. It is pertinent that our communities understand the high importance that must be attached to joint inspection visits after oil industry pollution incidents. The place of communities in the process of determining the cause of incidents cannot be over stressed, especially because the oil companies almost always attribute oil spills to third party interference or sabotage even before those incidents have been investigated.
This paper aims to present the political and socio-economic context in which oil activities are carried out in our communities. It is hoped that with this presentation we will all gain a good background to why every JIV must be seen as a moment for ecological defence and not just a moment for mere signing of papers.

The Niger Delta provides a clear template for the display of the direct correlation between climate change, human security and underdevelopment. The human security situation and the state of underdevelopment are however, deeply compounded by other factors besides climate change, but they are all related to the phenomenon when viewed through the justice filter. These factors include those that are social, economic and political.

Another key matter related to the topic under consideration is the rather peculiar notion of development foisted on the region, and indeed nation, that sometimes render negative actions as positive. These notions include the rise of *infrastructure politics* without consideration of needed social safety nets to secure the lives of citizens.

The challenges posed by climate change in the Niger Delta are stark and are rooted in the global neoliberal economic and governance structures. The fossil fuels addiction foisted on the world by an extremely predatory petro-military complex has so impacted our attitude to and use of nature's resources.

Our historic organic and positive linkage to Mother Earth has been disrupted by the ascendancy of capital as the measure of wealth, power and wellbeing. This disruption has created such levels of competition within communities and also between regional and national entities to the extent that solidarity, cooperation and mutual support – the very measures that would ensure socio-economic sustainability have been ignored or rendered inoperative.

There is no doubt that at this conference we will hear a lot about past assessments of the Niger Delta environment and its socio-economic context. The picture of what may have been an ideal, pristine and naturally well-endowed region got dramatically altered since the arrival of new forms of governance and economic exploitation arising from commercial and related political contacts with the West. That contact brought about violent confrontations, sacking of kingdoms, colonial subjugation and ultimately set in motion the ecological assault that has become virtually intractable.

Assessments such as that of the Willink Commission[iii] of 1958 captured a picture of the Niger Delta that has been widely cited for the simple fact that it was succinct and remains valid even to this day. This was the description of the Niger Delta as ***poor, backward and neglected***.[iv]

The Willink Commission recommended that the region should be given a special focus and this led to the establishment of the Niger Delta Development Board (NDDB) in 1960. This board did not achieve much before the Nigeria-Biafra civil war of 1967-1970 dealt a mortal blow on the exercise.[v] Other institutions like the Oil Mineral Producing Area Development Commission (OMPADEC), the Niger Delta Development Commission (NDDC)[vi] and the Ministry of Niger Delta Affairs have followed with questionable outcomes.

1.2 THE STORY OF OILS

The story of the Niger Delta can be equated to the story of oils. It is not for nothing that there has been a clamouring for the creation of an Oil State in the region. We are, however, not speaking of States creation here. The preponderance of oil in the region has brought hopes, disappointments and sorrows. In the 19th Century the region was referred to as Oil Rivers because of its massive oil palm production.[vii] In those days of market access struggles between local merchants, middle men and visiting adventurers, the creation of the Oil Rivers Protectorate in 1884[viii] ignited resentment among local leaders who saw the move as a means of restricting their direct access to foreign markets in the palm oil business. This and related issues lead to violent attacks and ransacking of Ebrohimie in 1894 and the razing to the ground of Nembe in 1895.[ix]

The commercial exploitation of crude oil began in the Niger Delta marked a turn for the worse in the history of resource conflicts in the region. The black gold has had dire implications for the social, cultural and economic development of the Niger Delta. On both the local and global scales the black gold has become the opium that has made policy makers insensitive to the unfolding ecological collapse in the region.

The search for ecological peace in the region has indeed been on a slippery/oily slope for more than a century. Destructions resulting from palm oil trade conflicts pale into insignificance when we consider the catalogue of woes imposed on our communities in the past three decades.

The fact that the massive dependence on crude oil for energy and power generation has contributed immensely to the climate crisis is no longer deniable. It is generally agreed that unless at least 80% of known fossil fuels resources are left untapped the world would be on track for catastrophic global temperature rise above preindustrial levels.

According to the International Energy Agency (IEA) the world's current level of consumption of fossil fuels is leading towards a temperature increase of 3.6 degrees Celsius, a reality that would trigger calamitous sea level rise, polar ice cap loss, water stress and catastrophic weather events. It is internationally agreed that beyond a global average temperature increase of 2 degrees Celsius over pre-industrial levels the effects of climate change will be catastrophic. Keeping below 2 degrees Celsius temperature increase requires capping total future global carbon dioxide emissions at 1,000 gigatonnes beginning from 2014. This carbon budget will likely be exhausted by 2040.[x]

Notably, 78% of the total greenhouse emission from 1970 to 2010 came from the burning of fossil fuels and industrial processes.[xi] If the burning spree continues then we would literally be setting the scene for global burning, not just a mere global warming. For every one degree Celsius temperature increase, Africa experiences a 50% increase above the global average. The implication of this is that uncontrolled temperature rise would be tantamount to burning and/or sinking Africa.

Although there is much discussion about climate change, there is a studied silence over the ecological collapse that is already setting in. More concern is being shown to energy and financial crises than the massive destruction of our biosphere. According to some researchers, global capitalism is provoking the sixth extinction[xii] of species in the history of the world mostly due to human activities. This is related closely to the dependence on fossil fuels in production and consumption patterns, including in industrial agricultural metabolism.[xiii]

Manifestations of climate vulnerability in the Niger Delta can be seen in coastal erosion, deforestation and loss of forest quality, sea level rise and reduced availability of fresh water.

Today our demands captured in the slogan "Leave the Oil in the Soil, the Coal in the Hole and the Tar Sands in the Land" has become a common refrain, but the some of those that have joined the train are more concerned about the price of carbon than on climate justice.

Fossil fuels extraction has not only brought woes and sorrows to the Niger Delta it has had serious effect on our ethics and values nationally. The neglect of the agricultural sector and the crippling of a nascent industrial sector are all fallouts from being bewitched by the black crude. The confluence of capital and power has meant a rapid build up of an underclass of citizens whose means of livelihood are largely extinguished by continuous ecological assault engineered by oil spills, gas flares and an assortment of toxic wastes including drilling cuts and produced water.

A way to understanding the ecological problems of the Niger Delta is through looking closely at the political ecology or the logic of power that creates the problem in the first place. We have pointed some light on this sort of interrogation to enable us now the roots of the crises and to aid us in our efforts to lay the axe to the roots of the tree. That is the journey we have embarked on. The journey goes on until victory is attained.

1.3 SECURITY CONCERNS

Human security in the Niger Delta, as in other places, cannot be supplied or enforced through the barrel of the gun. It can only happen when policy concerns are people-centred and where there is a situation of mutual trust between the State structures and her citizens. As things stand, the relationship is severely disrupted and security is more or less dispensed as articles of patronage. It is in this sense that oil pipelines have a higher investment for security than human lives. This is also why interference with the pipelines attract higher value than they ought to.

This may not be a surprise in a *rentier state* whose development efforts leave a huge deficit with the rise of the politics of socio-economic exclusion of groups from the benefits of the major natural resource. The political outcome is sharpened conflict in the Niger Delta where breached individual economic security threatens national and global security. This is compounded by the entrenched alliance between the state and oil companies that creates an oil political economy that gives little concern for the environment and local livelihoods.[xiv]

This rupturing of trust between state and the citizens has brewed an atmosphere of self-help among some social actors who have discovered through experience that violence attracts attention and patronage far more quickly and in a more materially beneficial way to the key actors. The militancy in the Niger Delta of 2005-2009 threatened the nation's oil economy more than anything else and quickly caught the attention of state powers and led to the institution of an Amnesty Programme and certain proverbially lucrative follow-up largesse.

Maintaining the integrity of the environment and securing the peoples' means of livelihood are key ways of ensuring that peace reigns in the region.
Among the many loses that the Niger Delta has suffered is the loss of mangrove forests mostly due to the activities of oil corporations. This has led to biodiversity loss and exacerbated coastal erosion in the area. Mangrove loss due to activities of the oil companies often start from forest fragmentation during the seismic exploration stages and continue with subsequent drilling and pipeline laying stages. This forest loss is a significant contributor of greenhouse gases in the region. In addition, the mangrove forest is a known to be the spawning ground for significant number of the fish species in the Gulf of Guinea and their loss has direct impacts on food security in the region. The loss of mangrove and the accompanying penetration by the polluting activities of oil operations also lead to the invasion of non-native *nypa palm* varieties that further degrade the environment.

The oil company infrastructure that constitutes the single most important industrial source of greenhouse gases in Sub Saharan Africa is the network of associated gas-burning furnaces popularly referred to as gas flares.

The figure of gas being flared in the Niger Delta is as unreliable as the figures given for amount of crude oil being extracted in the area. The official figures of crude oil extraction are largely estimates because of a weak metering system that is in place. It is estimated that oil companies flare up to 17.2 billion cubic metres of natural gas every year in the Niger Delta. For a country that produces only a tiny fraction of the electricity she needs this is a scandalous waste. In economic terms, the country burns off more than $2 billion every year.

There is no justification for the burning of associated gas in the oil fields besides the tenuous reason that the bad practice began when there was no market for natural gas in Nigeria. Another reason offered by the oil companies is that the Nigerian government is not forthcoming with its own part of the funding needed to halt the menace. There can be no tenable explanation for the continuation of the practice since routine gas flaring was outlawed in January 1984. From that date the offending oil companies are required to obtain official permits for flaring gas on a case-by-case basis from the minister in charge of the sector. Secondly, the flaring companies are required to pay a fine for the act. However, the fine has been puny and with lack of transparency in the sector, routine gas flaring has continued with little sign of abating.

Gas flaring has multiple impacts, besides being a high contributor of greenhouse gases. They are flared on offshore oilrigs as well as in onshore oil fields, some of which are located within communities. They cause acid rain as a result of the mixing of the nitrogen and sulphur oxides in them with moisture in the atmosphere. The acid rains corrode roofs made of corrugated iron sheets. These have ecological as well as economic impacts.

They also cause cancers, blood disorders, skin diseases, neurological diseases and a variety of breathing illnesses such as asthma and bronchitis, to mention a few. The flares equally affect agriculture with productivity losses closely related to distances from the furnaces. It is evident that gas flaring in place any talk of stomach and other infrastructure is a cruel joke.

The situation in the Niger Delta is bad on most counts but we believe that this can be overturned if we work to thwart the desires of those who prefer to exploit the people and the environment without any sense of responsibility. The Niger Delta is ecologically sensitive and its health is vital to the well being of the entire Gulf of Guinea.

We can create a preferred future for the Niger Delta – a future devoid of crude oil pollution, gas flaring and human insecurity. We can see an opportunity in the end of the crude oil age and begin to plan for a reengineering of the facilities that are heinous spots in our environment and put them into positive and sustainable use. Let's imagine the oil platforms becoming platforms for renewable energies. Let's imagine the gas flare stacks as museum pieces to teach our children lessons on how not to pursue development or foreign exchange. Let us stand together to demand the justice that our past leaders personified. Together we can change this picture of hell to the paradise that it once was.

1.4 WHY MONITOR?

Oil exploration and extractive activities have direct and often visible impacts on the environment. The companies involved in these polluting activities do carry out monitoring exercises to ensure they keep within the boundaries of environmental laws and regulations. However, experience shows that because laws are not stringently enforced, polluters can always exploit the slack to operate at levels far below what is acceptable. Oil wells and mining pits have life spans and at the end of their usefulness they are either decommissioned or simply abandoned in the worst cases. In other words, the operating companies would stay at a location for as long as it is profitable to them to do so. On the contrary, except where really tragic incidents occur, communities stay put on their territories and suffer the impacts of polluting actions of extractive companies while they operate and even after they had left.

When communities monitor their environment, they demand the strictest adherence to standards and can encourage or force operating companies to avoid bad environmental behaviour. If communities do not monitor their environment, they would be leaving the tasks of environmental monitoring to agents who may be causing the problems and who are not interested in expending resources to protect the environment if no one is paying attention. Environmental protection is not best ensured through voluntary actions of polluting oil companies. Every community person should be involved in environmental monitoring. Environmental health is the concern of everyone. While some community persons may acquire skills for detailed monitoring, everyone should learn to take note of general negative changes in their communities.

Community monitoring produces the evidence and the advocacy that encourages the polluter to do they right thing: stop polluting and clean up what mess they may have already done.

