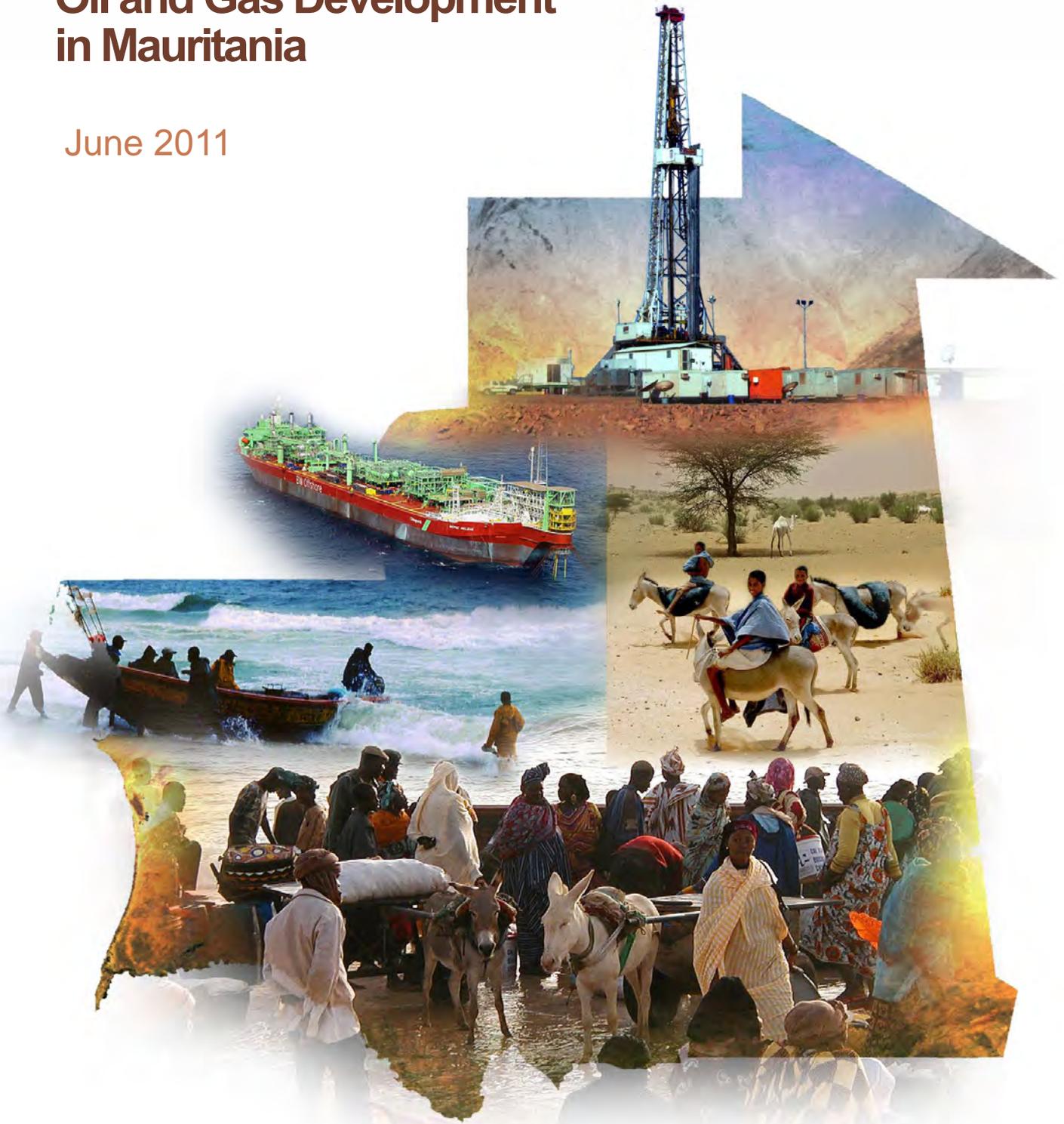


Strategic Environmental and Social Assessment of Oil and Gas Development in Mauritania

June 2011



STRATEGIC ENVIRONMENTAL AND SOCIAL ASSESSMENT (SESA) OF THE OIL & GAS SECTOR IN MAURITANIA

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World Bank

MAY 2011

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ACKNOWLEDGEMENTS

The Mauritania SESA project was directed by Mr. Marcello Iocca of D'Appolonia SpA and Mr. Miles Scott-Brown of Integrated Environments (2006) Ltd (IEL). Both are principal authors of the report.

Many individuals and organizations collaborated together on the project offering their time, knowledge and resources that contributed greatly to the success of the SESA process.

