THE ABIDJAN CONVENTION: DEVELOPING REGIONAL OCEAN POLICY

GROUP MEMBERS – WEST AFRICA

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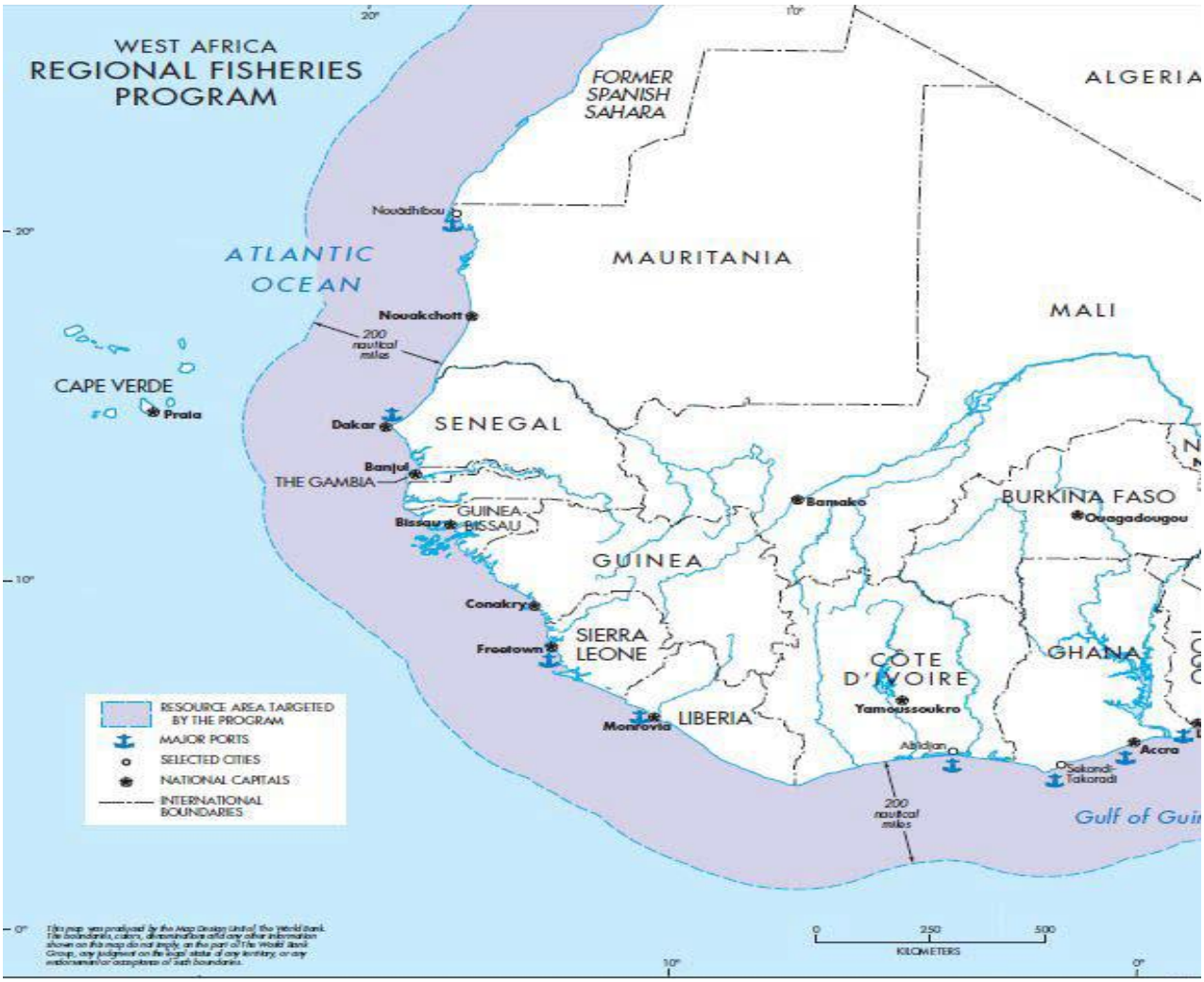
1.0 Introduction

The West African marine eco-region spans 3,500km of coast and includes 6 countries: Mauritania, Senegal, The Gambia, Cape Verde, Guinea Bissau, and Guinea. Some 8 million people live along this coastline. Fisheries in the West African marine eco-region generate some US$400 million annually, making them one of the most important sources of foreign exchange in the region. Guinea Bissau hosts the largest breeding population of green turtles in Africa while, Cape Verde is the 3rd most important loggerhead nesting site in the world.

1.1 The West African coastal areas

The coastal waters of West African countries from Mauritania in the north to South Africa at the other extreme contain highly productive ecosystems that support rich fisheries. The coastal area also supports coastal tourism, industries and numerous busy ports. The ecosystems provide an important livelihood for many coastal communities.

The region, however, has seen serious conflicts resulting in immense human suffering and poverty. In the last three decades or so, the rapid development, improper use of resources and extensive pollution has impacted negatively on the coastal ecosystems. Coastal erosion and floods are key problems, likely to be exacerbated by climate change. Destruction of critical habitats is widespread in the convention area, and coastal communities are both the perpetrators and victims of this destruction.



1.2 The Origin of the Abidjan Convention

The Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West, Central and Southern Africa Region (Abidjan Convention in short),covers a marine area from Mauritania to South Africa which has a coastline of just over 14,000 km.

The Contracting Parties include member countries that have ratified the Convention –Benin, Cameroon, Congo, Cote d'Ivoire, Gabon, Gambia, Ghana, Guinea, Nigeria, Senegal, South Africa and Togo and member States in the process or yet to ratify the Convention including Angola,

Democratic Republic of the Congo, Equatorial Guinea, Guinea Bissau, Liberia, Mauritania, Namibia, Sierra Leone and Sao Tome & Principe. The original mandate was in a "broad sense" adequate to address environmental problems of specific interest and priority to participating countries but paid little attention to socio-economic "development" as an engine of growth from which wealth generated could be channeled to address attendant environmental threats to marine and coastal areas by targeted actions.