There are many tools and statutes that can aid monitoring and enforcement of environmental rights. When we deal with issues related to oil spills, gas flares and other toxic events, the monitoring scope could includes:

1. EGASPIN
2. Human rights, environmental rights and collective rights
3. Environmental laws, such as environmental impact assessments, NEITI Act, etc
4. Contract stipulations
5. Customary laws and traditions

There are other pieces of legislations that deal with oil pollution and are designed to prohibit or control the pollution of water, air and land. They also prescribe sanctions in the form of fines, imprisonment or damages to be enforced against persons or companies who infringe their provision. For more on this see Module 3.

1.5 REVIEW QUESTIONS

a) What is the present state of the environment of your community?

b) Are there health concerns that may be arising from pollution in your community?

c) Do you think that monitoring is necessary or unnecessary in your community? Why do you think so?

d) Who can be a monitor?

e) How has massive pollution affected your community? mention the ways

2.0 MODULE TWO: MONITORING

2.1 IMPORTANCE OF MONITORING

Community vigilance is vital if we are to know what is harming us and what is harming our environment. Monitoring enables communities to examine and to know what changes or impacts oil exploration and exploitation activities bring to their environment.

When people know the consequences of activities being carried out in their domain they are better placed to take steps to avoid such harm. This could take three main forms. One way of avoiding harm is to stop the activity from being carried out in the community. A second way is to ensure that activities are carried out in ways that do not cause harm and to ensure that mechanisms are in place for timely and adequate response when accidents occur. We do know that extractive activities have a high propensity to cause harm. Community environmental monitoring is one of the means of ensuring that whenever harm occurs immediate actions are taken to restore the environment.

The three parties involved and/or affected by activities are the company, the State and the community. For maintaining a healthy environment all three parties must be involved in environmental monitoring. It is expected that corporations would routinely monitor every aspect of their operations, but no matter the level of diligence mistakes do occur or there may be some blind spots. State agencies such as NOSDRA and the ministries of environment in the States also engage in monitoring exercises. However, because the communities are the ones who suffer the effects of the impacts of accidents or wilful environmental damage during oil company operations, communities must continually keep an open eye and watch everything going on in their environment. Monitoring cannot be left for oil companies and State agencies alone.

To ensure adequate monitoring of their operations, extractive companies are expected to closely do the following:

- Obey all environmental laws
- Respond in a timely manner to complaints made
- Maintain a training register

- Make readily available information on the processes of production
- Maintain a register or record of maintenance and inspections on equipment.
- Make information on contractors and suppliers available
- Maintain an accident register
- Keep information on emergency situations and responses.
- Register environmental impacts
- Keep results of environmental audits

Community monitors should be able to obtain all the information when needed and the accuracy should be crosschecked with testimonies of the people affected or with information obtained from an independent monitoring programme.
The testimonies of the people constitute an important source of knowledge.

2.2 INDEPENDENT MONITORING

The ultimate purpose of environmental monitoring is to ensure a safe, clean and sound environment in which people live and grow in dignity. Results of monitoring should aid communities in organizing, protecting their environment as well as demanding for the right information to buttress their claim of the existence of environmental impacts. When such reports are verified, communities can utilize the findings in actions that aid the enforcing of their rights. They can also use the findings in making accurate and commensurate demands, including demands for compensation and clean ups. All parties would benefit from having independent monitors keep watch over the environment. Such independent monitors may be civil society groups, academics involved in studies. Independent monitors could also be professionals or consultants in the field.

The table below indicates a number of elements that can help specialist as well as community monitors carry out independent monitoring.

Environmental studies	Environmental management plan, the environmental impact study, contingency plans.
State requirements	Environmental licence or requisites from environmental authorities
Damage Indicators	Contamination and resource destruction indicators
Operational practices	Sources of contamination and use of resources
Internal regulations	International regulations including those of the country of origin of the company and the national ones
National regulations	Laws that protect human and collective rights

2.3 IDENTIFYING IMPACTS

To identify environmental impacts, the testimonies of local people are essential in relation to the changes observed and the current state of health, economic and environmental well being. Since water is the most frequent medium that receives and transports contamination, it is necessary to identify the structure of the river, area of influence, tributaries, drainage and discharge systems or the characteristics of currents or marsh areas and swamps.

Another receptor and transport medium of contamination is the air, therefore it is important to consider rain and the movement of the winds.

2.3.1 Map Your Rivers

Current course	Identify the use of the water. Sources of contamination that the river receives, pipes, oil infrastructure, rubbish, dirty waters from the camps. Observe for colour, smell, presence of fish and other organisms.
Evaluation of the river bank vegetation	The riverbank vegetation provides food for animals. The tall trees provide shade and help regulate temperature. They also help protect the bank from erosion. It is necessary to check the environmental health of the riverbank.
Evaluation of the stability/erosion of the shore	The presence of plants with roots control erosion. The absence of vegetation causes sedimentation in the rivers. A large quantity of suspended sediments causes the water to become turbid. This turbidity absorbs the sunrays that heat up the water and harms the development of aquatic species.
Colour and smell of the water	There are typical colours of contamination that indicate the presence of chemicals or the decomposition of organic material. A greenish colour indicates the presence of organic contamination. A brownish colour shows suspended sediments that can originate from erosion. Orange or red comes from drainage of corrosive liquids from oil wells. The classic multi-coloured water indicates the presence of floating petrol, oil or gasoline. Some bacteria can cause a similar effect.
Habitat protection	A river course with sluggish water, bends, rocks, shores, dried tree trunks and fallen branches, etc., contains better habitats for the development of diverse aquatic communities; It is in these zones that oil accumulates in the case of spillages. An essential component of the habitat is the sediments. Contamination affects these sediments that cause alterations in the quality of the soil.

.3.2 Note Physical and Chemical Analysis

Some analysis can be carried out in the field with simple equipment to measure environmental impact, such as measuring the temperature, pH, turbidity, electrical conductivity, dissolved oxygen levels and other elements such as chlorines, and phosphates, etc.

To carry out laboratory analysis it is necessary to take samples and send them as quickly as possible to the laboratories for analysis. It is important to have basic information on how to collect samples in a way that would ensure that they are acceptable for analysis.

2.3.4 Note Physical parameters – chemicals in the water

PH: Is the parameter that indicates whether the water is acidic, neutral or basic	The optimum pH for most species is between 6.5 and 8-0. Changes in pH imply changes in biological composition of the ecosystem, with those most tolerant reproducing and those most sensitive dying.
Electrical conductivity This parameter measures the total concentration of salts such as phosphates, chlorides, nitrates and others that are found in all waters.	In general it should be below 120uS/cm With contamination with oil there is a low conductivity.
Turbidity This parameter measures the suspended particles in the water, which can be algae, sands, etc.	If the water is turbid it heats up lower the rate of photosynthesis. The oil activity generates erosion due to construction of roads and deforestation.
Dissolved Oxygen Evaluates the presence of oxygen in the water.	The presence of bacteria in large quantities lowers the level of oxygen. Oil activity generates organic contamination coming mainly from the stations. The production waters being hot, reduces levels of oxygen.
Biochemical demand for oxygen This evaluates the quantity of oxygen necessary for microorganisms to decompose the organic matter.	The reduction of oxygen causes the appearance of algae and other anaerobic organisms. Anaerobic organisms are organisms that live without oxygen.
Hydrocarbons: In the lab they are expressed as TPH, which is measured in mg/l or ppm (parts per million). The HAP´s requires more complicated analysis	They can be aliphatic or aromatic. In general their presence in the water should be below 0, 5 mg/L at any given time and less than 0.3 mg/L as an annual mean. In soils they vary depending on their use. For the aromatic hydrocarbons more complex analysis are required. They should be absent from waters for human consumption.
Heavy metals: Identifies heavy metals, such as barium, chrome, lead and vanadium	The presence of some of these heavy metals is a characteristic of contamination of the oil industry. Its impact is detailed later.

2.4 REVIEW QUESTIONS

1 Who should be involved in monitoring?

2 Why is independent monitoring important?

3 Name four indicators that can help the monitor identify impacts

4 Why is it necessary to map your rivers and water sources?

5 Name the physical parameters in water analysis

3.0 MODULE THREE: Environmental Standards

3.1 Nigerian Standards
3.2 International Standards
3.3 What are the ISOs?
3.4 Company standards
3.5 Review Questions

3.1 NIGERIAN STANDARDS

The National Environmental Standards and Regulations Enforcement Agency (NESREA) is the agency saddled with ensuring that environmental laws, policies, guidelines and regulations are adhered to. The agency set up by the NESREA Act of 2007 "has the responsibility to enforce compliance with provisions of international agreements, protocols, conventions and treaties on the environment. The vision of the Agency is to ensure a cleaner and healthier environment for all Nigerians, while the mission is to inspire personal and collective responsibility in building an environmentally conscious society for the achievement of sustainable development in Nigeria."[xvii]

Monitors must note that even though NESREA has been set up to regulate and enforce environmental standards in Nigeria, sections 7(k) and 8(s) of the NESREA Act excludes the oil and gas sector from its areas of coverage. So how is the oil and gas sector's environmental performance regulated? The main regulatory provisions for this sector are the Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN).

Besides the EGASPIN, there are a number of environmental laws that also apply to this sector. Such laws include the Environmental Impact Assessment Act (1992) and other laws such as:

1.Petroleum Regulation 1967

1. Oil in Navigable Waters Act 1968
2. Oil in Navigable Waters Regulations 1968
3. Petroleum Act 1969 Petroleum (Drilling & Production) Regulations 1969
4. Petroleum (Drilling & Production) Amendment Regulations 1973
5. Petroleum Refining Regulations 1974; and
6. Oil Pipelines Act 1956.
7. Associated Gas Re-Injection Act 1979 No.99; Associated Gas Re-Injection (Continued Flaring of Gas Regulations 1984) and The Associated Gas Re-Injection (Amendment) Decree No. 7 of 1985 [xviii]

These laws and guidelines are meant to ensure that human and environmental rights are protected and that economic interests must not override environmental concerns.

The EGASPIN has provisions about decommissioning of oil installations at the end of their lifespan. The guidelines require that communities be consulted in the preparation of such plans. However, the EGASPIN leaves a gap for oil companies operating off shore to chose if they wish to notify communities of such actions or not. Communities must insist on being informed of installation and decommissioning plans as part of their monitoring exercises and as a way of ensuring that toxic activities are limited in their territories. They are also to ensure that decommissioned materials (including harmful wastes) are handled according to relevant laws.

Offshore installation decommissioning requirements:

6 Oil platforms sited in less than 100 metres water depth and weighing less than 4,000 tons (excluding the deck and super structure) must be completely removed.
7 The removal process should avoid significant adverse effects upon navigation or the marine environment.
8 After January 1 2003, no installation can be placed on the Nigerian continental shelf or exclusive economic zone unless it is designed for complete removal. In other words, Nigerian producing companies have five extra years after the January 1, 1998 deadline provided in the IMO Standards and Guidelines.[xix]

The director of the Directorate of Petroleum Resources (DPR) must certify completed decommissioning.

3.2 INTERNATIONAL STANDARDS

As already noted, oil and gas exploration and production cause severe environmental degradation, not only to the physical environment, but also to the health, culture, and economic and social structure of local and indigenous communities. Bottlenecks in the way of redress abound because environmental laws in our land are often ineffective because they are substantively inadequate and/or because they are inadequately enforced. These weaknesses leave space for oil companies to pursue the path of voluntary performance improvements in some countries in that context. [xx]

International standards are derived from international laws, treaties and covenants such as those of the International Maritime Organisation (IMO). Oil companies can be held accountable for their activities in Nigeria on the basis of international laws and the laws of their home country of their parent entities. For example, Chevron has been challenged in USA courts for actions in Nigeria and Shell has faced court proceedings in the USA, United Kingdom and in The Netherlands for their activities in Nigeria.

International laws that guide oil companies include those appertaining to the following areas:

- International petroleum transactions laws
- International trade rules
- Laws on ownership of mineral rights (onshore, offshore, and deep sea bed)
- Compensation issues
- State-owned entities and privatization
- Laws related to development rights
- Contract laws and contracts
- Arbitration
- Transfer and protection of technology and confidential business information
- Operating agreements
- Environmental protection laws
- Criminal and civil liability for oil spills Indemnification
- Transparency laws, including bribery
- Marketing and transportation

3.3 WHAT ARE THE ISOs?

The ISO (International Standards Organization) is an institution that has established a series of international standards. Among them the most well known are the ISO 9.000, a series of quality product certificates. Many producers of domestic appliances and some food producers say they comply with ISO 9.000, which means that they comply with the regulations on quality, information of products, presentation, materials, etc, proposed by this institution.[xxii] However, the standards set by the American Petroleum Institute (API) contribute the highest set of standards adopted as international standards for the oil and gas industry.