In this regard, we wish to thank all those who provided assistance from the World Bank, in particular Mr. Morten Larsen, Mr. Eleodoro Mayorga Alba, Ms. Alexandra Pugachevsky and Mr. Gothard Walser in Washington, D.C. We also want to thank the World Bank staff in Nouakchott, in particular Ms. Herménie Delanne, Mr. Haroune Ould Sidatt, Mr. Amadou Oumar BA for their support and assistance during the time both D'Appolonia and IEL were on mission in Mauritania.

We also want to thank Mr. Taleb Ould Abdi Vall, Minister of Petroleum, Mines and Energy (MPEM) for his time and engagement that was instrumental to the long term success of developing and carrying out the strategic environmental and social assessment.

We wish to offer special thanks to members of the Comité de Suivi Restreint, in particular Mr. Cheikh Ould Khaled, President of the Comité de Suivi since 2007 and Mr. Mohamed Yeslem Ould Ahmed, representative of the MPEM since 2007 for their invaluable collaboration and continuous support to the D'Appolonia-IEL team during all phases of the project. We also wish to equally thank Mr. Cheikh Ould Tourad, representative of the Ministry of Environment and Sustainable Development (MEDD) since 2010, and also Mr. Cheikh Ould Jiddou and Mr. Mohamed Ould Jiddou representatives respectively of the MEDD and the MPEM who have been members of the Comité de Suivi Restreint since 2008.

Moreover we wish to thank the many other representatives of the MPEM whom we spoke with over the years and who patiently, provided us with the data and the necessary information in order to continue the SESA, in particular the following individuals: Mr. Hamed Salem Ould Tekrou, Director General of Hydrocarbons and Mr. Itawal Oumar Ould Ahmed – Director of Exploration and Production of the MPEM, Mr. Cheikh Sidi Mohamed – Chief of the Petroleum Environmental Service and Mr. Cheikh Zamel, Chief of Geologic and Petroleum Information of the same Ministry.

We also wish to thank Mr. Abacar Ould Amanetoullah – Director of Regulatory Control of the MEDD for his help and valuable contribution to SESA discussions and Mr. Symaya, Head of the Mining Environmental Service of the MPEM.

We also appreciate the help provided by Mr. Samoury Ould Soueidatt – Director of the Coordinating Unit of the Mining Project of the former Ministry of Industry and Mines of the Second Project in Strengthening the Mining Sector of PRISM2 which represented an important focal point of reference throughout the duration of the SESA project.

We equally want to thank the many participants of the Comité de Suivi Elargi for their important contributions, notably the following organizations:

- Institut Mauritanien de Recherches Océanographiques et des Pêches (IMROP) ;

- Program Régional de Conservation de la zone Côtière et Marine ;
- Parc National du Banc d'Arguin ;
- Parc National de Diawling;
- Plan Régional Côtier Marin;
- World Wildlife Fund;
- Communauté mauritanienne de Pêcheurs;
- Fédération Nationale des Pêches;
- International Union for the Conservation of Nature (IUCN);
- Petroleum companies including Société Mauritanienne des Hydrocarbures (SMH), Dana Petroleum, Gaz de France and Petronas;
- Port Autonome de Nouakchott (PANPA);
- Marine militaire et sauvetage en mer;
- Marine marchande;
- Commune de Nouakchott;
- Représentants du Ministère de la Pêche et de l'Economie Maritime et du Ministère de l'Industrie et des Mines ; and
- Representatives of the Mauritanian Senate and Parliamentary Delegation responsible for Environment.

The Project would not have achieved success without the valuable participation of all those to took part in training workshops of 2008 and 2010.

We also wish to thank Mr. Geert Van Vliet, President of the Independent Scientific Panel of Petroleum and Gas Activities in the Islamic Republic of Mauritania for many interesting discussions and fruitful collaboration that took place in 2008.

Finally we are grateful to the Oil for Development Program, established by the Norwegian Development Cooperation Agency for their support of the Petroleum Governance Project who in association with the World Bank financed the project.

We also like to especially thank the professions of the IEL and D'Appolonia team who contributed in a significant manner to the project including: Vittorio Zattra, Erin Swerdfeger, Yaya Pitti, David Berrade, Manjunatha Ranga, Mark Pedersen, Claire Preece, Federico Breda, Giovanni De Franchi, Emma Gordge, Paul Lochner and Maria Rosario de Partidario.

Lastly, but not in the least, we want to express our sincere thanks and gratitude to Mr. Mohamed Ould Wedou Lemghabodje for his excellent work as our representative and local consultant and for

his dedication, punctuality, competence and dedication to completion of those tasks entrusted to him throughout the duration of the Project.