The original mandate was in a "broad sense" adequate to (1) address environmental problems of specific interest and priority to participating countries through their collective will and commitment, (2) deal with immediate, underlying and root causes of environmental problems and the need to proffer solutions to address them; (3) cover a wide range of issues as a comprehensive umbrella agreement for the protection and management of the marine and coastal areas – it lists the sources of pollution which require control e.g. pollution from ships, dumping, land-based sources, exploration and exploitation of the sea-bed, and pollution from or through the atmosphere, (4) identify environmental management issues for which cooperative efforts are to be made i.e. coastal pollution, specially protected areas, combating pollution in cases of emergency and environmental impact assessment, (5) generate scientific and technological cooperation and liability and compensation.

It was all- encompassing and recognized that "the West and Central African States felt that the Abidjan Convention was too general to provide sufficient protection on its own", albeit that protection could be sought from any of its specific protocols.

The mandate of the convention is to seek to foster regional cooperation to address environmental problems and duly recognize the varying governance structures, extreme political, social and economic variations within and between the Contracting States, and their impacts on varying capacity for political will, technological and human and material resources for collective action. It recognizes the need for sustainable environmentally sound development for maintaining and preserving the natural heritage available for utilization/exploitation for the benefit of the human condition, quality of life and for the regional elimination of abject

poverty, without which there can be no sustainable development, and by implication protection of natural resources and the resource base in the coastal and marine environment.

1.3 Objectives of the Convention

The original objectives of the Convention included inter alia:

(1) The reduction of threat to the marine and coastal environment, its ecological equilibrium, resources and legitimate uses posed by pollution and by the absence of an integration of an environmental dimension into the development process;

(2) To ensure cooperation among Contracting Parties in order to ensure sustainable, environmentally-sound development through a coordinated a comprehensive approach;

(3) To emplace a carefully planned research, monitoring and assessment programme in view of the scarcity of scientific information on marine pollution in the West and Central African Region.

(4) To complement existing conventions concerning marine pollution and fill the gaps to meet the special requirements of the West and Central African Region.

The specific objectives of the Convention included inter alia in articles 4 to 15, are as follows:

1) to take all appropriate measures to prevent, reduce, combat and control pollution of the Convention area and to ensure sound environmental management of natural resources, using for this purpose the best practicable means at their disposal, and in accordance with their capabilities;

2) to cooperate in the formulation and adoption of other protocols prescribing agreed measures, procedures, and standards to prevent, reduce, combat and control pollution from all sources or promoting environmental management in conformity with the objectives of the Convention;

3) To establish national laws and regulations for the effective discharge of the obligations prescribed in the convention and endeavour to harmonize their national policies in this regards;

4) to cooperate with the competent international, regional and sub regional organizations to establish and adopt recommended practices, procedures and measures to prevent, reduce, combat and control pollution from all sources in conformity with the objectives of the Convention and its related protocols and to assist each other in fulfilling their obligations under the Convention and its related protocols;

5) In achieving (1) the contracting parties shall act to avoid the transfer, directly, or indirectly, damage or hazards from one area to another or transform one type of pollution into another;

6) to take all appropriate measures in conformity with international law to prevent, reduce, combat and control pollution in the Convention area caused by normal or accidental discharges from ships, and to ensure the effective application in the Convention area of the internationally recognized rules and standards relating to the control of this type of pollution;

7) to take all appropriate measures to prevent, reduce, combat and control pollution in the Convention area caused by dumping from ships, and aircraft, and to ensure the effective application in the Convention area of the internationally recognized rules and standards relating to the control of this type of pollution;

8) to take all appropriate measures to prevent, reduce, combat and control pollution in the Convention area caused by discharges from rivers, estuaries, coastal establishments and outfall, coastal dumping or emanating from any other sources on their territories;

9) to take all appropriate measures to prevent, reduce, combat and control pollution resulting from or in connection with activities relating to the exploration and exploitation of the sea-bed and its subsoil subject to their jurisdiction and from artificial islands, installations and structures under their jurisdiction;

10) To take all appropriate measures to prevent, reduce, combat and control pollution in the Convention area resulting from or transported through the atmosphere;

11) To take all appropriate measures to prevent, reduce, combat and control coastal erosion in the Convention area resulting from man's activities, such as land reclamation and coastal engineering;

12) to take all appropriate measures, individually or jointly, to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other marine life and to establish protected areas, such as parks and reserves, and to prohibit or

control any activity likely to have adverse effects on the species, ecosystems or biological processes in such areas;

13) to cooperate in taking all necessary measures to deal with pollution emergencies in the Convention area, whatever the cause of such emergencies, and to reduce or eliminate damage resulting therefrom; and to notify the organization and / or any other Contracting Party likely to be affected by such emergency;

14) To develop technical and other guidelines to assist the planning of development projects in such a way as to minimize harmful impact on the Convention area;

15) to endeavor to include an assessment of the potential environmental effects in any planning activity entailing projects within their territory, particularly in the coastal areas that may cause substantial pollution of or significant and harmful changes to the Convention area; and to develop procedures, in consultation with the Organization, for the dissemination of information concerning such assessment activities;

16) To cooperate, with the assistance of competent international and regional organizations, in the field of scientific research, monitoring and assessment of pollution in the Convention area, and to exchange data and other scientific information for the purpose of the Convention and its related protocols;

17) to develop and coordinate national research and monitoring programmes concerning all types of pollution in the Convention area and to establish in cooperation with competent international and regional organizations, a regional network of national research centres and institutions to ensure compatible results,

18) to participate in international arrangements for pollution research and monitoring in areas beyond their national jurisdiction;

19) to cooperate, directly or through competent international or regional organizations, in the development of programmes for technical and other assistance in fields related to marine pollution and sound environmental management of the Convention area;

20) to co-operate in the formulation and adoption of appropriate rules and procedures for the determination of liability and the payment of adequate and prompt compensation for damage resulting from pollution of the Convention area.

2.0 ISSUES AND CHALLENGES AND THREATS

A comprehensive study and analysis of the Articles of the Convention shows that over ninety per cent (90%) of the contents were focussed on pollution and related matters that has to do with pollution. There are emerging issues that has come into national, regional and international debates and concerns. As a result of this, our group identified 4 major issues that need to be addressed by the Abidjan Convention. These are (a) Pollution, (b) Overfishing, (c) Oil and gas and (d) Climate Change. They are presented below.