Companies that regulate their own environmental management procedures or voluntary mechanisms use the ISO 14.000 series.

Series ISO 14.000

14.001	Environmental management systems
14.010	Environmental audits
14.020	Labelling
14.030	Evaluation of environmental performance
14.040	Analysis of the production cycle
14.050	Terms and definitions

Oil and Gas companies increasingly utilise standards developed by the Association of Oil and Gas Producers. Areas covered by such standards include the following:

Basic surface safety systems
Wellhead and Christmas tree equipment
Offshore piping systems
Pipeline coatings
Pipeline fittings
Pipeline welding
Drilling fluids

3.4 Company standards

Corporations have work and safety standards to guide their operations. These should usually be at par with international standards or, at the minimum, national regulations

3.5 Review Questions

1. What are ISOs?
2. Why are ISOs important in the oil sector?
3. List out the various ISOs you know

4.0 Module FOUR: Environmental Plans

4.1 Environmental Impact Assessments (EIAs)
4.2 The Importance of EIAs
4.3 Environmental Risks Analysis
4.4 Environmental Management Plans
4.5 Contingency Plans
4.6 Review Questions

4.1 Environmental Impact Assessment (EIA)

In order to limit the harm caused by extractive activities environmental and social concerns must be taken very seriously. Such concerns can be addressed through Environmental Impact Assessments, Socio-economic Impact Assessments and others. The most frequently required of these is the EIA.

The EIA is a necessary strategic environmental assessment needed to evaluate potential and actual impacts of policies, programmes and plans with the purpose of mapping out directions and preparing plans for the mitigation of adverse results and/or totally abandoning proposed paths of action. The EIA is ideally carried out at all stages of project formulation and implementation. An environmental impact is any form of direct or indirect alteration to the environment wholly or partially consequent upon an activity being carried out in the environment. An EIA predicts, identifies and evaluates expected and unexpected environmental impacts.

In Nigeria, where EIAs are conducted these have been done reluctantly or perfunctorily. Often the idea is that the EIA is merely a document prepared to satisfy project approval requirements. With that frame of mind, project proponents produce so-called EIA documents as part of project requirements without opening such documents for public scrutiny as required by the law.

For the attainment of transparency in project delivery in the extractive industry, it is essential that certain **environmental marker questions** be raised before their commencement and also during execution. Such questions include:

1) Is the project in an environmentally sensitive location?
2) Will the project adversely impact the environment?
3) Does the project explicitly or implicitly aim at having positive environmental impacts?
4) Would the project have significant negative environmental impacts? (Significant environmental negative impacts are inherent negative impacts irrespective of what other positive impacts the project my have).

If the answer to any of these questions were *yes* there would be need for further assessments. If the answers were all *no* then there would be no need to conduct further studies.

In all cases those who did not prepare the matrix must review the questions and answers.

4.2 The Importance of EIAs

It is important to note that where a project is evaluated to have negative environmental impacts that cannot be sufficiently mitigated or compensated for, the conclusion should be not to execute or implement such a project.

EIAs cannot be acceptably carried out without the involvement of communities that stand to be affected by the project. This participation must be initiated at the beginning of the project.

The critical issues that EIAs help address include:

- Access to safe water and sanitation.
- Good air quality and control of toxic chemicals the industry generates. Gas flaring constitutes real assault to the health of the people and the environment. They also significantly add to climate change thus deepening the tragedy of the area in expected sea level rise and increased coastal erosion. Although Africa has the lowest per capita contribution to greenhouse emissions in the world, the oil industries complex of the Niger Delta is one of the highest single contributors in the world.

One of the least considered causes of poverty, insecurity and destruction is climate change. As the world's temperature rises as a result of the release of greenhouse gases into the atmosphere, we experience sea-level rise, floods, loss of natural resources and freak weather events. In the northern part of Nigeria there is an increased threat of desertification. All these have direct implications on our food and water supply systems, and health. Thus climate change makes access to food sources unpredictable and increases poverty and disease. Women bear the brunt of all these and resulting conflicts affect them disproportionately.
The Niger Delta has been adjudged as one of the most Climate Change vulnerable areas of the world.

- Assurance of sound and equitable management of biodiversity and ecosystems.
- Mitigation of the effects of natural disasters.
- Opening of opportunities for community control of community resources. Ownership engenders protection. Community-based resource management methods would lead to sustainable usage of resources.

It is obvious that poverty issues would be dealt with and sources of conflicts addressed. In the process of evaluation of the environmental impacts it is necessary to take into account biophysical aspects, human health and social well being.

1. Description of the method
2. Characteristics of the area
3. Definition of the area of influence
4. Identification of the impacts
5. Analysis of alternatives
6. Prevention of mitigation measures
7. Management plan
8. Monitoring and vigilance plan
9. Environmental audits
10. Exit plan

As a tool for community environmental advocacy, the EIAs provide the tools for the following, among others:

- Enlightenment campaign at the community levels
- Trained individuals should go back and train people at the local levels
- Making the EIA Act available (Empowerment).
- Political Action
- Letter writing
- Legislative Advocacy
- Networking with other groups
- Building community union which speaks for the entire community with one voice
- Litigation

One of the very important studies that must be carried out in the EIA process is a ***base line study***. This study sets out a description of the current situation, including social, economic and biodiversity information. Participants must ensure that the information in the base line study is complete and the description of the area correct as per population, medical centres, schools, services, etc. Communities need to work with trusted scientists to ensure that there is a complete listing of the flora and fauna found in the area and that the report produced at the end of the exercise is actually based on the realities on ground.

The report must cover all possible areas of impact such as"

1. Modification of the landscape of the ecosystems and other elements of biodiversity, including ecological functions, interaction of tropic webs.
2. Transformation of soil use and changes in its microbiology.
3. Extraction of other resources (Water, rubble, sand, etc.)
4. Impacts of the process (noise, gas emissions, vibrations, heat)
5. Soil, water and air contamination
6. Deforestation, destruction of habitats, breeding sites, migration corridors
7. Alterations of water bodies, interruptions in flow, drainage or supply of the aquifers

8. Effects on the wild fauna, endemic species in danger of extinction or threatened.
9. Construction of infrastructure that brings other impacts
10. Types of waste and forms of disposal
12. Risks of accidents
13. Storage of dangerous chemicals
14. Effects on the types of local occupations
15. Effects on sacred or ritual sites
16. Effects on crops or other subsistence activities
17. Impacts on local inflation
18. Increase in violence and other social problems
19. Others

Environmental Impact Assessment studies are instruments for all stakeholders in any project. They are instruments for the State and are required by law. They are instruments for the companies as they are part of the internal proposals of the company and guide their actions. It is a vital instrument for communities because it can be used as a benchmark with which to hold environmental transgressors to account.

4.3 ENVIRONMENTAL RISK ANALYSIS

Environmental are important during installation, operations and decommissioning stages of any hazardous project. The risks refer to hazardous outcomes and the chances of their occurrence and the consequences of such events. The risks include the probabilities of adverse effects such as a spillage that could occur within a certain time multiplied by the magnitude of the damage. Normally this is expressed in numbers of deaths, environmental damage, and illnesses.

A risk agent is a toxic substance or activity of chemical or organic origin. To these dangerous situations must be added other natural hazards that could occur including seismic activity, landslides and others. The analysis helps authorities to identify and quantify the risk and to propose actions or to avoid actions that imply situations of risk. Uncertainty over risk is not cause to ignore the need for action; on the contrary it demands consideration and action. This as an application of the Precautionary Principal, recognized through international agreements such as the Biodiversity Convention.

An environmental risk study must:

1. Identify all the possible dangers and damages – for example use of explosives in seismic data collection stages, etc.
2. Study the risks of each scenario
3. Analyse the consequences of each situation, deaths, damages to property, number of people suffering from illnesses, species in danger, etc.
4. Identify the most probable scenarios
5. Identify the routes of accidents and critical consequences medium and long term.
6. Identify actions to reduce risk
7. Identify actions to repair the damage

The studies are recommended for activities such as that of the oil industry and companies should not cite lack of legislative requirement to avoid action.

There must be a management plan for each risk identified. It is always possible to ask for more details from these studies.

4.4 Environmental Management Plans[xxvi]

Every EIA should ideally be accompanied with an **Environmental Management Plan** (EMP). Such plans help to mitigate negative impacts and to enhance positive ones. Management plans have to propose measures to avoid and or mitigate the impacts identified in the Environmental Impact Assessment studies. Usually they include

1. Socio-economic programmes (for community development)
2. Programmes for management of waste disposal
3. Monitoring, vigilance and control programmes
4. Recuperation programmes, including for example reforestation
5. Industrial security programmes and
6. Environmental education programmes

To the problems identified in the environmental impact assessment solutions must be found in these studies. For example, if contamination is identified the response should not be compensation but rather how to avoid contamination.

It deforestation is indicated; in the management plan it should be stipulated how deforestation will be avoided. Usually companies identify problems but when the time comes to offer solutions they offer other "benefits", such as a bridge, or a school, and with that they assume that they have the right to contaminate.

4.5 CONTINGENCY PLANS

These are the plans developed to help in addressing unexpected situations such as accidents. They must be completed before the work starts and all the workers must know of such plans. They must contain methods of communication to the local population and the authorities to communicate any emergency.

It is possible to face an emergency with strong or weak measures. For example if an oil spill occurs that posses a risk to a water source, a contingency measure could be to have storage tanks as a reserve and have quick response to manage the emergency. A weak measure would be to offer a few tanks and a clean up crew hired in that moment.

In the event of an explosion, a responsible measure would be to provide fire control equipment and ambulances, security systems for the local population, pre-established exit routes. A weak measure would be to face the accident with local resources.

4.6 Review Questions

1. What are the critical issues that need to be addressed by an EIA?
2. At what stage in a project is Environmental Risk Assessment important?
3. What do you understand by the terms Environmental plan and Contingency plan?

5.0 Module FIVE: Environmental and Health Impacts

Oil exploration and exploitation stages have unique impacts on the environment. There are also social and economic impacts on the communities as well.

5.1 Exploratory Stages

5.1.1 Seismic Exploration

Seismic comes from the Greek work *sismo* which means tremor. Seismic is a geophysical process of direct intervention on the environment that creates artificial earth tremors by the use of explosives that cause waves that allow a radiograph to be made of the subsoil. With the information obtained maps of the subsoil are produced and the different structures present in the area of study including those with potential to contain stored hydrocarbons appear.

Engineers create the tremors by drilling shallow wells of up to 2 to 20 metres below the surface. The diameter may vary between 5 and 10 centimetres and the distance between them varies between 15 to 100 metres. Explosives are fitted into these wells and then covered with the material removed during drilling. When the explosive is detonated the required waves are generated.

Before the explosion, the cables that join the whole seismic system are extended and geophones are installed; these are equipment that register the waves caused by the explosions. These waves travel through the subsoil and from the depths of the earth reflect the different types of rocks and structures.

There are two types of seismic: 2D or in two dimensions and 3D or in three dimensions. In principle, one type of seismic is different to the other due to the distance between the seismic lines or density, which is greater in 3D seismic. To obtain greater density means that the seismic labour is greater and the impacts are greater. 3D is used, because 2D only provides information in the vertical plane, more information is provided from 3D.

5.1.2 Impacts From Seismic Exploration

Activities	Impacts
Opening of Seismic lines	Deforestation of variable magnitude in function of vegetation cover found along the line and construction of helicopter landing sites and temporary camps. Creation of new access routes that creates greater risks of colonization. Loss of resources due to the presence of working crew. Generation of solid wastes.
Detonations	Compacting of the soil when using vibrating lorries. Generating or increasing erosion processes when operations occur in susceptible or unstable areas. (Landslides) Generation of noise and movement of the soil, ´blow back' when wells aren´t properly covered. Vibrations that cause cracks in nearby houses. Displacement of wildlife due to the noise and death of fish when the detonations are in the water. Affected aquifers Unexploded explosives remain buried and can cause deaths and amputations, etc.