EXECUTIVE SUMMARY

PROJECT CONTEXT

The Republic of Mauritania (RIM) expects to join West Africa's recent energy boom. The discovery of the Chinguetti oil field in 2001 created favourable circumstances for a rapid offshore oil development, thereby raising the country's hopes for oil wealth. This was bolstered in 2006 when the Chinguetti field came into production, while other offshore oil and gas discoveries were also made. Despite these promising initial finds, the favourable conditions for an offshore oil boom in Mauritania have yet to be realized, as production has failed to meet initial expectations.

Similarly, after 35 years of inactivity, drilling is set to start again in the innermost part of the country. While it is still early to tell, promising oil and gas plays in both the onshore and offshore may yet renew the promise of Mauritania becoming a global energy player.

The Government of RIM has recognized the importance of strengthening the legal and regulatory framework and improving environmental governance in response to rapid growth of the oil and gas sector. Preparation of a Strategic Environmental Assessment (SEA) is one tool to help ensure that oil and gas development will proceed in a sustainable manner in accordance with best international environmental and social practice and standards.

SESA OBJECTIVES

In March 2008, the D'Appolonia-Integrated Environments (2006) Ltd. team (D'Appolonia-IEL) was awarded a contract to initiate a Strategic Environmental and Social Assessment (SESA) process for the Government of Mauritania based on a draft development policy for oil and gas exploration and production (E&P) operations in both offshore and onshore areas.¹

The objectives of the SESA are as follows:

- To identify the social and environmental impacts which could be generated by oil and gas development, evaluating the scope and probability of these impacts due to increased activities in the onshore and offshore;
- To put forward recommendations to avoid, manage and/or attenuate these impacts;
- To facilitate the integration of these measures into a coherent policy and to ensure its application; and
- To help in capacity building and training of Government officials in the management oil and gas sector impacts, in particular the Ministries of Environment and Petroleum, Energy and Mines.

¹This document is referred to as a SESA Strategic Environmental and Social Assessment rather than a Strategic Environmental Assessment (SEA) to highlight the importance of social issues in Mauritania

The expected outcome of the SESA will be a series of concrete measures for the hydrocarbon sector to meet the needs for environmental protection, ensure the well-being of local populations and identify clear institutional responsibilities for government, private sector and civil society.

SESA METHODOLOGY

The methodology employed in the SESA was derived from the SESA terms of reference, input from the SESA team and interaction with Mauritanian counterparts and from best SEA practice. The Project involved the following activities:

- Gathering of environmental and social baseline data to determine key environmental and social impacts related to oil and gas development;
- Defining two trend scenarios for oil and gas development onshore and offshore; which were used to develop strategic recommendations;
- Identifying key SESA challenges;
- Preparing key recommendations; and
- Developing a SESA Action Plan.

KEY FINDINGS

Key findings of the SESA are as follows:

Institutional, Legal and Regulatory Framework

- The roles and responsibilities of the Ministry of Environment and Sustainable Development (MEDD) and its inter-institutional coordination with other ministerial departments are not clearly defined. Additionally, there is a lack of coordination and capacity for the implementation of effective EIA processes.
- Institutional development for sector management by the Government of RIM and associated education and skills development face significant challenges.
- There is the need to support the growth of indigenous (in-country) technical and professional skills and to develop training institutions for development of programs focused on technical skills development for the oil and gas industry.
- There is an incomplete legal framework in Mauritania that sets overarching strategy and sectoral policy for oil and gas sector development, including intentions regarding environmental management. The regulatory framework regarding compliance performance in relation to specific regulations is also not well developed. The framework also does not account for biodiversity considerations or uniformity of EIA requirements.
- There is a lack of consistency and uniformity in the quality of EIAs submitted for oil and gas projects.

- Independent of the future level of E&P activity the country may face in the short and long term period, the core responsibility of RIM Authorities is to implement an overarching policy aimed to promote and govern development of Mauritania's oil industry.
- Implementation of an overarching legal and regulatory framework for the oil industry is of prime importance to the successful development of domestic hydrocarbon resources, while not compromising the integrity of the natural, social and cultural environments.