2.1. POLLUTION

2.1.1 INTRODUCTION

Marine pollution as used in this paper was defined in Article 2 of the Barcelona Convention of February 16 1976: Pollution means the introduction by man, directly or indirectly, of substances or energy into the marine environment resulting in such deleterious effects as harm to living resources, hazards to human health, and hindrance to marine activities including fishing, impairment of quality for use of sea and reduction of amenities.

The vast African continent borders the Atlantic Ocean on the west and the Indian Ocean in the east, with long coast lines extending into the two hemispheres, the Mediterranean in the north, the Red Sea in the northeast – all having varied climatic and environmental conditions and resources. This very vastness renders one regional approach to marine pollution impracticable.

2.1.2 PRINCIPAL SOURCES OF POLLUTION AROUND AFRICA

Generally speaking, the immediate sources of pollution, and their influence on the marine environment, may be different in each region. Each region should be carefully studied to determine priority areas of concern and possible action. Several sources of pollution such as

land-based pollution, industrial/sewage wastes, oil pollution and nuclear based pollution should be investigated.

2.1.3 THE SITUATION OF WEST AFRICA

There are different kinds of marine pollution namely: pollution from ships, pollution caused by dumping from ships and aircrafts, pollution from land-based sources and pollution from activities relating to exploration and exploitation on the sea bed. The main focus of this section will be on pollution from ships.

2.1.3.1 Pollution from ships

Ships were previously used for transporting passengers but are now used mainly to transport goods. Around 90% of global trade is carried through the sea by the International maritime community. There are different forms of marine pollution caused by the ships. Those are: oil spills (operational or accidentally), noxious and harmful substances, contaminated ballast waters, domestic and industrial litter, and anti-fouling paints from the hulls. Ships can pollute the environment regardless of whether they are at sea or in the port by releasing chemical substances through the fumes.

2.1.3.2 Oil spills

Ship based oil spills can be divided into operational and accidental discharges. Operational discharges are caused by normal shipboard operations such as cleaning of cargo tanks and working in the engine room. Accidental discharges arise from maritime accidents including major oil spills. Pollution caused by tanker accidents declined in early 1970's and 1980's.

2.1.3.3 Emission of harmful substances

On the western coast of Africa, pollution emanating from the ships in the form of airborne polychlorinated biphenyls (PCB's) had been observed off the huge ship's graveyard in Mauritania by researchers who were cruising off the western coast of Africa. These chemicals are now banned by the Stockholm Convention on Persistent Organic Pollutants (2001) because of their health risks. Other harmful substances released by ships are sulphur oxide, nitrogen oxide, particulate matter and carbon dioxide. These gases come from the Heavy Fuel Oil (HFO) used for engine propulsion. These emissions from heavy fuel oil can be avoided by using a clean fuel in order to lower the amount of harmful gases released into the atmosphere, which contribute to global warming.

2.1.3.4 Contaminated ballast waters

Ballast water is taken in by ships that are not fully loaded to stabilize them. Ballast water which is collected in another region is often discharged before the ship reaches its next port. Clearly, this water can serve as a vector for the introduction of alien and invasive species into the new environment. Alien and invasive species may threaten native species, altering habitats and affecting functioning of the ecosystem. Contaminated ballast water is also a form of pollution. In 2013, around 4000 birds of 18 different species were washed up on the coast of the English Channel covered in sticky substance. The sticky substance was later identified as Polyisobutylene also known as PIB which is an oil additive released into sea during discharging of polluted water and tank cleaning. The IMO working group on the Evaluation of Safety and Pollution Hazards of Chemicals agreed to prohibit discharging of PIB at sea and the effective implementation was projected in 2016.

2.1.3.5 Solid waste

Enforcement at sea is difficult, thus ships can dispose of waste off high seas without consequences. Ships generate a lot of domestic solid waste such as plastics, wood, rubber etc. Impacts raise a lot of environmental concern in the marine environment. Plastics release, persistent bio-accumulation and toxic compounds (PBTs) which associated with many health problems in marine life. Plastics are degraded into small micro plastics after long times, and these are deadly to marine life. For example, small fragments of micros plastics had been found in gut content of leatherback turtles.

2.1.3.6 Anti-fouling paints

Anti-fouling paint is used to prevent marine organisms from attaching to the hull of a ship, which can slow the speed of a ship. This paint contains a toxic substance called tributyl tin (TBT) which is dangerous to marine animals. Tributyl causes imposed in molluscs which inhibits production resulting to rapid population decline.

2.2 Solutions

Through its Division of Geophysics, Global Pollution and Healthand its Division on Economic and Social Programmes, UNEP concentrated attention on the following marine regions:

1. The Mediterranean, implementation of a comprehensive action plan;
2. The Persian Gulf;
3. The Caribbean; and
4. The West African coastal region: initiation of preparatory work for this region encouraged by the success in the Mediterranean.

UNEP's role in the development of the action plans was as follows:

1. To work out a draft action plan for a given region in consultation with governments and concerned agencies;
2. To secure the approval of the action plan by the governments of the region concerned;
3. To implement the action plan with the co-operation of thegovernmentsconcerned; and
4. Encourage the governments concerned to assume full responsibility forfurther action on the protection of the environment.

2.2.1 UNEP's role in the Gulf of Guinea and Adjacent Coastal Areas

The Gulf of Guinea and the adjacent coastal areas, along with the Mediterranean, are the marine regions receiving priority attention from UNEP.Action by UNEP for the Gulf of Guinea was requested by Ghana during the Third Session of the Governing Council in 1975, supported by Zaire, Ivory Coast, Nigeria and Senegal. The countries concerned called on UNEP to study the problems of marine and coastal pollution in all their aspects and particularly oil pollution along the West African Atlantic coastline, with a view to initiate a Barcelona-type convention for that area.