5.1.3 Offshore Seismic Exploration

These impacts are shown in fish and fish larvae of commercial importance, especially when the prospecting is carried out in areas in which the species complete crucial biological cycles.

Some of the impacts of seismic prospecting in oceans are on fish shoals. It has been found that for some species the fishing catch can be reduced by as much as 45% of the average. The impacted areas can be as wide as 10Km radius from the point of activity.

5.2 Exploitation/Drilling

Drilling can be vertical, inclined or horizontal. These drill holes are sunk until they reach formation structures that could contain hydrocarbons (crude, gas, condensed hydrocarbons and a mixture of these). These can be up to six kilometres deep and are known as an oil well.

Drilling exercise can last for weeks or months. It produces industrial as well as domestic waste. Some of these wastes can be quite toxic/radioactive.

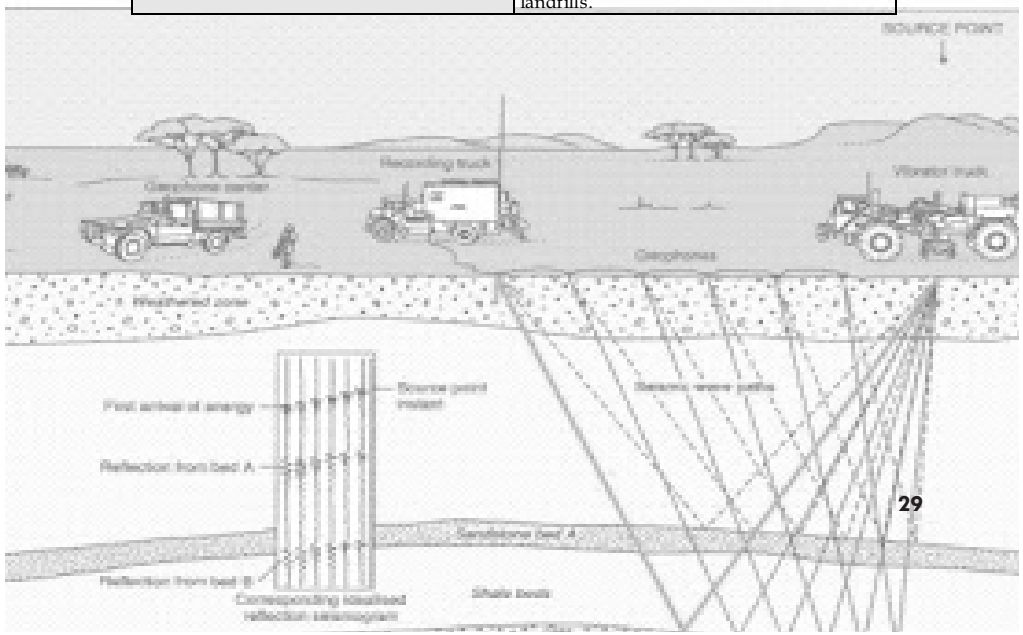
Drilling sections are the rocks grounded by the drill. These sections are impregnated with oil and mud and are converted into another enormous polluting agent. The mud from drilling can be in a base of oil or water. This ground rock, when it has finally been separated from the drilling mud on the surface, is generally dumped directly into the environment without any treatment. Drilling muds contain various toxic heavy metals, inorganic salts, detergents, organic polymers and corrosion inhibitors.

5.2.1 IMPACTS OF ONSHORE DRILLING

Activity	Impact
Preliminary phase **Acquisition of lands, etc.**	1. Expropriations 2. Pressure and Violence 3. Corruption
Drilling phase **Mobilization of machinery, equipment, etc.**	1. Deforestation and loss of biodiversity 2. Erosion 3. Interruption of water flows
Access routes	Presence of a large number of workers
Removal of vegetation cover	Generation of solid residues
Landfills	Presence of chemical substances
Ground levelling	Contamination by chemical substances, including radioactive material.
Assembly of drilling equipment	Noise and vibrations
Drilling	Displacement of fauna and permanent interruption of corridors
Deposit of drilling sections	Accidents
Disposal or garbage and residual waters	Interruption of natural drainage channels
Production tests	
Relations with the community	
Use of large quantities of polluting chemical additives	

5.2.2 METHODS OF TREATING DRILLING SECTIONS

Encapsulation	The drilling sections are cut with sodium silicates, cement, carbon ashes and principally with live lime, materials that solidify in reaction to water in the form of capsules that are later packed and tied up with synthetic material. In this way the well-known tamales are made and later buried.
Bioremediation	Consists of using microorganisms like mushrooms and bacteria to degrade the hydrocarbon chains (complete compounds of hydrogen, carbon and other chemical elements), in simple compounds like carbon dioxide (CO_2), water and simple organic compounds.
Indirect thermal disproportion	This method is based on applying the cuts and residue that have hydrocarbons to high temperatures (1,500 degrees Fahrenheit) for approximately 0.5 seconds to bring them to their boiling points in special burners. In this manner steam is generated, which is released into the atmosphere or is re-condensed to manufacture new fluids or to generate heat. The burnt land that is unusable is deposited afterwards in landfills.



5.2.3 CHEMICALS USED IN DRILLING WELLS

CHEMICAL USES	HEALTH EFFECTS
Bentonite (Aluminium Silicate)	Irritant to the eyes and respiratory passages
Mil-Ex (Poliacrilamida anionic)	Irritant to the eyes and respiratory passages and skin
Potassium Hydroxide (Potasacaustic)	Irritant to the eyes and respiratory passages, highly corrosive to the skin (ulcers) and very toxic if ingested, produces cancer.
Polypac/Polipacul (celulose)	Irritant to the eyes and respiratory passages
Soda Ash (sodium carbonate)	Irritant to the eyes and respiratory passages, very toxic if ingested.
Barium Sulfate	Strong irritant when inhaled (can cause silicosis) and it irritates eyes and skin, very toxic if ingested
Benex/Gelex (Sodium polyacrilate)	Irritant to eyes and respiratory passages
Live lime (Calcium oxide)	Irritant to the eyes and respiratory passages, very toxic if ingested
XCD Polymer (Sodum polychloride)	Eye irritant
Barofibre	Irritant to the eyes and respiratory passages, very toxic if ingested.
Mica	Irritant to the eyes and respiratory passages
Milpar MD (detergent)	Irritant to the eyes and respiratory passages and skin
Caustic Soda (Sodium hydroxide)	Highly irritating to eyes, respiratory passages and skin

Other chemicals:

Iridium 190 and 191 Uranium, Torio, Stronium 90 Ridium 226	Sometimes the emissions of production waters are more radioactive than the maximum level of discharge permitted at a nuclear power station. Uranium accumulates in the lungs, bones and kidneys where it will produce grievous bodily harm and cancer.

5.2.4 OFFSHORE DRILLING

The greatest number of studies of the effects of mud and drilling scraps are provided from the North Sea. The British Petroleum sector recorded that there are 1.5 million tons of mud and contaminants at the bottom of the sea, of which 166,000 tons are from petroleum forming individual piles up to 30 meters in height. It is reported that at some North Sea locations, large piles of oil-based cuttings remain on the sea floor near the platforms. Piles of oil-based cuttings can affect the local ecosystem in three ways: by smothering organisms, by direct toxic effect of the drilling waste, and by anoxic conditions caused by microbial degradation of the organic components in the waste. [xxvii]

Hydrocarbon-based muds can affect the fauna over an area of 500-800 metres radius or more depending on the currents at the point of dumping. These effects are cumulative and can persist for many years.

Areas near to drilling platforms have recorded elevated levels of aromatic polycyclic hydrocarbons in the tissue of fish, which causes *hepaticas* illnesses in human communities that depend on these fish to eat.

5.2.5 Reinforcement of Wells

During the reinforcement, a series of chemicals varying in toxicity are used, the most important being lime and clay.

Additives are added to these to accelerate (sodium chloride, sodium silicate and sodium carbonate) or decelerate (lignin, lignosulphate of calcium and cellulose derivatives) the process of cementification.

Also added are agents that prevent the loss of flow (cellulose derivatives), dispersants (organic synthetic products), density controllers (bentonite, soil rich in diatoms – to reduce it- **barite**, sand – to increase it. Antiforms (phosphate esters, fatty acids and polyoxidate alcohols), among others, each one with different levels of risk to the environment and health.

5.3 CRUDE OIL EXTRACTION

After the discovery and determination of the viability of oil find, the exploratory wells serve as producing wells to extract the oil. Other wells called development wells are often drilled and are used in two ways.

1. They can be production wells to extract oil.
2. They can be wells through which water is injected with gas or vapour to the formation products, to help extract the crude.

One of the most significant problems during extraction of hydrocarbons is the formation waters. The quantity of water is greater when the well starts to decline.

In the last stages of production, the quantity of water can be several times greater than the hydrocarbons extracted.

The composition of the production waters varies according to the characteristics of the field, but in general terms contains hydrocarbons, radioactive materials present in natural forms, chemicals of production, inorganic salts, metal salts and dissolved solids.

The separation process is usually realized in stations where the crude from the wells flows, even when the separation is carried out many times at the same site. The separation means separating the water and gas from the crude oil.

5.3.1 OFFSHORE EXTRACTION

For the extraction of petroleum from the sea a marine platform is constructed. The presence of the platform causes an important physical impact, since it can alter the behaviour of wildlife, especially when this infrastructure is installed within a mating, feeding site or migration route of some species.

The heat produced on the platforms overheats the seawater, producing negative impact especially in those species that have a highly demanding ecological niche, such as those that make up the coral reefs.

Chemicals used in the extraction			
Types of chemicals	**Effects wanted**	**Chemicals used**	**Effects on health**
Demulsifiers	They break up the mixture, oil-water when the oil is extracted from the subsoil.	**Methylbenzene** **Ethylene oxide** **Toluene**	They are aromatic hydrocarbons. Their effects on health are detailed in the next table
Anti-forms	To avoid that with the agitation to produce the mixture foam is produced		
Dispersants and flocculants	To recover part of the crude that comes out with the water		
Inhibitors	Inhibit the deposition of paraffin	**Ethylenglicol** **Diethylenglicol**	Skin irritant and respiratory passages. They are very dangerous if ingested: Convulsions, abdominal pains, renal failure and death.
Anti corrosives	So that the oil pipe lines are not damaged		

5.4 HEAVY METALS EXTRACTED ALONG WITH CRUDE OIL

Many heavy metals are extracted from the ground mixed with petroleum.

Cadmium Is a metal that is absorbed rapidly by plants and it presents a great, potential risk to human health and wildlife. The acute poisoning with cadmium includes: nausea, vomiting and abdominal pain. The chronic effects include: kidney illnesses that can bring on bad renal filtration, kidney stones and kidney failure. The respiratory damages include diminishing of the sense of smell, bronchitis, emphysema (it usually takes 20 years for this illness to appear); fragility of the bones, it can increase the chances of prostate and lung cancer. It produces brain malformations and it complicates birth and pregnancy.

Lead It is toxic for the majority of living things due to its effect on the nervous system. It accumulates in an organism until toxic levels are reached and produce their effects.

Acute poisoning produces vomiting, abdominal pains, kidney problems, convulsions, coma and death within 3-4 days. High concentrations of lead produce disturbances in movement due to the effect on the nerves and it alters children's learning capacity.

Chronic poisoning can take 10 years to appear, first vague signals begin with gastrointestinal problems, fatigue, depression, irritability and a decrease in the mental capacity for reasoning, concentration, memory, along with changes in the nerves of the extremities. Later the appearance of anaemia, headaches, loss of weight, abdominal colic, paralysis of the wrists and hands and it can affect the brain giving convulsions, loss of memory, deafness.

In children it can produce mental disabilities, epilepsy, vision and growth problems. It can also produce sterility problems in men and in women occasional malformations during pregnancy, abortions and premature births. Although it produces kidney cancer in rats, it has not been demonstrated in human beings. The maximum concentration permitted in potable water is, according to the WHO (World Health Organization), 50 micrograms/litre and 150 micrograms/m3 in the atmosphere.

Mercury This metal rapidly penetrates the food chain where it accumulates. Acute poisoning produces **gastroenteritis,** inflammation of the gums, vomiting and irritation of the skin with dermatitis which can turn into ulcers. One can die if the kidneys stop functioning. The chronic poisoning can produce irritation of the gums until bleeding, metallic taste and the loss of teeth; but the most common and damaging sign is the shakes that begin in the fingers, eye lids, the tongue and lips, spreading throughout the body until it inhibits walking.