Oil and Gas Development Context

- There is a high degree of uncertainty regarding the actual Mauritania onshore and offshore hydrocarbon potential reserves; however a certain potential, to be further confirmed, can be recognized at present.
- Exploration of Taoudeni Basin is at a very early stage. There has been no production to date onshore and large portions of onshore acreage remain unexplored.
- International oil industry presence in the country is not well established at present. Variable interest has been shown.
- Political instability and a lack of a clear regulatory process may have further jeopardized foreign investment.
- There is a lack of permitting or a regulated system for control of discharges to air, soil and water and a management process for disposal of municipal and industrial wastes. Constraints on oil and gas development were recently introduced within the national parks, but not in other environmentally sensitive areas.
- There is also a lack of, or apparent inconsistency, in the application of best management practices for the onshore, in particular for remote areas. Furthermore, there are no restrictions or limitations to operations in protected areas e.g. World Heritage sites.
- In the absence of significant additional finds, current offshore production in RIM is projected to last no more than 10-20 years.
- The country's long-term economic health is highly dependent on functioning coastal and marine environments. If not properly managed, development of the offshore oil sector could affect the marine environment, and both the artisanal and industrial fishery activity.
- There is a lack of clear understanding regarding impacts of the oil and gas industry on fisheries. There is no definition of sensitive areas off limits to oil and gas development, or "no go" zones outside of the National Parks.
- There is a lack of institutional capacity in both the MPEM and MEDD regarding assessment of environmental and social impacts relating to offshore oil and gas operations. EIA does not appear to be done on a regular basis for all phases of oil and gas development, e.g. seismic operations.
- There is no capability at the national level to respond to a major oil spill.

SESA ACTION PLAN

Based on the analysis conducted, a series of recommendations were developed, along with an Action Plan to facilitate their implementation. Priorities were structured into immediate, short term (1-2 years) and medium term (3-5 years).

Priority 1: Immediate Action (2011-2012)

Streamline Environmental Roles and Responsibility

It is recommended that the Government of Mauritania take steps to more clearly define the institutional structure for environmental management, whereby MEDD is the competent authority responsible for establishing the national environmental policy, while sectoral environmental departments within other ministries are responsible for the policy's implementation and sectoral regulation. In addition, a National Environmental Agency (NEA) should be established to ensure effective follow-up, monitoring and compliance with established government policy and legal instruments. The NEA is to be part of MEDD.

Improve the Management of the Environmental Impact Assessment (EIA) Process

It is recommended that a dedicated environmental unit be established within MEDD to manage EIA proceedings for the oil and gas industry resulting from general authorization processes approved by MPEM.

Establish the National Environmental Agency Dedicated to Monitoring and Follow-up Beyond Environmental Approval

It is recommended that a National Environmental Agency is established under the control of MEDD. The NEA shall be charged with developing an auditing and compliance function to ensure conformance of the oil and gas industry with newly developed guidelines and regulations.

Extend Role of the Comite de Suivi in SESA Implementation

It is recommended that the role of the Comite de Suivi (SESA Project Coordinating Committee, or Inter-Ministerial Council) be extended from 2011-2012, and beyond, to act as an overall coordinating body of the SESA.

Implement Comprehensive Environmental, Health, Social and Safety Training Across All Phases of Oil and Gas Development

It is recommended that the Comite de Suivi become the central coordinating body for training and capacity building. A cross-ministry training assessment should be done followed by a training plan.

Improve the Policy, Legal and Regulatory Framework Governing Oil and Gas Activities

The Government of Mauritania needs to develop an appropriate Policy aimed to promoting the safe exploitation of the domestic hydrocarbon potential reserves, whilst preserving the environment and the civil society from potential damages. To this end, it is necessary that oil development policy include the coordinated review of the general existing rules (e.g. the environmental, the contract code and the marine pollution codes) supplemented and integrated by the implementation of relevant decrees to make the legal framework fully operational. In particular, MEDD needs to fully

implement the EIA law with a set of clear regulations and procedures, while improving internal capacity to carry out evaluation, permitting, monitoring and compliance.

A Comprehensive Approach to Oil Spill Prevention and Response Should be Implemented

A large portion of Mauritania's national economy is dependent on fishing and there is vital interest in preventing an incident similar to the Deepwater Horizon drilling rig explosion and subsequent oil spill. A key list of actions can be implemented to ensure safe offshore operations, including: Ensure Responsible Licensing; Introduce a Specific Regulatory Regime for Offshore Operations; Establish Strict Liability Regimes; Enhance Industry Cooperation and Response Mechanisms for Offshore Accidents; Introduce a New Model for Public Oversight; Encourage Regional Cooperation; and Address Gaps of International Law on Marine Pollution at the National Level.

Finalize Development of a National Oil Spill Contingency Plan

A national authority for oil spills under the direction of the Ministry of Transport, in coordination with the Ministries of Environment and Fisheries should be established. Contingency measures for Class II and Class III spills, both in the terrestrial and marine environment, should be developed.