2.2.2 Recommendations

The West African countries can work together to preserve the marine environment off the coast and its living resources on a national level. Some of the steps which could be taken are as follows:
1. Firstly, each coastal state should include marine affairs as a priority issue for its economic development, and an effort should be made to give substance to such policy intentions. Institutions such as the department of environmental affairs, maritime and safety authority, and NGO's dealing with marine conservation should be involved in implementing rules serving to curb pollution fromships. If there are institutions such as marine or oceanographic institutes

or centers, these can train marine specialists and oceanographers and conduct scientific research they should be examined, the equipment in their custody assessed, and their financial and personnel needs determined.

2. The second aspect of national action is to develop the capacity to detect and punish violators of national legislation against those who degrade or pollute coastal and adjacent waters from ships, and to clear away the effects of such pollution and degradation in a reasonable time after occurrence. This is a complex, difficult and expensive undertaking for any country, as past oil-spill incidents have shown, and particularly so for developing countries given their budgetary constraints and competing national demands and expectations. Nevertheless there is no choice; an effort has to be made to develop these capabilities at the national level or in co-operation with other states. For example, states should have navies whose mandate could be broadened to include pollution control activities. Police air wing and civilian aircraft could also be used to monitor pollution activities.

3. The third aspect of national action is to study relevant marine environment instruments with a view to accept and effectively enforce them. Such instruments include several Inter-governmental maritime consultative organizations (IMCO), and other international conventions, e.g., the London Convention on Dumping of 1972.
All too often a number of governments accept international instruments and thus assume international obligations, but without giving national effect to such instruments. Such a gap cannot be redressed other than by national authorities, and such action in itself shows that a country is serious in its concern for the protection of the marine environment. Such action is needed by the governments of West Africa.

4. Each nation should examine whether or not it has adequate environmental legislation and whether such legislation is effectively enforced. Many nations do not lack appropriate legislation, but rather do not enforce such legislation. One important issue that requires constant attention is the decision on the standards to apply to avoid causing undesirable environmental consequences to marine regions and resources.

5. Educating people onboard vessels not to pollute their coastal environment is essential. Environmental education is important to the health and enjoyment of the people and the health of the environment.

3.0 OVERFISHING IN THE WEST AFRICAN COASTAL AREAS

The waters off West-Africa are amongst the most fertile in the world. Due to the upwelling phenomenon, observed only in a few areas worldwide, deep nutrient rich water comes to the surface providing the fundament for a complex and plentiful food web, which is able to supply food and income for the sub-Saharan countries bordering these waters. Although the resources appear to be inexhaustible, the contrary can be observed: fish stocks are dwindling, and fishermen are struggling to make a living. The West African Region attracts many commercial vessels from Europe and Asia. In 2014 it was reported that overexploitation of West Africa's fishery resources has had negative impacts upon the social, economic and human issues. There is loss of income for the locals, their primary food source is being destroyed and business is threatened. IUU fishing is the major concern.

Today more than 50% of the West African coast fisheries are overfished and more permits are being issued for fishing regardless of the situation, to Japan, South Korea, Russia, Spain, Italy, China and many other countries. The estimate is that IUU fishing is responsible for about one third to half of the total regional catch (Greenpeace).

There has been a decline in catches and an increase in costs and workload. The locals who are dependent on fishing for their livelihoods have to travel longer distances to catch fish and battle for fishing space with industrial trawlers, resulting in the rise of threats to lives at sea.

3.1 Parties responsible for overfishing

West Africa is estimated to have the highest levels of illegal, unreported and unregulated (IUU) fishing on Earth. Foreign vessels are taking advantage of some of the world's poorest countries, which can't afford to guard their own territorial waters and where the corruption index is often among the highest in the world.

Since the world's leading fishing powers have emptied their own waters, the problem of industrial overfishing is being exported to distant seas. The European Union made its first bilateral fishing agreement in Africa with Senegal in 1979, and soon afterwards Chinese trawlers and other Asian vessels entered West African waters, any of them operating illegally. Many of the vessels involved in illegal activities in West Africa are operating under flags of convenience. According to the Environmental Justice Foundation, a significant number of these vessels are originally owned by European companies.

There are various fishing agreements between some West African countries and European companies. The foreign fishing fleets take their catch to ports far from Africa, making millions of dollars, while Africa's coastal communities grow poorer.

These agreements are questionable because they promote the export of African marine resources into the EU to the detriment of local economies and food sovereignty. Morocco has allowed EU vessels into the national waters of neighboring Western Sahara, effectively hijacking its fish stocks.

3.2 Problems associated with overfishing

(a) Overfishing by foreign vessels is driving many species towards extinction and destroying the livelihoods of fishing communities in countries such as Ghana, Liberia and Mauritania, says the London-based Overseas Development Institute (ODI).

(b) Corruption and few resources for monitoring fishing mean foreign trawlers often venture into areas near the coast which are reserved for local fishermen, the ODI says in a report.

(c) Foreign fishing vessels are exhausting local stocks, often illegally, to the point of forcing local fishermen to go further out to sea to find fish, hugely increasing their costs, according to the ODI.

(d) West Africa's fisheries were heavily underperforming due to poor governance, and this allowed open access to the resources.

(e) The high level of illegal fishing in the West African region is a symptom of weak governance in many of the countries.

(f) The fisheries of West Africa have become an 'offshore economy' for a lot of countries, providing little benefit locally.

3.3 Effects of Overfishing

West African coastal states are losing $1.3 billion annually and 37 % of their annual catch to IUU fishing. Most of the illegally caught fish is taken to the EU and China, the world's biggest fish markets, where demand is constantly growing. At the same time, industrial overfishing is destroying the livelihoods and food security of some of the world's poorest people, forcing them to seek new, and hopefully more secure futures elsewhere.

The uncontrolled harvesting of pelagic fish and octopus by hundreds of foreign fishing vessels is having a deep ecological impact on the Atlantic Ocean's Canary Current upwelling marine ecosystem, a major biodiversity hotspot. It is also destroying vast amounts of by-catch. The followings are some of the negative effects of overfishing in the coastal areas of West Africa.