Changes in character appear (timidity, irritability, loss of memory) possibly due to the destruction of small parts of the brain. It affects the kidneys, causes loss of vision and hearing and it can put one in a coma. It also produces malformations. Amounts are permitted until 50 micrograms/m3.

Arsenic Symptoms of acute poisoning are: abdominal pains, diarrhoea and dehydration, and cardiac arrest that could bring on a coma. Chronic exposures can cause grave skin damage (bile, ulcers, warts, contact dermatitis, cancer), eyes (**conjunctivitis),** nerves (strange sensations in the extremities muscular disability), liver (it can create cirrhosis). It is clearly carcinogenic for the skin, liver, lungs, and the blood (leukaemia). The accepted level is 200 micrograms/1

Cobalt, Copper, Iron, Selenium, Magnesium, Molybdenum, Antimonium, Barium, Silver, Talio, Titanium, Zinc, Chrome, Vanadium

All of these metals produce a high risk to human health and have the ability to accumulate in living beings and become part of the food chain. The symptoms vary depending on where they enter the organism, through the skin, respiration, or by consumption.

Skin damage like dermatitis, eczema, flush with bile, conjunctivitis in the eyes until ulcers.

Respiratory diseases including discomfort, pneumonia and asthma. Digestive problems (**gastroenteritis** with abdominal pains, ulcers and kidney problems).

Cardiac illnesses

Nerve damage with disruption of the movement of the extremities.

Copper and Antimonium are especially carcinogenic (lung cancer).

5.5 PRODUCED WATERS

The production waters are composed of formation waters that come from geological formations and are obtained normally during extraction of petroleum and water that become contaminated when injecting them into an oil deposit (this activity pollutes a large amount of superficial water).

These waters are highly contaminated, for which they pose a great risk to the fauna, flora, soils, water sources and human beings. For that reason, there exist restrictions for their manipulation and or deposition.

The main part of the drinkable water in the world is found in aquifers (subterranean waters) of low depths. The majority of aquifers are fed from superficial sources and are highly susceptible to contamination by other fluids. The production waters are an 'ideal' contaminant, since essentially it has the same specific gravity of the aquifer and they mix easily, mixable with the fresh water.

At the moment there are no studies about the eco toxicity of the different contaminants from the formation waters in tropical waters, and though the principal worry has concentrated on the presence of hydrocarbons other components can have greater effects, especially when they act jointly.The concentrations of salts in the formation waters can reach several times more than salt water, negatively affecting native fauna and flora. Another important source of impact is the high temperatures that these waters reach.

Chemical composition of formation waters		
Salts	Of Calcium, Cyanide, Magnesium, Manganite	Salts and metals present depend on the soil and different types of lesions may appear. Those of cyanide can cause: immediate death, and in low doses can lead to intense head aches, sour taste, and loss of smell and taste, dizziness, vomiting, difficulty in breathing, anxiety, convulsions, loss of consciousness. In chronic intoxication it can produce goitre. Other derivatives are very irritable to the skin, eyes and respiratory passages. Each composition has different maximum limits.
	Of Sodium	It is eliminated at concentrations between 150-180,000 ppm (up to 6 times saltier than salt water 35,000 ppm) This water is neither apt for human consumption nor for animals and is lethal to plants. Associated with sulphate salts they can cause grievous health problems and intense diarrhoea.
	Of Chloride	These are the main components of these waters and are extremely corrosive. They are not apt for human consumption.
	Of sulphur	They kill the fish, cause bad smell and taste to the water. The maximum level of sulphites acceptable is 0.5mg/1
Gases	Carbon monoxide (CO), Carbon dioxide (CO_2), Sulphuric Acid (H_2SO_4)	They reduce the possibility of survival of fish thereby causing malnutrition of the local population in the area.
Heavy metals	Barium, mercury, arsenic, selenium, antimonium, chromium, cadmium, cobalt, lead, magnesium, vanadium and zinc	They accumulate in fish and molluscs and pass into the food chain. If consumed they can produce chronic intoxications. Their concentration must be below 1mg/1.
Radioactives	Stronium 90 Radium 226	They can accumulate in fish and molluscs
Aromatic Hydrocarbons	Benzene, Toluene	Are very toxic and cancerous and produce malformations. Their absence is recommended (see table of Chemical composition of crude oil)
Polycyclic Hydrocarbons	Antracene, pirenes, fenantreno, benzopirenes	They are strong skin irritants that can cause skin, testicular and pulmonary cancer. Due to their high risk of producing cancer the tolerance levels are 0. (See table. Chemical Composition of Crude oil)

The formation waters poured into the rivers and with high levels of hydrocarbons are ingested by the local population. The maximum levels of salt allowed in waters for consumption in some countries is 250mg/l in sodium, 250mg/l in chlorides, and 500mg/l in dissolved solids, though experts express that the real optimum level of quality should be below 100mg/l.

5.5.1 DISPOSAL OF PRODUCED WATER

The disposal of production waters is one of the most discussed issues within the oil industry. For this there exist norms and procedures prohibited or recommended.

Pouring on the surface	The water obtained is simply poured over the soil surface causing contamination to rivers, lakes, aquifers, water sources. This causes the salination of these waters, soil and associated biodiversity.
Pouring into the marine and coastal environment	This is a common practice in the platforms close to the coast as with those out to sea. It leads to the accumulation of heavy metals and hydrocarbons in marine species and the contamination of the coastal shores. In some cases, it covers more than 30 m in depth. The lethal effects occur only after many years of pollution.
Annular injection	It consists of the injection of the waters into the annular section of the well, (between the pipes of revetment and the production pipe). The fluid is poured into the first permeable zone below the revetment pipe, closest to the surface.
Evaporation	In arid zones, where there is a high level of transpiration that is above that of precipitation, the production waters are deposited in holes so that they evaporate. With this method the sources of water and subterranean water become contaminated.
Reinjection in wells	This method poses a risk of contamination to aquifers, above all when the reinjection wells don´t reach the same level at which the crude was extracted, or the distance of the aquifers is less than 10 Km.
Secondary Recuperation	The water is re-injected to the production formation at the foot of the aquifer for an additional recovery of oil from the deposit due to the maintenance of pressure.

5.6 ASSOCIATED GAS

In many oil fields associated natural gas is extracted. Though sometimes the natural gas is used as a source of energy in the same installation or processed, in other cases it is simply burnt or flared. The principal atmospheric emissions from burning the gas are CO_2, Methane, Ethane, Butane, Propane, Hydrogen, Helium and Argon, Volatile aromatic hydrocarbons, Nitrogen oxide, Sulphur dioxide, Carbon monoxide, Halogens, CFCs.

The natural gas has a very low solubility in water. The methane (gas which is found in greatest concentration), in distilled water has a solubility of 90ml/l, on the other hand in marine water it has a solubility of 36g/l (it is a lot less). In tropical waters, the solubility of methane tends to be less.

Chemical composition of gas emitted & effects on health	
SO_2	(see table: Chemical Composition of Crude oil)
H_2S	Acute intoxication: Cough sometimes with blood, pulmonary oedema. Headaches, vomiting and convulsions that leads to death by asphyxia. Sub acute intoxication: Problems with conjunctivitis, bronchitis with blood, nausea, vomiting, diarrhoea, headaches and delirium. It can be cause of cardiac alterations. This is a gas of important presence in the oil refineries. It is allowed up to 10ppm (14mgr/m3)
NO_2, NO	Acute intoxication: Cough, irritation of the larynx, eyes and pulmonary oedema and respiratory difficulty that can lead to death. Those with pulmonary illness or asthma present more problems. Chronic intoxication: it can assist the development of emphysema, respiratory infections by reducing the defences in the lungs. It can be cancerous. A maximum of 0.5 ppm are permitted (100micrograms/m3)
CO_2 Methane Ethane Propane Butane Pentane Heptane CO	Are considered as simple asphyxiating gases that compete with oxygen in the lungs. In large concentrated quantities and in closed spaces they would produce the effects of asphyxia. In atmospheres without oxygen, these gases produce weakening and paralysis, loss of consciousness. The continual presence causes death. The production of CO produces diminution in mental capacities, respiration difficulties, headaches, confusion, loss of consciousness, coma and death. It can affect the heart, muscles, and leave cerebral lesions (Parkinsons) It causes babies to be born underweight and increases mortality of new born.

5.6.1 GAS ECOTOXICITY

The chronic exposure produces accumulative effects including embolism, rupture of tissues, especially those of the eyes and nose, damage to the circulatory system and other pathological changes.

Three types of intoxication have been detected:

Light: reversible changes to the central nervous and cardiovascular system
Medium: serious changes in both systems and an increasing number of cases of leukaemia.
Strong: irreversible changes to the brain, heart tissue and alimentary canal.

In the ocean the gas penetrates rapidly into the marine organisms through the bronchia causing problems in the physiology of the respiratory, nervous system and circulation of blood with enzyme activity and others. This causes a change in behaviour of fish, their excitability, increase or decrease in activity, etc. The symptoms are manifested very rapidly.

5.7 TRANSPORT OF CRUDE OIL

Once the crude is separated, this is transported through pipes or in tanks. The risks are accidental or routine spillages and explosions and fires.

Oil pipelines generate many conflicts due to the destruction of the course of water, biodiversity, agricultural crops, dwellings and other properties, the loss of land rights and the permanent risk to the populations along the route.

The affected area is, as a general rule, far greater than that fixed in the contracts because the predicted impacts are greater than those declared by the companies in their studies or contracts.

5.7.1 IMPACTS OF THE PIPELINES

Some of the impacts related to, or resulting from, the various actions during crude oil exploration and extraction are outlined below.

Initial Phase

a) Expropriations
a) Selection of Route
b) Pressure
c) Topography
d) Violence, threats
e) Acquisition of lands
f) Corruption
g) Division of communities and community organisations
h) Disturbance to vegetation and the topography

Construction Phase

1) Mobilization of machinery, equipment, and other elements
1) Construction of access roads
2) Removal of plant covering
3) Landfills
4) Ground levelling and construction of pits, in the case of buried oil ducts
5) Deposit of drilling cuts
6) Arrangement of waste and residual waters
7) Relations with the community
9) Affected vegetation, deforestation and loss of biodiversity
10) Erosion and risk of landslides due to the removal of land, compression of soil
11) Interruption of water flows, floods, stagnation of waters
12) Disturbance of riverbeds
13) Pollution of water by oils, muds, and solid waste products
14) Presence of a large quantity of workers
15) Generation of solid residues
16) Risks of ruptures due to earthquakes and volcanic activity
17) Accidental spills owing to leaks in valve sites
18) Displacement of fauna due to the effect of the noise and the heat
19) Damage to property, surrounding areas, and constructions
20) Loss of crops, loss of soil fertility
21) Air pollution from machinery
22) Risk of accidents
23) Interruption of water drainage
24) Construction of roads for the maintenance of the ducts
25) Damage to infrastructure and dwellings because of vibrations
26) Increase of violence, delinquency, loss of privacy
27) Division of communities and organizations
28) Death of wild and domestic fauna because of different kinds of accidents, or from pollution

Operation Phase

1) Pollution from leakage
2) Accidental or caused ruptures
3) Permanent loss of biodiversity
4) Alteration of water flows, floods, stagnation of waters
5) Fires, spills, and accidents due to the robbery of fuel
6) Sabotage because of being strategic and vulnerable infrastructures

7) Ruptures from the effects of seismic movements, eruptions, or other natural events
8) Ruptures due to landslides provoked by rains in disrupted zones

5.7.2 OFFSHORE PIPELINES

The crude or extracted gas in the sea can be stored in storage tanks in the marine oil rigs or can be transported through ducts to the land infrastructure.

The gas ducts can be a constant source of leaks or spills, which can be because of accidental rupture or because of routine practice, owing to the aging of the tubing.

Seawater can cause the corrosion of the tube.

5.8 OIL SPILLS

Oil spills are a recurring decimal in the Niger Delta. There is very little evidence to back up industry claims that they usually clean up the spills when they occur. The environment is dotted by the tell tale signs of spills.