Develop a Marine Strategy to Ensure Sustainable Use and Avoid Conflicts with Oil and Gas Operations

A Marine Strategy should be developed as an action plan for applying an ecosystem-based approach to the management of human activities and, in particular to oil and gas activities.

In order to reduce the risk of possible detrimental effects to the areas of the Banc d'Arguin National Park and Diawling National Park, the Government shall also consider establishing a moratorium of E&P activities in those blocks surrounding protected areas.

Linkages with the Mauritania Poverty Reduction Strategy Paper (PRSP or CLSP)

The SESA findings and scenarios for oil and gas development should be integrated with strategic actions of the PRSP in order to make full use of actual oil industry incomes. Key environmental and social issues arising from the SESA should also be closely linked with socio-economic considerations and strategies developed within the PRSP.

Priority 2: Short-term Action (2012-2013)

Establishment of a Dedicated Spatial Information System to Assist in the Integrated Planning of Oil and Gas Activities

The Government should move towards establishing a centralized spatial information system for oil and gas activities to track, store and disclose all regulatory submissions.

Undertaken Coordinated Spatial Planning to Avoid Land and Resource Conflicts with the Oil and Gas Industry.

Planning and administrative measures are recommended in order to promote coordination of oil and gas activities with other land uses. Adoption of these measures should use cumulative effects assessments to identify potential conflicts with other resource development, and present a coordinated zoning process amongst affected parties.

The Government of RIM Should Work With Governments of Other Oil Producing Countries

It is recommended that a Regional SEA Cooperation Initiative for the African Extractive Industry be established to disseminate and share the results of the SESA and other SEAs underway for different sectors in Africa.

Establish a Trust Fund for Biodiversity Conservation

It is recommended that Mauritania establish a Conservation Trust Fund, similar to others in use in West Africa.

Establish Environmental Damage Liability Provisions for Oil and Gas Operations

It is recommended that the Government of Mauritania should ensure necessary provisions are in place concerning liability for environmental damage caused by oil and gas operators. The 'Polluter Pays Principle' should also be incorporated as one of the guiding principles for allocating liability for environmental damages. An obligation should be put in place an obligation to subscribe to an insurance policy, bond or other financial instrument to cover environmental damages resulting from spills, blowouts and other accidents that may occur during E&P operations.

The Government of RIM Work with Oil and Gas Operators to Improve the Consultation and Community Engagement Process for Oil and Gas Projects

At the present time, the need for consultation for oil and gas projects is included in environmental assessment legislation, but consultation is not necessarily undertaken in all cases. Environmental assessment reports should not be approved without inclusion of the public consultation process and its results. Consultation regarding oil and gas operations in Mauritania should be undertaken in a culturally appropriate manner, taking into account local customs, ethnic background, approach to business interactions, knowledge of extractive industries and their effects.

Priority 3: Medium to Long-term Action (2012-2015)

Create a Mauritania Operators Group to Coordinate Implementation of Best Practice Standards for Oil and Gas Operations

Oil and gas operators should form a Mauritanian Association of Petroleum Producers to work with the national government to improve the legal, regulatory, social and operative frameworks for the oil and gas industry. The association could also act as a central lobbying industry group to government, a practice common in many oil producing countries.

The Government of RIM Should Implement a Transparent Revenue Collection and Distribution System to Share the Benefits of Oil and Gas Development with Local Communities

It is recommended that the Government of Mauritania continue to implement a transparent revenue collection and distribution program and work with communities and individual oil and gas operators to maximize community development programs. This can also form part of Mauritania's commitment to becoming an EITI Compliant Country.

Ensure Linkages to Wise Use of Water

With particular reference to onshore operations, the oil and gas sector should develop a water management strategy that links directly to AGIRE and PANAGIRE. The strategy should aim to commit the oil and gas sector to conserve water usage in its activities, to develop strategies for water

sourcing and to minimize the use of potable water sources, to ensure that there are no conflicts with other water users and to promote use of recycled water.

Action Plan Cost Estimate

The costs associated to the full implementation of SESA work plan are:

Priority 1 activities	2.76 Million USD
Priority 2 activities	0.88 Million USD
Priority 3 activities	0.28 Million USD

Realistically, it will not be possible to implement all measures suggested in this Action Plan due to cost and resource limitations. Therefore, it is recommended that the following three key Priority 1 measures be implemented immediately.