(a) The global consequences of overfishing cannot be overlooked. The most obvious effect is the depletion of fish populations, which disrupts the balance of ocean food chains and ecosystems;

(b) In addition to negative environmental consequences, overfishing has serious social and economic consequences. In areas where overfishing has occurred, many who have relied on fishing as a way of life have been forced to move or to seek other trades. In African and Asian coastal nations where fish is a major source of dietary protein, overfishing can cause malnutrition and food insecurity, thereby perpetuating poverty.

(c) There is also growing evidence that the increased volume of fishing activity worldwide is having a very serious effect on the health of the oceans as a whole. When commercially valuable species are overexploited, other species and habitat that share the same ecosystem are affected.

3.4 Recommendations and Possible Solutions

(a) EU parliament members to rethink their African fishing policies, properly taking into account the devastating political, social and ecological impact of their large industrial fisheries.

(b) Africa's waters managed regionally by a well functioning effective regional fisheries management organization;

(c) Elimination of destructive fishing practices to ensure sustainable levels of marine life;

(d) A reduction in the size and numbers of fleets fishing in African waters, with increased monitoring and control of those that remain;

(e) A network of well enforced ocean sanctuaries across the region;

(f) Sustainable fishing and fish processing operations managed and financed by Africans, providing livelihoods, food security and enabling poverty alleviation in the region;

(g) The West African Regional Fisheries Program which was started in 2009 by 9 West African countries should encourage other WA countries to join in order to strengthen governance reforms, reduce illegal fishing and increase local value-added enjoyed from the fisheries.

3.5 Conclusions

Based on the foregoing evidence, we conclude by saying that (a) West Africa should create hundreds of thousands of jobs if governments invested in the maritime industry, instead of selling off fishing rights to foreign operators. West Africa nations must crack down on foreign fleets fishing illegally off its Atlantic coastline and build up their fisheries to protect the livelihoods of millions of people. Though illegal fishing is a difficult issue to tackle, financially and politically, if it is addressed, this will create jobs, boost revenues and incentivize young people to stay in the region, which will reduce mass migration and youth unemployment.

4.0 OIL AND GAS

4.1 Introduction

As with other natural resources oil and gas (O&G) extraction has been a great source of revenue for a number of African countries. This has previously mostly been a terrestrial industry but more and more exploration is being conducted offshore in more recent years. For example, the Gulf of Guinea, a stretch of West Africa's coast spanning more than a dozen countries, is a growing source of oil to world markets. The Gulf of Guinea has for a long time now been a significant producer of hydrocarbons and continues to attract significant amount of the foreign direct investment targeted at Africa's hydrocarbons. Gulf of Guinea nations mostly supply European and American markets, although Angola supplies much to the Chinese as well. Nigeria is the biggest oil exporter followed by its fellow OPEC member Angola. Smaller producers include Equatorial Guinea, Congo Brazzaville, Gabon, Cameroon and Ivory Coast. Apart from some established West African oil producers keenly intent on ramping up oil output over the next number of years such as Angola, new exporters are also entering the market.

African countries therefore need to become more knowledgeable about their offshore environments to be able to actively participate in policy development initiatives both internationally and regionally.

a) Abidjan Convention

The Articles with the most relevance to O&G are:

- Article 8: Pollution from activities relating to exploration and exploitation of the sea-bed
- Article 9: Pollution from or through the atmosphere
- Article 12: Co-operation in combating pollution in cases of emergency (as well as the Protocol concerning co-operation in combating pollution in cases of emergency)
- Article 13: Environmental impact assessment

Since the establishment of the Convention working groups have been established such as the Group of Experts on Regional Environmental Standards for the Offshore Exploration and Exploitation of Oil and Gas in West, Central and Southern Africa.

b) Stakeholders

Various groups have a stake in the industry including:

- O&G companies (international and local)
- Governments (and their relevant departments and institutions)
- Scientists, research institutions
- NGO's (environment, social development)
- Country citizens
- Other sectors with a stake in the marine environment i.e. fisheries, offshore mining, bio-prospecting companies, tourism, transport

4.2 Challenges posed by Oil and Gas

As a major source of wealth and energy in Africa, oil and gas (O&G) resources are critical for growth, development and good governance. They also pose major management and security (piracy occurs off the coasts of some countries) challenges for African governments. The issues go beyond technical management of O&G resources and collection of revenues.

Resources control, governance, transparency in utilization of resources for wealthy developments, preserving and optimizing the resource base, environmental protection and securing equitable and intergenerational long-term benefits (especially poverty reduction) are among the many critical ingredients that should be embedded in any coherent strategy aimed at the harnessing of O&G resource wealth, in order to achieve sustained growth from O&G resources ,entails managing and enhancing the status of a complex portfolio of natural, human and social capital.

a) Limited refining capacity

For all of Africa's oil resources, refining capacity on the continent remains limited and as a result countries like Angola and Nigeria export crude oil, only to import refined oil again later at an additional cost. Problems in the refining industry on the continent include corruption, poor maintenance, theft and other operational problems.

b) Oil economy has minimal linkages to other sectors

Another challenge is that in most African countries the hydrocarbon sector has minimal linkages to other sectors of the economy, with the sector proving very little employment. In Angola for example, the oil sector employs less than 1% of the workforce. Furthermore, some of the countries in the region, with the highest income inequality are oil producing states; such as Gabon, Nigeria, Angola and Equatorial Guinea. In this sense, in a country like Nigeria, where 70% of the population lives below the poverty line, many locals see fuel subsidies as the only benefit of living in an oil rich nation. Of course, fuel subsidies bring with it its own inefficiencies and losses to the economy. Efforts aimed at the diversification of u

c) Environmental impacts

Due to the nature of the offshore environment oil and gas operations may have impacts over the larger environment and due to the nature of the operations other activities are excluded during the surveys, exploration drilling and when platforms are constructed and operated.

i) Exploration phase

During exploration surveys air guns are fired which provide data on the geology of the area. This may impact on the marine life. There is still some uncertainty over the effects on large marine animals (whales, dolphins) as this has been reported to interfere with their communication as well as causing physical damage. In most countries it is required that marine animal observers are on board who can delay operations if animals (cetaceans, turtles, seals) are spotted in the area. Even less is known on the effects of fish and smaller marine animals. When drilling, impacts could include possible oil leaks and habitat degradation. There are newer less harmful methods but this is not widely used.

ii) Production phase

During production impacts include oil spills, the rig acting as a "new artificial habitat" changing the environment, release of drilling fluid which may be toxic. Other activities are restricted in the area e.g. fishing and navigation, which leads to conflict. Management and regulation of different activities is therefore required.