Chemical Composition of Crude oil

Aromatic Hydrocarbons Volatile Organic Compounds	Benzene, Toluene	These are dissolvers of greases and so act on the skin producing dermatitis. In the nervous system, they produce excitation, depression, headaches, and "pins and needles" in the hands and feet. Their most important effect is on marrow, producing anaemia, loss of defences, and could cause leukaemia that causes death in 50% of treated cases. They can produce congenital malformations. The EPA accepts .5mcg/1 in potable water, which means a risk of 1 case of cancer for every 100,000 exposed people
Polycyclic Aromatic Hydrocarbons "PAH"s	Anthracene, benzophenone	These are strong irritants to the skin. They can produce reddening and injury, and cancer of the skin, testicles, and lungs. Because of the high risk of cancer, they cause, the tolerance in water is zero. One presence of 28 nanogram/l equals a risk of 1 case of cancer in every 100,000 people.
Gases	Sulphur (iv)oxide (SO_2)	Acute poisoning affects the nervous system, causing headaches, dizziness, fainting fits, respiratory stoppage, asphyxia from spasms, and death. They can produce rhinitis, laryngitis, bronchitis, and pneumonia. In humid environments they generate particles of sulphuric acid that will be very irritating to the skin, eyes, and respiratory apparatus. Chronic poisoning can give

When there is a spill, a common practice is to burn the crude. This causes another form of pollution.

Soot /Smoke	They have particles of various sizes, some are retained at the nasal level, others are retained in the pulmonary alveoli, and however the smallest particles can pass directly to the blood. It must be remembered that many of these particles are like sponges that in their numerous hollows contain hydrocarbons of incomplete combustion (of benign origin) that are carcinogens, and it is only a question of time before they enter the blood and cause cancer. There are skin and lung carcinogens.
Carbon monoxide (CO)	Injuries to the heart, muscles, and brain. Can be fatal in closed spaces.
Carbon dioxide (CO_2)	Its presence will increase in the atmosphere and contribute to the green house effect.
Sulphur oxide (SO_2)	This substance is responsible for the acidification of soils, surface waters and the development of illnesses in the local populations, since when it comes into contact with water it forms suspended particles of sulphuric acid that penetrates lungs, eyes and skin causing serious irritation. The radius of action of these types of emissions can reach up to 5 Km.
Nitrogen oxides (NO_2)	When it mixes with water it forms nitric acid that with the hydrocarbons not burnt increases the green house effect and acid rain that causes respiratory problems. With solar light it can facilitate the production of ozone, which is a gas that irritates the respiratory system.
Aromatic hydrocarbons from incomplete combustion	More than 6.500 substances formed due to the consequences of combustion or the union with nitric acid have been detected. All of them are characterised by being cancerous and mutagenic (they produce malformations). We highlight the benzene ones (COVs) and the polycyclic (PAHs) because they are the least combustible and the most volatile and because they cause direct damage or when mixed with nitric acid.
Heavy metals	At low concentrations, but they are also present. Their effects have already been analysed (see table of heavy metals).

5.10 REVIEW QUESTIONS

1. Mention two environmental problems associated with crude oil exploratory stage
2. Mention two environmental problems associated with crude oil extraction
3. Mention five heavy metals in oil spills and gas flares

6.0 Module SIX: Health Impacts of Oil Spills

Oil activities produce toxic materials that are harmful to the body and the environment at every stage of development and usage.

Many of these health issues take time to manifest in the body, hence the need to understand the impact of these oil activities on the health of the community. This section is adapted from A Community Guide to Environmental Health by the Hesperian Foundation. It is aimed at helping communities prevent the event of such health hazards or remedy such issues.

Environmental monitors are to use this section in community meetings so that they understand the health implications of the oil industry activities in their communities.

6.1 HEALTH PROBLEMS ASSOCIATED WITH OIL ACTIVITIES

Health problems arising from oil activities result when toxic substances are taken in from polluted water, air or soil (through farm produce). Some of such are:

3.5.1 Blurred vision, Eye reddening
3.5.2 Headaches
3.5.3 Nose sore and bleeding
3.5.4 Asthma and breathing problems
3.5.5 Increased risk of TB (tuberculosis)
3.5.6 Ear infections
3.5.7 Skin irritation and rashes
3.5.8 Cancer (skin, lips, mouth, lungs)
3.5.9 Menstrual problems: miscarriages, stillbirth, and birth defects
3.5.10 Ulcer
3.5.11 Heart attack
3.5.12 Lungs and throat infections

Oil development has different stages and each stage has associated human and environmental health impacts.
We outline some of these impacts at each of these stages. Indications are also given as to what can be done by the community.

6.2 EXPLORATION STAGE (PRE-DRILLING STAGE)

When oil exploration commences, forests are cut down, animals flee, streams and rivers are polluted and / or blocked up and homes destroyed in some cases.

Before this begins communities can

1. Learn from NGOs and other oil affected communities about what is to come and how to prevent harm and protect the community health.
2. Demand to take part in producing the EIA. If the report shows that oil operation would be destructive, the community can call for a stop of the operation.

6.3 EXPLOITATION STAGE

This stage involves oil drilling/extraction, waste disposals, transportation and refining.

Oil drilling/extraction
In the course of drilling fires could start and may cause damage to workers and community. Oil spilling from the process could pollute groundwater and waterways, harm plants and animals, and damage resources for hunting, fishing and farming.

1. Communities can use cameras, video, radio announcements, written reports and drawings to document the harms done by the drilling process. These should also be used to draw attention of those responsible for the accident as well as the public to the occurrence.

Waste disposal
When oil is extracted from the ground it is mixed with gas, heavy metals and other toxic water. For the oil to be useful it must be separated from the other materials. The toxic water is usually dumped in the waterways and thus poses danger to the community.
The other wastes are dumped into *contaminated ponds.* Normally the oil companies often use a dug hole for this purpose of dumping waste.
This pond could leak into the groundwater or overflow causing dangerous spills that could endanger the community.

A. Communities can demand that the oil companies line the pits with concrete to reduce groundwater contamination.
B. Communities can monitor such ponds for leaks and spills
C. Demand the oil companies to clean up the ponds before their operation is complete.

Transportation and storage

The process of moving produced oil through pipelines or in trucks or ships often times spill oil. Such spills affect the environment and the health of the people.

a. Communities should demand that companies carryout public awareness campaigns about possible event of oil spill and immediate clean up.
b. The EIA conducted must include plans to guide the way pipelines are built, used and maintained.

Refining

This is the place where the oil is made into other products such gasoline, diesel, lubricating oil, etc.
In this process of refining oil, toxic waste is released into the air, water and soil. Pollution from refineries lead to cancer, reproductive problems, asthma, and abnormalities in the brain and nervous system of children.
Communities living near to refineries must take note of this and be very vigilant in environmental monitoring.

In all of developmental stages involved in oil production, there is always a reoccurrence of *oil spills and gas flares*.

Gas Flares

Gas generated alongside oil is of necessity to be removed from oil for the oil to be useful. Oil companies most times do burn off such gases because it is a cheaper way out rather than to transport and use it productively for power generation or as cooking gas etc.

Such flares expose communities to pollution that causes asthma, deafness, cancer, skin and eye diseases and reproductive problems. Also it causes *acid rain* and further poisoning to the waterways and drinking water sources.

Oil Spills

When oil spills in water, it does not mix with the water. Hence it spreads over the water surface preventing air from getting in.

Fishes, animals and plants that live in water are unable to breathe so they die. The water body polluted becomes unsafe for drinking, washing and bathing.

When the spills occur on land, it blocks the soil pore spaces, thus preventing air from getting in. This leads to the killing of microorganisms, worms and other living things that make the soil healthy. Same effects happen when oil covers the skin of animals and humans, their pores are blocked. The result is skin diseases.

6.3 Review Questions

1. What are the health problems associated with oil activities?
2. What are the methods of treating drilling sections?
3. Name some of the heavy metals associated with oil extraction.
4. How do oil companies dispose their waste water and associated gas from their extraction sites?

7.0 Module SEVEN: Environmental Monitoring/Reporting

7.1 Tools
7.2 Observations
7.3 Documentation/Reporting
7.4 Actions
7.5 Review Questions

7.1 Tools

a) Notebook and a sketchpad or drawing book – these are essential for taking notes and for making drawings and sketches. The monitor must ensure that he/she takes sufficient notes while in the field. Thinking that one would remember what was seen or heard in field after getting back to the community or office may not always work well.
b) Pens and pencils – These are basic writing tools.
c) Camera – Cameras are necessary for taking still photos and videos. These provide evidence that monitors may not be able to capture in words.
d) Mobile phones – these can also be used to take photos and to make video/audio recordings. If the mobile phone has Internet capability the monitor can share results of a monitoring exercise to relevant stakeholders in a timely manner.
e) GPS equipment – These are essential for recording location coordinates. Some mobile phones can serve this purpose
f) Measuring tapes – These can be useful for measuring distances, lengths and diameters of objects. The monitor should have a small 3 metres retractable tape and at perhaps a 30 metres tape.

7.2 Observations

With all we have discussed so far we are now set to move to the field for the task of monitoring and reporting. The objective of monitoring is to have the observed problems responded to. The monitor is a change agent and having reports merely filed away does not justify the efforts put into the process, neither does it show an appreciation of the enormity of the environmental challenges the community may be facing.

At the beginning of the process of community environmental monitoring, the monitors must follow the steps set out in the Community Dialogue outline (see at the Appendix) to prepare a document what the state of the environment was before industrial or oil exploration/extraction activities commenced there. This would also include a community resource mapping. Subsequent changes would be monitored in comparison to that.

The monitor must be very observant and note the occurrence of oil spills as well as the presence of industrial wastes in the community. Key indicators of change include where water bodies (streams, rivers or creeks) become turbid, have petroleum products on their surfaces or when unusual death of aquatic lives occur. Unusual smells could also suggest that something potentially harmful had happened that required investigation.

Other indicators could be the discolouration of leaves of plants, shrivelling of crops and other similar changes.

7.3 Documentation/Reporting

A monitoring exercise is not complete if there is no report of the findings. The nature of the report depends on the type of incident as well as on the target audience. An urgent alert could be just a few paragraphs long. This would be an urgent call for action and should be followed by a more detailed report.

Generally a good report should be sufficiently informative for
a) Community leaders/people
b) Relevant government agencies
c) Companies concerned
d) The media

A simple outline for a monitor's report should include the following:
1. **Name and contact address of the Community Organisation** coordinating the monitoring exercise. Every community should have an environmental monitoring team. The team should have an address and telephone numbers by which relevant stakeholders and the media can reach them for further information or to notify the community of actions taken in response to the monitoring report.
2. Subject line or Topic – The report should have a clear subject line or topic. The monitor should ensure that the subject is clear and descriptive. For instance, for an oil spill incident, the topic could be ***Oil Spill Damages Creeks and Farmlands at XYZ Community.*** **T**he essence is to give information, capture the interest of the reader and encourage further reading.
3. Date of the incident - If the monitor is not certain of the date when the incident happened he/she should note the date and time when the community noticed the problem.
4. **Name (s) of monitor(s)**. Including the name of the monitor authenticates the report rather than leaving it as a faceless fabrication.
5. **Name of community** – This should include the name of the local government area and the State. As much as possible always include the name of the country bearing in mind that the report may be read by other persons (like researchers) that may not be familiar with the communities or States. The monitor could also describe the best way to access the location for those who may wish to visit to see things for themselves.
6. **Location of the incident –** This could include the coordinates of the location. Name the oil or gas field and also name the oil well and flowstations if the incident is related to a well or flowstations.
7. **Major livelihood means of the people –** Mention if the community people are mostly farmers, fisher folks or workers in government service, oil companies, artisans, etc. This record enables the reader to understand the loss of livelihoods that may be occasioned by the environmental incident.

8. **The incident –** If the monitoring visit is a result of an environmental incident a careful record of what occurred must be made. Name the company, individual or agency that caused the problem. Obtain as much information surrounding the incident as possible. Simply state what you have observed and not include your opinion at this stage. If it is an oil spill, get some information about the volume of oil spilled. Estimate the area covered by the spill and record the names of water bodies impacted. Describe the damage done. Take photographs.

9. **Testimonies –** The monitor must ensure to speak to community people and workers that had either seen the incident or have suffered the impact. Obtain permission to make audio and video record their statements before doing so. These can be transcribed into the written report later on. Include the names and ages of the respondents. It is also useful to obtain brief information about them. Are they married? What do they do for a living? How does what have happened affect them? What do they think needs to be done to ameliorate the situation and to avoid reoccurrence? It is important for the monitor to ensure that both men and women are interviewed.

10. **Observation/comment –** The monitor may also include an analysis of what has been observed. If the monitor includes his/her opinion this should be clearly indicated as such.

11.**Recommendations of steps to address the problem –** It is useful for a report to conclude with a list of action points and demands. These can be picked out from the testimonies of the impacted persons and community. There are levels of actions that can be taken by all stakeholders.