R4: Support for Comite de Suivi in SESA implementation	\$390,000
R1 : Streamlining environmental responsibility	\$150,000
R3: Establish National Environmental Agency	\$400,000
TOTAL	\$940,00 US\$

The rationale for this decision is as follows:

- Without support for the Comite de Suivi, there will be no realistic implementation of the SESA.
- There is a need to realign responsibilities and priorities within MEDD and sectoral departments in other ministries to clearly delineate responsibilities for environmental approvals and licensing. This also includes creation of a National Environmental Agency.
- The creation of a National Environmental Agency is recommended as a means of establishing a monitoring and follow-up capacity for oil and gas activities. This NEA should be established as part of realignment of environmental responsibilities but given the current low level of oil and gas activity in Mauritania this should be done at a modest level, but fully coordinated with other ongoing responsibilities on MEDD.

STRATEGIC ENVIRONMENTAL AND SOCIAL ASSESSMENT (SESA) OF THE OIL & GAS SECTOR IN MAURITANIA

PART A: STRATEGIC DIRECTIONS AND RECOMMENDATIONS

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ABBREVIATIONS

AGIRE	Integrated Water Resource Management Support Project (Aménagement et Gestion Intégrée des Ressources en Eau)
BOE	Barrel of Oil Equivalent
BPD	Barrels Per Day (also bls/day)
CEN	European Committee for Standardization
CENELEC	European Committee for Electrical Standardization
CLC	Civil Liability Convention, 1992 and the Compensation Fund IOPC
E&P	Exploration and Production
EIA	Environmental Impact Assessment, now often EA
EIR	Extractive Industry Review
EITI	Extractive Industries Transparency Initiative
ESA	Environmental and Social Assessment, the current preferred term
EHS	Environment, Health and Safety
FIPOL	Fonds Internationaux d'indemnisation pour les dommages dus à la pollution par les hydrocarbures, see IOPC
FPSO	Floating Production, Storage and Offloading Vessel
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GoM	Government of Mauritania, see RIM
GTEE	Technical Committee Environment and Sustainable Development (GTEE) (Groupe Technique pour les Evaluations Environnementales)
GTZ	German Society for Technical Cooperation
HSE	Health, Safety and Environment
IAIA	International Association for Impact Assessment
IFC	International Finance Corporation
IMO	International Maritime Organization
IOPC	The International Oil Pollution Compensation Funds (See CLC and FIPOL)
IPIECA	The global oil and gas industry association for environmental and social issues
IUCN	International Union for the Conservation of Nature
IMROP	The Mauritanian Institute of Oceanographic and Fishery Research
MARPOL	International Convention for the Prevention of Pollution from ships
MEDD	Ministry of Environment and Sustainable Development

MPEM	Ministry of Energy and Petroleum
MIM	Ministry of Industry and Mines
MPEM	Ministry of Petroleum Energy and Mines (current)
NCEA	Netherlands Commission for Environmental Assessment
NEA	National Environmental Agency
NGO	Non-government Organization
OECD	Organization for Economic Cooperation and Development
OSERP	Oil Spill Emergency Response Plan
OSPAR	The Oslo and Paris Commission and Convention for the Protection of the Marine Environment of the North-East Atlantic
PANAGIRE	National Action Plan for the Integrated Water Resource Management (Plan d'Action National Pour la Gestion Intégrée des Ressources en Eau)
PNBA	National Park of Banc d' Arguin
PFW	Produced and Formation Water
POLMAR	Pollution Marine French Government's Oil Spill Response Procedures
PRISM-2	Project of Strengthening of the Institutions of the Mining Sector
PRSP	Poverty Reduction Strategy Program
PSA	Production Sharing Agreement
RIM	Islamic Republic of Mauritania
SEA	Strategic Environmental Assessment of a sector or program, not of a project
SESA	Strategic Environmental and Social Assessment
SMH	Société Mauritanique des Hydrocarbures
TOR	Terms of Reference
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
WB	World Bank
WWF	World Wildlife Fund

GLOSSARY OF TERMS

Adaptive management	The implementation of new or modified mitigation measures in response to an unanticipated environmental effect.
Baseline	A description of the biophysical and socio-economic state of the environment at a given time, prior to development of a particular project.
Biodiversity	The variety of life on earth.
Biophysical	Pertaining to the natural environment.
Contamination	Pollution.
Conservation	The preservation of natural resources for use by future generations.
Consultation	A process of communication with those potentially affected by a project, policy, plan or program.
Cumulative effects	Changes to the environment that are caused by an action in combination with other past, present and future actions.
Endangered species	An animal or plant in danger of extinction.
Environment	The combination of elements whose complex interrelationships make up the settings, surroundings and conditions of life of the individual and society as they are or are felt.
Ecosystem	An interconnected and symbiotic grouping of microorganisms, fungi, plants and animals.
Environmental audit	An environmental management tool consisting of a periodic and objective evaluation of an organization and installations to assess compliance with regulatory and other requirements, as defined by audit criteria.
Environmental impact assessment	A critical evaluation of the likely effects of a project on the environment, including the prescription of mitigation and management actions.
Environmental management plan	A comprehensive plan for the implementation of mitigation measures prescribed in the environmental impact assessment.
Fauna	The total animal population in a given area.
Flora	The total vegetation assemblage in a given area.
Global warming	The increase in average temperature of the surface of the earth.
Groundwater	Water found beneath the Earth's surface.
Habitat	The home of a plant or animal.
Impact	The consequence of an action or activity on the human or natural