4.3 Opportunities

Sub Saharan Africa represents one of the fastest growing and highest potential O&G exploration and production areas in the world. Most of the new developments are still in the relatively early stage of what promises to be a huge build up of infrastructure and activity. The total investments in the offshore maintenance modification and operation segment of the sector were projected to reach $153 billion by 2013.

Examples of projects in West Africa include:

a) The Kudu gas field off the coast of Namibia is the countries only known hydrocarbon resource and contains large reserves of quality dry gas. Only 14 hydrocarbon wells had been drilled by mid 2011 of which eight are in the Kudu gas field. While seismic data and continued exploration activity supports the outlook for the establishment of a local oil industry, there is still no tangible proof that this commodity van be extracted profitably. Thus, except for the Kudu gas development, Namibia is still in the early development phase of exploration.

b) South Africa has a small amount of O&G production with limited reserves. Over 265 wells have been drilled offshore, but large virgin acreage still exists offshore. Overall the region's oil reserves are expected to increase over the medium to long term, but over the short-term, production of crude oil is most likely to remain concentrated in Nigeria, Angola, Equatorial Guinea and other Gulf of Guinea nations. With oil and gas identified to be developed within the government's Operation Phakisa initiative more capacity is being developed in the sector with the aim of finding new oil wells and growing the industry.

c) In June 2007, the Jubilee field was discovered off the coast of Ghana (which was projected to have a potential of 1.8 billion barrels of reserves). Offshore O&G activities were projected to be in excess of $20 billion by 2009.

d) In September 2009 Anadarko Petroleum discovered oil off the coast of Sierra |Leone at the Venus B1 exploration well, with commercial viability still to be confirmed.

e) Undiscovered reserves in Senegal Province estimated to be 2.4 billion barrels

f) Undiscovered potential in the Gulf of Guinea Province with estimated reserves totaling 4.1 billion barrels.

4.4 Policy Framework

Except for the South African offshore O&G industry, which is governed by the White Paper on the Energy Policy of the Republic of South Africa and the Energy Security Master Plan for liquid fuels, the rest of the region remains silent on this policy issue.

In SA, the policy document aims to, among other objectives, improve social equity by addressing the energy requirements of the poor; enhance the efficiency and competiveness of the SA economy by providing low cost and high quality energy input into industry, mining and other sectors and accomplish this within the constraints of environmental sustainability.

4.5 Regulatory Framework

The O&G sector in SA is governed by the Petroleum Product Act 2003, no 120 of 1977 as amended. Offshore O&G is not dealt with directly as yet within the MPRDA, 2003 (amended draft in progress). O&G falls under the mandate of the Department of Mineral Resources which has relegated regulatory functions to the Petroleum Agency of South Africa (PETRO SA), which handles promoting the industry, licensing, monitoring and data archiving. In some countries institutional governance is not emphasized.

4.6 Recommendations

- The regional economy blocks can play a supporting and coordinating role and be instrumental in advancing the following initiates. This needs to follow a stepwise process to be effective:
- Active participation on policy development, as well as individual countries developing and implementing policies
- Promoting regional integration in O&G exploration.
- Capacity building and training across the region, including a regional (or even continental) oil response plan
- Building regional infrastructure (e.g. building refining structures) for sustainable production

Active participation with the environmental sector and its goals needs to be cross-cutting across these steps.

5.0 CLIMATE CHANGE ISSUES

5.1 Introduction

One of the biggest threats to coastal and marine systems is climate change, the impacts of which are already being detected in many cases and areas of Africa. Though its effects are not yet fully understood, climate change is known to be a threat multiplier for marine and coastal environments.

In physical terms, the major direct impacts of climate changes are sea-level rise including inundation of low-lying areas, shoreline erosion, coastal wetland loss, saltwater intrusion, higher water tables and higher extreme water levels leading to coastal flooding (Leatherman and Nicholls, 1995). Other climate change impacts such as increased storminess, higher temperatures and reduced/increased precipitation, deforestation also have immediate or secondary impacts of the coast.

In environmental terms, rising sea levels threaten the coastal regions' biotopes (beaches, lagoons, swamps, etc.), whose disappearance, degradation or salinisation constitute high risks for resident species. Mangrove swamps, which occupy large surface areas in Nigeria, Guinea, Guinea-Bissau, Cameroon, and Senegal, are particularly sensitive. The submergence of these mangrove swamps or coastal lagoons could lead to a loss of biodiversity. In addition, there are productive coastal ecosystems generating fishing, farming and tourism income which are at risk. Climate change is also expected to have impacts upon freshwater resources - which are shared regionally in West Africa on a watershed basis, along with loss of biodiversity and exacerbation of vectors spreading disease.

West Africa is an insignificant contributor to greenhouse gas emissions globally, but it has a high vulnerability to climate change impacts. Therefore elements of its regional ocean policy relating to climate change must be focused on adaptation strategies.

Climate changes create new challenges and risks, but also provide new opportunities for the African continent. There is an opportunity for Africa to harness renewable energy technologies as it has hydroelectric, wave, solar and wind energy potential. These could be developed on a regional basis, including offshore opportunities.

West Africa is heavily vegetated and its plant resources must be protected for two reasons. Firstly, to protect the coastline against erosion, and secondly as a carbon sink to mitigate against climate change generally.

A regional ocean policy could deal with conservation and rehabilitation of plant resources along the coastline. Possibly a regional ocean policy could also deal with joint desalination initiatives.

Although there are visible impacts already being detected in many areas of African coastal countries, much remains uncertain. Many African countries have highlighted oceans and coasts in the adaptation chapters of their Nationally Determined Contributions (NDCs) as part of their climate change efforts. Adaptation efforts in West African must take cognisance of the vulnerability of coastal communities. There are a number of areas along its coastline which are densely populated. Nicholls *et al.* (2008) have found that Africa is ranked as the third and fourth highest continent in terms of port city's population exposure (more than 2.6 million people in the coastal floodplain in 2005). Given the low wealth and poor development of flood management in Africa, this existing exposure is of concern.