Repeat Visits

Note that some incidents do not receive immediate responses from offending companies or government agencies. Even where there is a timely response, it is important that monitors make followup visits after the initial reports and to issue suitable updates after such visists.

7.4 Actions

1. Community monitors should alert the community, relevant state agencies, concerned NGOs, press and company of the incidents and location.
2. Community leaders should demand an immediate stoppage of any oil spill irrespective of cause of the spill.
3. The Community should demand and insist on an urgent clean up of the spill or waste by the responsible company using the EIA as legal document to ensure accountability.
Community members should avoid drinking from the affected area.
4. Community leaders should post signs warning community members about the pollution incident and urging everyone to avoid eating shellfishes e.g. crabs, water snails, shrimps etc. They should aslo avoid eating any other fish from the contaminated areas.
5. Everyone should avoid taking bath or processing food in affected water bodies.

6. Demand for compensation must not be a reason for stopping responsible companies from cleaning up spills. Spills clean up are paramount and must be carried out immediately. Oil companies should not be denied access to the spills or other incidents.
7. In the case of non-routine gas flares (a process of releasing the excess gas in the pipelines by the company in order to prevent explosion), community should demand the company to give a 24 hours notice before such flaring. *Routine flaring is illegal in Nigeria.*
8. In the event of a flare, community members should stay away from the flare as much as possible.
9. Make a safety plan including the following for emergencies:
   - Mapping your community showing the oil wells, drilling sites, pipelines, waste pits, refineries and other sources of pollution. Also include your farmlands, drinking water sources and locations, schools, health and worship centres.
   - When there is an incident, call the community together and talk about the affected location and the possible impact.

7.5 Review Questions

1. What are the tools needed for environmental monitoring?
2. How do you record your findings?
3. As a monitor what are the indicators to take note of while monitoring an environment?
4. Make a simple outline of the steps to take when monitoring an environment
5. What are the actions that need to be taken after monitoring?

8.0 Module EIGHT: Tools for Ecological Defence

8.1 Networking
8.2 Policy Advocacy
8.3 Media Advocacy
8.4 Litigation
8.5 Community Actions/Mobilisation
8.6 Review Questions

8.1 Networking

There is an African proverb that says that those who wish to go fast go alone while those who wish to go far go with other persons. One of the ways to attain effective results from community environmental monitoring is for community team to be part of networks of advocates. Through networking communities are able to disseminate information about the state of their environment and also to learn from others. Networks also help to share expertise and by so doing strengthen constituent groups.

Communities should form networks with other communities or groups that have environmental, social, economic or other interests that are similar or related to theirs. It is important to note that because network members may not agree on everything, it is essential that members focus on areas of agreement and work together on them. We have in mind there situations where some community groups may be more interested in having direct dialogue with polluting companies or public agencies while others may prefer to name, shame or litigate against such companies or agencies. These may not be irreconcilable differences that should bring about friction between the groups. However, where disagreements bother on issues of transparency or trust, it may be better to only team up with those that are in agreement.

Network membership is not necessarily restricted by geographical proximity. This means that a community in Nigeria can join networks with other communities in other countries or even continents. Members should share contacts and introduce other groups that they know would bring value to the network.

Network members should have designated representatives that would attend meetings when such are called. This makes for easy management of numbers of persons attending network meetings. Networks should have officers for ease of communication. For networks to be effective, member groups must maintain regular communication among themselves.

8.2 Policy Advocacy

Sometimes a community may want public policy to be made or to be changed so as to address pressing problems they are faced with. This is one area that the use of networks can be very useful because communities are often not well equipped to handle policy

advocacy. One of the reasons why communities are not well placed to handle public advocacy is the problem of access top policy makers in terms of distance and bureaucratic bottlenecks. In order to engage in this sort of advocacy the designated community persons must find all existing policies related to the issues at hand. They also need to know what constitutional provisions there are that can be used to advance their case. Networks have a pool of knowledgeable persons that can help with these.

The community needs to develop and maintain links with their political representatives at local government, state and federal levels. They should also develop ties with relevant enforcement agencies of government, concerned academics and university departments as these could provide critical expertise that policy advocacy may demand.

Public policy advocacy could also involve lobbying political parties. In this case, to put pressure on government it may be useful to have the opposition parties as allies. Care must be taken to ensure that your community is not seen as taking sides with political parties as this can be counterproductive at times.

It is essential that the community be united in the struggle for policy creation or change. They should also get other communities to join in the struggle and to escalate it. One good example is the long drawn struggle of Ogoni people to have their environment cleaned up. It took over two decades before policy direction gained momentum towards a clean up. While that is gathering speed, other communities like that of Egiland stepped up their demand for a forensic environmental audit and clean up of their own land. When communities focus on the same value, policy makers inevitably get to listen and to act.

8.3 Media Advocacy

The media is a very important avenue for bringing community concerns to the public, companies and to the government as well. Media advocacy succeeds where the community group produces credible information and reports that are shared in a timely manner. Some media advocacy tools include press releases, media interviews, monitor's reports, letters, press conferences, paid advertisements, petitions and others. Whatever tool or means is used, the community must ensure that they do not make exaggerated or unsubstantiated claims.

The media helps to do the following:

a) Provides a mechanism for rapidly sharing important environmental information about problems and also solutions.
b) Builds public support towards addressing environmental issues.
c) Attracts and holds the attention of key decision makers.
d) Contributes to the protection to community environmental advocates from attacks by those opposed to the community campaigns. With increasing criminalization of environmental rights activism around the world, being in the public view gives a level of protection. [xxviii]

The success of media advocacy is built on the basis of trust. The job of the journalist is made easy when a community builds a track record of truthful and clear reporting of incidents. When journalists find that a community's report cannot always be trusted, they would have to invest a lot of energy to confirm reports before publishing such reports.

Reporting on environmental incidents sometimes require to be backed up with data and scientific research. If the situation demands for technical information that the community does not have, it is advisable to approach competent organisations or public agencies that could help out. This is important because those you campaign against will also want to strike back by countering your arguments. One way polluters try to counter campaigns against their activities is for them to deny that any pollution had occurred or where they admit to insist that the pollution was so little to be of no consequence. There is always a tendency to under-report incidents or not to report at all.

8.4 Litigation

The courts can be very useful spaces for campaigns for environmental action. The court is often the last resort when companies or government neglects to listen and respond to the complaints of problems suffered by communities. When communities decide to take this path they are well advised to keep in mind that the legal process can be lengthy and costly. Oil companies have huge reserves of resources and legal teams and can afford to use the court literally as a space for playing games. Nevertheless, the courts are vital tools for environmental defence.

The court is the right place to go to if any company, government agency, person or groups of persons are carrying on illegal activities in the community. Legal cases can be brought by specific individuals or by the entire community. When the whole community brings a suit it is called a class action.

It should be kept in mind that although communities may not win all the cases they take to court, every case helps to place the incidents they are complaining about in the public view.

Winning a case is great, but sometimes litigation can help to delay certain actions, or force the review of projects to be more sensitive of environmental impacts. Putting polluters in the dock is also a good way to dissect the harm done publicly and to show if government is on the side of the people or on the side of the polluters. Successful cases set precedents for other cases to be brought before the courts.

When environmental monitoring is carried out with utmost care and detailed information is documented and reported, these can be useful as evidence in litigations. Monitoring also prepares witnesses for court cases.

Communities can be assisted with litigation by public interest lawyers and by civil society organisations with legal teams. Always seek legal advice before you decide on litigation. It is also helpful to seek relief by all other means before taking the matter to the courts as a final resort.

8.5 Community Actions/Mobilisations

So far in this module we have discussed the public means by which a community can carry out advocacy. It is also very important for communities to be mobilised themselves. Community advocacy would not work where the communities are divided. Keeping communities divided is a key strategy used by companies and government agencies when they seek to avoid being held to account over environmental or social dislocations they may have caused.

Community mobilisation works around specific issues and communal values. When the majority of community persons agree that something is wrong and needs to be rectified it becomes easy to mobilise for action. It is important that the momentum that brings the people together is sustained and not allowed to wane. Mobilisation requires regular sharing of information. Posters, handbills, pamphlets, short messages on mobile phones and the social media are good tools for creating awareness and mobilising the people. Let them see the dangers they face collectively if the current situation is not addressed. Let them see that it is all about survival and not individual or selfish interests. The key is to keep the morale of the people high and assure them of the likelihood of success. You cannot mobilise people by selling them defeat!

Other tools for getting the people interested in the issues is through drama, dance and songs. No matter how serious the situation may be, the arena of mobilisation is not a funeral. It is helpful to keep such gatherings lively.

The leadership team should facilitate meetings to ensure that clear goals and targets are set and that everyone is carried along. Leadership must include both men and women and should not be slanted against any sex.

8.5 Review Questions

1. Why is networking important in environmental monitoring?
2. Why do we need policy and media advocacy during environmental monitoring?
3. Is litigation a very important part of monitoring? If yes in what ways is it helpful and if no, why is it not important? State your reasons?

9.0 CONCLUSION

We will end this Community Guide for Environmental Monitoring with a quote from our departed Oronto Natei Douglas. In a case study he conducted titled "Using a Variety of Advocacy Tools in the Niger Delta" [xix] he stated,

To groups and individual wanting to use any of the tools described above, the following must be borne in mind.

***Human resource asset**: No advocacy tool can succeed without a commitment from those who are to use it. The people must believe in the struggle or issue that is the subject of the campaign. It is better to take time and identify the human beings, and train such persons well in the use of the tools, than to rush into a campaign hoping that you will get efficient along the way. The campaign will collapse and many lives will become endangered by such ill preparedness. Also, there must be new challenges and innovations so that the human resources are at all times motivated.*

***Use of Tools**: Under no circumstance must campaigners depend on only one set of tools. What is best is a combination of several tools at any given time.*

***Do not worry much over setbacks**: That you cannot win all the time is a well known saying. When you lose, let the loss be a reference point for hard work, not a setback.*
You will become entrapped in the setback and will not make progress. Always ensure that there are reviews so as to present the opportunity for advocacy reflection. Some tools may disappoint at some point. Do not blame the tools. Look at whether the right tool was used in the right way under the circumstances.

***Know when to declare, "it is all over"**: You can continue to advocate until justice is done but you must also know when to make peace with a repentant environmental transgressor. When the horse is dead, do not beat it.*

APPENDIX

Appendix

HOMEF's Community Dialogues

The **Community Dialogues (CD)** are diagnostic exercises that provide space for community members to review environmental situation of their communities, identify needed areas of action to preserve and defend their patrimony.

A **CD** can be for one village or a cluster of villages or communities can also hold it jointly. Although the major focus is on rural communities, the **CD** is suitable for all communities irrespective of whether they are urban or rural. They would equally work for workplace, schools and other specialised communities.

The CD is a two-steps exercise:

4 Identify assets and concerns. Prioritise areas that need action
5 Acquire knowledge/competence in ecological monitoring and defence
5.1 Set up Community Ecological Defence and Action Committees (**CEDAC**)
5.2 Identify areas of action for community
5.3 Advocate for remediation, conversation or protection
5.4 Identify other action areas

OPERATION Steps

3 Communities select representatives
4 Communities identify key environmental assets
5 Representatives identify areas of environmental concerns
6 Communities train on Monitoring

The Dialogue

A dialogue is driven by conversations on a series issues including those listed below. Please note that these are just guides. Communities are expected to add to this initial list according to their peculiar situations. A typical CD should last for a total of not more than five hours (including a 1 hour cultural/lunch break). Recommended timeframe: 9:30am-2: 30 pm. Facilitators should keep strictly to time, while ensuring that the process is not rushed.

SECTION ONE: Introduction (30 minutes)

Objective: This is the opening of the CD and it is vital that everyone understands the importance of the exercise. Participants should own the process and see the questions and points raised as basically guiding suggestions.

Community members are the most important participants in this process and they should see that the output would eventually assist them in defending the gifts that Nature has bestowed on them. HOMEF facilitators must ensure that they have made prior visits to the communities to ensure desirability of the CD.

- Welcome by community (leader or representative)
- Introduction by HOMEF
- Breaking up into groups of not more than 20-30 persons (depending on total numbers). Each group has someone that takes records of the discussions.

SECTION TWO: Environmental Assets (45 minutes)

Objective: Community members are to discuss in groups and identify the environmental assets or gifts of Nature in their territory. The identification of these re-sources using local names should help evoke their significance to community members. Participants are encouraged to include as many re-sources as they know or can remember – including those that are no longer easily available in their communities.