	environment. Impacts may be positive, negative or neutral.
Issue	A question or concern regarding an environmental impact, consequence or effect.
Mitigation	Prescribed actions taken to prevent, avoid, reduce or minimize the impacts, or potential adverse effects, of a project.
Monitoring	A combination of observation and measurement to assess the environmental and social performance of a project and its compliance with the EIA/EMP, or other approval and regulatory conditions.
Proponent	The proposer, or applicant, of a project.
Protected Area	A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
Risk	The likelihood of occurrence of an adverse project effect.
Scoping	A tool to assess, evaluate and prioritize relevant issues or concerns arising from a project.
Screening	Process to assess which projects require an environmental impact assessment and to what extent.
Social impact assessment	A component of EIA that assesses the impacts of a project, policy, plan or program on people and society.
Stakeholder	Someone who has an interest in the outcome of a project, or a decision affecting them.
Strategic Environmental Assessment	A systematic process for evaluating the environmental consequences of proposed policy, plan or program initiatives in order to ensure they are fully included and appropriately addressed at the earliest appropriate stage of decision-making on par with economic and social considerations.
Water quality	A measurement of the purity of water, or drinking water.
Wetland	An area of land saturated with water that has high biodiversity importance.

1. PROJECT BACKGROUND

1.1 BACKGROUND AND CONTEXT

The Republic of Mauritania (RIM) expects to join West Africa's recent energy boom. The discovery of the Chinguetti oil field in 2001 created favourable circumstances for a rapid increase in offshore oil exploration, thereby raising the country's hopes for oil wealth. This was bolstered in 2006 when the Chinguetti field came into production, while other offshore oil and gas discoveries were also made. Despite these promising initial finds, the favourable conditions for an offshore oil boom have yet to be realized, as production has failed to meet initial expectations.

Similarly, after 35 years of inactivity, drilling is set to start again in the innermost part of the country. While it is still early to tell, promising oil and gas plays in both the onshore and offshore may yet renew the promise of Mauritania becoming a global energy player.

Independent of the actual hydrocarbon potential of the country, weak institutional structures and lack of local competence pose major challenges for Mauritania to effectively manage its petroleum resources. As a result, the Government of RIM has recognized the importance of strengthening the legal and regulatory framework and improving environmental governance in response to rapid growth of the oil and gas sector.

The implementation of a Strategic Environmental Assessment (SEA) was recognized as the most useful tool for managing the social and environmental effects of offshore hydrocarbon development early on in 2006 (Goodland 2006).

In 2007, the Government of the RIM acted on this recommendation to undertake a SEA of the hydrocarbon sector to ensure that oil and gas development will proceed in a sustainable manner, in accordance with best environmental and social practice and standards.

In March 2008, the D'Appolonia-Integrated Environments (2006) Ltd. team (D'Appolonia-IEL) initiated a Strategic Environmental and Social Assessment (SESA) process for the Government of Mauritania based on a draft development policy for oil and gas exploration and production (E&P) operations in both offshore and onshore areas.² This report summarizes the finding of the SESA process and provides a number of recommendations for the successful implementation of strategic directions for the oil and gas sector.

1.2 SEA TERMS OF REFERENCE (TOR)

A terms of reference (TOR) for a strategic environmental assessment of oil and gas activities in Mauritania was first proposed by GTZ (Goodland 2006). In 2007, the NCEA provided advice on the Terms of Reference for the Strategic Environmental Assessment of Oil and Gas Development and Coastal Management - Mauritania and later, a review of the Environmental Impact Statement and

²This document is referred to as a SESA Strategic Environmental and Social Assessment rather than a Strategic Environmental Assessment (SEA) to highlight the importance of social issues in Mauritania

the Social Impact Study for the Chinguetti Offshore Oil Development Project (Commission for Environmental Impact Assessment 2006; Commission for Environmental Impact Assessment 2007).