Without adaptation, the physical, environmental and economic impacts of climate changes tend to increase with time under all climate change scenarios. Hence while Africa is highly vulnerable to climate changes, there are adaptation options that are available. It is important to note that the adaptation will not avoid all impacts, and there will be a need to be other investment and maintenance.

5.2 Environmental Issues related to Climate Changes

5.2.1. Biodiversity loss

Biodiversity is an important resource for African people. Uses are consumptive (food, fiber, fuel, shelter, medicine, wildlife trade) and no consumptive (ecosystem services and the economically important tourism industry). Given the heavy dependence on natural resources in Africa, many communities are vulnerable to the biodiversity loss that could result from climate change.

5.2.2. Vulnerability of Coastal Wetlands

With the exception of four landlocked countries, the remaining 14 countries in West Africa have significant coastlines with a combined length of approximately 6,467 km (CIA, 2012). Approximately 28% of the region's population—or 88 million people- resided within 100 km of the coast in 2010 (CIESIN, 2012b). With major urban centers located along the coastline, the coastal zones of these countries face increasing pressures from rapid demographic growth, as a result of increasingly impoverished conditions in the countryside, partly due to climate change-driven drier conditions inland. This suggests that land-use effects on coastal processes (e.g., deforestation due to greater exploitation of the coastal wetlands) and vice versa (i.e., the effect of sea level rise) will be extreme.

Coastal erosion or sea advance is expected to lead to degradation of vital coastal wetlands, such as the mangrove forests, which cover roughly 15,000 km2 in West Africa (Feka and Ajonina, 2011). A sea level rise of 0.5 m and 1 m will result in a loss of mangroves of 806 and 2,149 km2, respectively (Dennis et al., 1995). The loss of coastal wetlands will likely have a direct impact on the economy of the countries and the region. Another threat from a rising sea level is the salinization of coastal wetlands, which can lead to mangrove die-offs and increased salinity

in groundwater aquifer and surface water that further constrains subsistence farming in these coastal wetlands.

5.2.3 Potential Climate Change Impacts on Fisheries

Coastal West African states rely on the fisheries sector, to varying degrees, for formal and informal employment, foreign and domestic trade, foreign exchange earnings, local development, and household food security (Lenselink, 2002). Adverse impacts on the sector, accordingly, have wide repercussions from regional to household levels.

The projected impacts of climate change on fisheries will be both social and economic for fishing fleets and fishing communities, also dependent on these populations' resilience to change and capacity for adaptation. Projected changes include the composition, production, and seasonality of plankton and fish populations (FAO, 2010). The most direct consequences of climate change on coastal fisheries include an increase in ocean temperature, acidification through increased oceanic CO2 absorption and pH reduction, and a rise in sea levels (Doney et al., 2012). The responses of individual species to the physiological impacts of climate change will compound into difficult-to-predict large-scale changes of ecosystem dynamics, particularly food webs, from microbes to the fish species fished by human populations (Doney et al., 2012).

Rising sea levels and warming upper layers also disrupt current ecosystems, particularly plankton and predator fish populations (Allison et al., 2009; Doney et al., 2012). With a rise in annual global temperature (e.g. of the order of 1.5 to 2.0°C) in coastal regions that have major lagoons or lake systems, changes in freshwater flows and a greater intrusion of salt water into lagoons will affect the species that are the basis of inland fisheries or aquaculture (République de Côte d'Ivoire, 2000; République du Congo, 2001; Cury and Shannon, 2004).

Wiafe et al. (2008) investigated the impact of climate change on zooplankton biomass in the upwelling region of the Gulf of Guinea. It was determined that zooplankton biomass during the upwelling season has declined significantly over a 24-year period. Impacts on food webs will impact fish stocks in terms of access to prey populations, but also direct physiological responses to raising temperatures or changes in predator population patterns. Changes in spawning or migration seasonality can alter predator-prey interactions, as well as accessibility of fish populations to fishers. Rising temperatures are also associated with increased susceptibility to diseases amongst fish populations (Allison et al., 2009; Doney et al., 2012).

5.2.4 Migratory birds and plants

About one-fifth of African bird species migrate on a seasonal basis within Africa and an additional one-tenth migrate annually between Africa and the rest of the world (Hockey 2000). One of the main intra-Africa migratory patterns is flown by waterfowl, which spend the austral summer in southern Africa and winter in central Africa. Palearctic migrants spend the austral summer in locations such as Langebaan lagoon, near Cape Town, and the boreal summer in the wetlands of Siberia. If climatic conditions or specific habitat conditions at either end of these migratory routes change beyond the tolerance of the species involved, significant losses of biodiversity could result.

As the climate changes, plants will naturally attempt to adapt by migrating, assuming the landscape is not too fragmented. However, given that most of the land in Africa is inhabited by humans, not all species will be able to migrate. From a conservation management perspective, this indicates that creating avenues of migration for critical plant groups (in either direction of the climatic gradient) might be a useful hedge against destructive changes in climate. Unfortunately for some regions, such as the fynbos, which is at the edge of the continent, there are limited options for migration.

5.2.5 Disease

Climate change has critical health implications. Changes in rainfall will affect the presence and absence of vector- and water-borne pathogens (IPCC 2001). For example, it can be expected that small changes in temperature and precipitation will boost the population of disease-carrying mosquitoes and result in increased malaria epidemics (Lindsay and Martens 1998). Increased flooding could facilitate the breeding of these malaria carriers in formerly arid areas (Warsame et al. 1995). These problems will be exacerbated by the inability of many communities to cope with increased disease. In many African urban settlements, population expansion has outpaced the capacity of municipal authorities to provide civic works for sanitation and other health delivery services. If settlement conglomerations such as those envisaged for West Africa and the eastern seaboard of South Africa develop, vulnerable populations will cover entire regions, not just isolated areas (Nicholls et al. 1999).