- **Vegetation, including trees of value**
  - Forests: location, size. If there are plantations state type and if owned by communities or corporations.
  - Trees: types and prevalence. Give names in local language and in English
  - What is the quality or state of the forests, if any
  - Identify cultural, religious or recreational significance
  - In each case make a list of uses (for example: as food or for trade)
  - Are there trees that no longer exist in the community? Name them.
  - Are there new species of trees or plants noticed in recent years in your community?

- **Animal species in the community**
  - Types: location, size
  - Species (mammals, reptiles etc.): types and prevalence. Give names in local language and in English
  - Identify cultural, religious or recreational significance
  - In each case make a list of uses (for example: as food or for trade)
  - Are there animals that are no longer (readily) available in the community? Name them.
  - Are there new animals, birds, insects etc. found in your community in recent times?

- **Water resources**
  - State types and numbers of water bodies in your community
    - River/Creek
    - Stream
    - Pond

- Have you noticed any change in the volume of water in your water bodies?
- Have you noticed a change in the speed of flow or direction of flow of creeks, streams or rivers in your community?
- Species (Fish, crustaceans, reptiles, etc.): types and prevalence. Give names in local language and in English
- Identify cultural, religious or recreational significance
- In each case make a list of uses (for example: as food or for trade)
- Has there been noticeable reduction in the quantity of fish and other aquatic life forms in your water bodies? Name the species
- Are there fish species that are no longer (readily) available in the community waters? Name them
- Are there new species found in your waters

· **Land**
  - Ownership structure (are there communally owned lands? If yes, state location and size if known.)
    - State use of community land, if any
  - Land use (state predominant land use: housing, public facilities, farmlands/gardens, recreational, etc.)
· **Air**
  - Are there unusual fumes, dust or smoke in your community?
  - What are the sources of the fumes, dusts or smoke if any?
· **Occupation and Livelihoods**
  - What are the main occupations of community people? List as many as you know
  - What livelihood activities are connected with the environment
    - Farming
    - Hunting
    - Fishing
    - Professionals (forest rangers, veterinary officials, etc.)
    - Other
  - What livelihood activities are not connected with the environment
    - Civil Servants
    - Health workers
    - Traders
    - Service delivery – mechanics, computer repairs, etc.
    - Drivers, etc.

      Professionals (state, please)

Social Infrastructure
- Health Facilities
  - Primary health centres
  - Public hospitals
  - Specialist hospitals
  - Private clinics/hospitals
  - Pharmacies
  - Patent medicine stores
  - Herbal homes
- Schools
  - Primary
  - Secondary/Technical
  - Tertiary
- Roads (Who built most of them: community? Government? Companies?)
- Waterways
- Other

· **Corporate Presence in Community**
  - Types of companies operating in your community
  - State if they are local or national or multinational
  - What are their activities?
  - Where you consulted before their entry into your community? Are you regularly informed of their activities?
  - Do their activities impact on the environment?
  - Are Environmental and Social Impact Assessments carried out before big projects are executed? Are you part of the processes
  - How do they treat complaints when you have any?

· Any Other

SECTION THREE: Community Ecological Defence Norms (30 minutes)

Objective: In this section participants are to examine ways, including those preserved through cultural teachings and traditional knowledge by which nature's resources have been preserved through the years.

· How does your community protect natural re-sources?
· Are there protected animal species? Why?
· Are there restrictions with regards to use of lands, etc for cultural or other reasons? Explain.

SECTION FOUR: Environmental Challenges and Hazards (45 minutes)

Objective: Some human activities adversely impact our environment. There are also natural processes that can pose serious challenges to our ability to enjoy a safe environment that supports life and livelihoods. The objective of this section is for us to identify the major challenges and hazards in our environment.

- What activities most impact your vegetation?
  - Logging activities (legal or illegal)
  - Land-use changes (plantations, etc.)
  - Pollution and waste disposal (state type and source if known – e.g. oil spills, gas flares, toxic dumps)
- What activities most impact animals in your community?
  - Deforestation
  - Land-use changes (plantations, housing estates etc.)
  - Pollution and waste disposal (state type and source if known – e.g. oil spills, gas flares, toxic dumps)
  - Other
- What activities most impact your water resources
  - Deforestation
  - Dams, road construction, etc.
  - Pollution and waste disposal (state type and source if known – e.g. oil spills, gas flares, toxic dumps)
  - Other
- What activities most impact your Land?
  - Land acquisitions (by whom? Adequate compensations paid?)
  - Land-use changes (plantations, housing estates etc.)
  - Pollution and waste disposal (state type and source if known – e.g. oil spills, gas flares, toxic dumps)
  - Other

- What activities most impact your Air quality?
  - Pollution and waste disposal (state type and source if known – e.g. oil spills, gas flares, toxic dumps)
  - Fumes from factories
  - Fumes from motor vehicles, etc.
  - Other
- What activities most impact your Livelihoods
  - Displacement
  - Loss of farmlands
  - Pollution of rivers, swamps, creeks, etc.
    - § Pollution and waste disposal (state type and source if known – e.g. oil spills, gas flares, toxic dumps)
  - Other
- What do you think most affect health of community members
  - Use of polluted waters (drinking, cooking, etc.)
  - Food from polluted farmlands
  - Air pollution
  - What are some common health challenges
    - § Malaria
    - § Cancers
    - § Breathing diseases (asthma, bronchitis, etc.)
    - § Skin diseases

- Name other adverse actions and their impacts

For oil spills and waste dumps state when recent incidents occurred, name company or government agencies involved and follow up actions – What was the cause of the incident? Was there a clean up? Who handled the clean up? Was the clean up satisfactorily done?

SECTION FIVE: Action Areas (45 minutes)

Objective: In this section participants identify action areas to place the community on the path of ecological protection and defence

6 What is to be done?
- 6.3 Summarise the key environmental problems from Sections Two and Four above.
- 6.4 Are there environmental resources that need to be protected, remediated or restored?
- 6.5 Need for community health monitoring
- 6.6 Are there issues that require legal action? What are they?
- 6.7 Are there issues that require advocacy (media, policy, etc.)

7 How would these be done?
- 7.3 Is there a need for detailed study of any of the situation?
- 7.4 Environmental monitoring
  - 7.4.1 By community members? What aspects would require these? Any need for monitoring training?
  - 7.4.2 Would there be need for experts for sample collection and analysis?
  - 7.4.3 Legal experts

8 Who would do what?
- 8.3 Community members – Identify things that can be done by communities, for example reforestation efforts with native tree species. Members could also volunteer to take the training to other communities.
- 8.4 Government (Federal, State or Local Government?)
- 8.5 Corporations
- 8.6 Consultants

9 When would these be done? Set a time frame

Cultural/Lunch break (60 minutes)

SECTION SIX: Bringing it all together (45 minutes)

Objective: In this section participants reconvene in plenary and each group presents responses gathered from the dialogue. From these presentations the responses are mapped and synthesised.

1.0 What to do with the outcome
  1.1 Share with stakeholders
  1.2 Utilize aspects for advocacy
2.0 Set up CEDAC if needed
3.0 Agree on next steps including Environmental Monitoring/Reporting Training

ENDNOTES

i Based on the welcome words by Nnimmo Bassey, Director, Health of Mother Earth Foundation (HOMEF) at the inaugural Community Dialogues at Erema, Egi (17th February 2015) and Goi, Ogoni Rivers State, Nigeria (18th February 2015).

ii HOMEF.2014. Re-Source Democracy, http://www.homef.org/sites/default/files/pubs/resource-democracy.pdf

iii Willink, Henry (1958). Report of the Commission Appointed to Enquire into The Fears of Minorities and the Means of Allaying Them. Port Harcourt: Reprinted by Community Defence Law Foundation.

iv Willink, Henry. Page 96

v Adedoja, Tokunbo (2007). "Tackling the Niger Delta Crisis". Lagos: Thisday **http://www.thisdayonline.com/nview.php?id=84284**, 22 July.

vi OMPADEC was created in 1992 while the NDDC was created in 2000.

vii See http://en.wikipedia.org/wiki/Niger_Delta

viii Some documents say 1887 while others say 1891. See for example SEAL67's Nigeria and the Royal Niger Company: The True Story (posted 04 August 2014 http://subliminalcodesintext.blogspot.com/2014/08/nigeria-and-royal-niger-company-true.html

ix Okonta, Ike and Douglas, Oronto (2003). Where Vultures Feast – Shell, Human Rights and Oil. London: Verso, pp 12-14

x Magill, Bobby and Climate Central (2014), "Global Growth in Fossil Fuel Burning Continues Unabated. Scientific American. http://www.scientificamerican.com/article/global-growth-in-fossil-fuel-burning-continues-unabated/ 13 November . Accessed 1 December 2014

xi IPCC. AR5. Page 4

xii The sixth extinction is also referred to as the Holocene extinction. See en.wikipedia.org/wiki/Holocene_extinction

xiii Duran, Ramon Fernandez (2012), The Breakdown of Global Capitalism: 2000-2030 – Preparing for the beginning of the collapse of industrial civilization. Ecologistas en Accion.

xiv Allen, Fidelis (2012). Implementation of Oil Related Environmental Policies in Nigeria – Government Inertia and Conflict in the Niger Delta. New castle upon Tyne: Cambridge Scholars Publishing. P. 46

xv Associated Gas Reinjection Act of 1979

xvi Ajugwo, Anslem O.(2013). "Negative Effects of Gas Flaring: The Nigerian Experience." Journal of Environment Pollution and Human Health 1.1

xvii http://www.nesrea.org/about.php

xvii This Decree promulgated (with effect from 20th April 1985) to deal with the problems arising from the implementation of the associated Gas Re-Injection Act 1979. The 1985 Decree permitted a company engaged in the production of oil and gas to continue to flare gas in a particular field or fields if the minister issues a certificate indicating that after January 1, 1984 that utilisation or re-injection of the produced gas is not appropriate or feasible in the particular field or fields. The company would then be required to pay a fine and continue to flare gas in particular field or fields. The fee then prescribed was eleven kobo per 28.317 standard cubic meter of gas flared.

xviii Environmental Guidelines and Standards for the Petroleum Industry of Nigeria (EGASPIN), 327

ENDNOTES

xx Wawryk, Alexandra S, INTERNATIONAL ENVIRONMENTAL STANDARDS IN THE OIL INDUSTRY: Improving the Operations of Transnational Oil Companies in Emerging Economies. Oil, Gas and Energy Intelligence. Volume I, issue #01 - January 2003. Seen at http://www.gasandoil.com/ogel/samples/freearticles/roundup_09.htm

xxi PetroSkills. Fundamentals of International Oil and Gas Law https://www.petroskills.com/course/fundamentals-of-international-oil-and-gas-law-iog

xxii This section is based on Oilwatch International's Monitoring Manual for the Oil Industry, Quito, 2003

xxiii Nnimmo Bassey, Change and conflict: What can women do?- Paper presented at the Conflict Management Training of Ijaw Mothers of Warri held in Warri, 5-6 July 2006.

xxiv They are evaluations of the company's environmental behaviour that can either be internal or independent. The most common and applicable to the petrol industry are those to ensure compliance: they are usually independent and the ones used to evaluate some internal processes.

xxv These should propose the removal of all the infastructure, rubbish, and rubble of the area, the restoration of the ecosystems to there original condition before the project started.

xxvi Oilwatch International's Monitoring Manual for the Oil Industry

xxvii See Fact Sheet - Discharge to Ocean at **http://web.ead.anl.gov/dwm/techdesc/discharge/index.cfm**

xxviii A report by Global Witness states: "Each week at least two people are being killed for taking a stand against environmental destruction. Some are shot by police during protests, others gunned down by hired assassins. As companies go in search of new land to exploit, increasingly people are paying the ultimate price for standing in their way.

"We found that at least 116 environmental activists were murdered in 2014 - that's almost double the number of journalists killed in the same period. A shocking 40 % of victims were indigenous, with most people dying amid disputes over hydropower, mining and agri-business. Nearly three-quarters of the deaths we found information on were in Central and South America". For more see https://www.globalwitness.org/campaigns/environmental-activists/how-many-more/

xxix Environmental Law Institute. 2004. A Toolkit For Environmental Advocacy in Africa. Accessed at https://www.eli.org/sites/default/files/docs/africa/Advocacy_Tools_Handbook_Final_Revised.pdf

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