5.3. Policy recommendations

a) GOVERNANCE

Governments must strive to achieve the following with regard to all their activities pertaining to ocean and coastal governance:

1 Mapping of climate adaptation capacity across the region.
2 Awareness-raising in coastal communities, particularly those most vulnerable to climate change impacts.
3 Sourcing of indigenous knowledge with regard to climate adaptation mechanisms which can be implemented along the coastline.
4 Public participation in all their actions relating to climate change adaptation along the coastline.
5 Prioritise risk identification and management relating to climate change impacts along the coast.
6 Development by coastal local authorities of portfolios of climate adaptation projects.

7 Collaboration with each other regionally to undertake research and monitoring and build capacity pertaining to climate change adaptation in the coastal environment.

8 Collaboration with each other regionally to formulate research agendas and promote research into climate impact management along the coastline.

b) COASTAL WETLANDS AND BIODIVERSITY

Governments must undertake the following with regard to conservation of coastal wetlands and other freshwater resources, and coastal biodiversity:

1 Collaboration with each other and individual action to identify wetlands, other freshwater resources and biological resources which require protection against the likely impacts of climate change along the coastline.

2 Improve research and knowledge into wetlands, other freshwater resources and other biological resources along the coastline which are vulnerable to climate change impacts, and improve knowledge of the economic and ecological importance thereof.

3 Improve institutional and governance structures for management of coastal wetlands and freshwater resources and other biological resources along the coastline.

4 Improve monitoring of all freshwater resources along the coastline threatened with salinization and share data in this regard.

5 Forge partnerships with multidisciplinary wetland experts to establish best practice wetland conservation strategies.

6 Collaborate with each other to formulate technical and management mechanisms to prevent erosion of wetlands and other valuable freshwater resources along the coastline.

7 Support the education and training of personnel in the rehabilitation and restoration of wetlands and other freshwater resources along the coastline.

8 Ensure the integration of the management of wetlands with coastal forests and other coastal resources in an integrated manner.

c) FISHERIES

Governments must strive to achieve the following with regard to fisheries under their control:

1 Support and grow their aquaculture industries, both on-shore and off-shore, in order to mitigate against food security threats associated with climate change.
2 Improve planning and management of fisheries in a manner that enhances climate change resilience.
3 Share knowledge resources regarding best practice fisheries management under climate change, across all relevant disciplines.
4 Promote and support the training of personnel in optimal management of fisheries under climate change.

d) COASTAL ZONE DEVELOPMENT/LAND USE

Governments must implement the following with regard to the regulation of development in the coastal zone:

1 Improve their geospatial data bases relating to the coastline with relevant information to assist developers and decision-makers in making appropriate decisions given the risks and opportunities associated with climate change.
2 Inform their citizens of the risks pertaining to living and working in threatened coastal environments and the possible need for future relocation.
3 Implement measures to provide alternative livelihood sources in the event of livelihood threats, for example generation of income from coastal conservation.
4 With regard to coastal development, pursue development programmes that promote climate change adaptation.
5 Promote green infrastructure in threatened coastal areas.
6 Design seaports must in a manner that promotes climate change adaptation.
7 Ensure that climate model predictions are available to the development sector in order to guide development design and location.

e) CONFLICT AND SECURITY

Governments must undertake the following with regard to conflict and security:

1 Research pathways linking climate change impacts to social conflict, integrating climate science and social science considerations.

2 Develop and refine climate and conflict related indicators pertaining to the coastal environment.

3 Monitor possible conflict scenarios arising from climate impacts along the coastline, and undertake suitable data collection and analysis in this regard.

4 Support integrated climate and social science research on climate – security issues along the West African coastline.

5 Undertake suitable scenario modelling to understand the potential for climate impacts to give rise to security issues along the coastline.

6 Collaborate with each other in order to establish regional early warning systems regarding climate change impacts along the coastline.

7 Collaborate with each other with a view to undertaking climate stress testing to understand the nexus between climate events and social and political impacts along the coastline.

8 Formulate climate adaptation strategies for that minimise conflict, for implementation along the coastline.

9 Promote activities that bolster social capital and civil society participation in adaptation and disaster risk management along the coastline.

6.0 General Conclusion

6.1 Pollution

- Each state should include marine affairs as a priority context on its economic development, and an effort should be made to give substance to such policy intentions.

- Institutions such as the department of environmental affairs, maritime and safety authority, and NGOs should be involved in implementing rules about how to lessen pollution from the ships.
- Each state should study relevant marine environment instruments (such as IMCO and other international conventions) with a view to accept and effectively enforce them.

6.2 Overfishing

It is fair to say that individuals cannot solve this global problem all by themselves,

(a) there is need for politicians to strengthen our International laws. The African waters must be managed by a well functioning and effective Regional Fisheries Management Organization.

(b) There must be elimination of destructive fishing practices to ensure sustainable levels of marine life. A reduction in size and numbers of fleets fishing in African waters, with increased monitoring and control of those that will be permitted to fish.

(c) Africa's waters must be managed by well funded, functioning Regional Oceans Management organization.

This above mentioned recommendations can be achieved by

i. Safe catch limits and control on by-catch
ii. Protection of pristine and important habitats
iii. Monitoring and Enforcement of fishermen activities.

6.3 Oil and gas

- 1. Active participation on policy development.
- 2. Promoting regional integration in O&G exploration.
- 3. Capacity building and training across the region.
- 4. Building regional infrastructure.
- Active participation with the environmental sector needs to be cross-cutting

6.4 Climate change

Governments must share information and research and deliberate amongst each other with regard to the following, to achieve the outcomes as stated:

- Identifying effects and risks of climate change in the region and possible adaptation measures, with a view to co-ordinated adaptation action.
- Protecting coastal wetlands and biodiversity in the region, with a view to co-ordinated conservation action.
- Optimising management of fisheries resources under their control, with a view to co-ordinated sustainable use programmes to ensure food security.
- Ensuring sustainable property development and land use practices along their coastlines with a view to reducing risk to life and property from sea level rise and storm surges.
- Finding solutions to resolve conflict scenarios which may arise across the region due to impacts of climate change upon man-made and natural resources.

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