A formal Term of Reference for the SESA project was subsequently developed in September 2007 by the Government of Mauritania (République Islamique de Mauritanie (RIM) 2007). This initial TOR formed the basis for project bidding and subsequent consultant selection to complete the SESA project. Subsequently, the project was put on hold for 15 months due to a coup d'état. A revision to the terms of reference to include onshore oil and gas considerations was later made in December 2009 as part of the project reactivation plan.

1.3 SESA OBJECTIVES

As defined in the revised terms of reference, the objectives of the SESA are as follows (République Islamique de Mauritanie (RIM) 2007):

- To identify the social and environmental impacts which could be generated or induced by oil and gas development, including evaluating the scope and probability of these impacts due to increased exploration and exploitation activities in RIM, in particular the offshore zones;
- To put forward suitable and feasible recommendations intended to avoid, manage and/or attenuate these impacts;
- To facilitate the integration of these measures into a coherent policy and to ensure its application; and
- To help in capacity building and training of Government officials in the management of sectoral impacts, in particular the Ministries of Environment and Petroleum.

The results of the SESA will be a series of concrete, practical measures for environmental protection within the hydrocarbon sector while ensuring the well-being of local populations, identifying clear institutional responsibilities for the government, the private sector and non-government organizations.

1.4 VISION FOR SUSTAINABLE MANAGEMENT OF THE MAURITANIAN OIL AND GAS SECTOR

The vision for sustainable management of energy development in Mauritania is articulated in the project terms of reference (République Islamique de Mauritanie (RIM) 2007):

“The Government of the RIM, conscious that the activities of exploration and exploitation of oil and natural gas can have significant impacts on the environment and on the traditional communities which live near the perimeters of exploration or exploitation, has developed and put in place a strategic vision to define the portions of the territory of Mauritania which will be open to oil contracts, the conditions of such agreements and the procedures of decision-making. It is certain that the Mauritanian economy will pass by a period of important transformation because the exploitation of the offshore discovered oil and the strategic vision that will be likely to emerge and facilitate the passage to an oil economy. This can have substantial effects on the fisheries sector, which constitutes for the moment the principal industry branch of the country.”

Indeed, the hydrocarbon policy of the Government of the RIM is centered on the promotion of private investment for the exploration and exploitation of oil and gas resources. In order to support the implementation of this policy, the RIM government obtained financing from the World Bank in the form of a supplemental credit to the Mining Sector Institutional Strengthening Project (PRISM-2). In addition, the Government obtained a credit from the Islamic Development Bank, and from the Norwegian technical assistance co-operation program. Project financing covered the following components of the hydrocarbon sector:

1. Improvement of the legal – regulatory and contractual framework;
2. Institutional capacity building in this sector;
3. Environmental and social management;
4. Data management and land register; and
5. Evaluation of sectoral strategies.

The development of these activities will be largely positive, but has the potential to generate negative socio-economic impacts on underprivileged or vulnerable groups and potential negative environmental impacts. These impacts should be fully evaluated and properly mitigated to ensure the sustainable management of the country's hydrocarbon and other natural resources.

1.5 PROJECT TEAM

The core SESA Team consists of two companies, D'Appolonia SpA. of Italy and Integrated Environments (2006) Ltd. of Canada. In addition, CSIR, South Africa also assisted in public consultation.

Key individuals in the team are as follows:

- Marcello Iocca – Project Manager;
- Miles Scott-Brown – Co-Project Manager;
- Mohamed Wedou – In-country Representative;
- Vittorio Zattra– Legal and institutional;
- Mark Pedersen – Fisheries and Marine Environment;
- David Berrade, Claire Preece, – Social;
- Emma Gordge, CSIR – Public Consultation;
- Maria de Rosario Partidario – SEA training and project review;
- Joseph Wells, Federico Breda, Erin Swerdfeger, Manju Ranga and Ralohn Hunt – Technical assistance; and
- Samantha Sapienza – Translation and editing.

1.6 COMITE DE SUIVI

The Coordination Unit of the Institutional Strengthening Project of the Mining Sector (PRISM-2) for the Ministry of Industry and Mines (MIM) (now MPEM) has represented the contractual counterpart of the D'Appolonia-IEL Team. However the dialogue, preparation and follow-up required for the execution of the study has been ensured by an Inter-ministerial Steering Committee (Comite de Suivi Restreint) created by decree. The Steering Committee was appointed by an Inter-Ministerial Decree n. 1636 of July 13 2007.

Since 2007, the initial composition of the Comite de Suivi Restreint, now called Comite de Suivi, changed. At the time of project reactivation in 2010, members of the Comite de Suivi included the following:

- Mr. Cheikh Ould Khaled, President of the Comite de Suivi since 2007 and representing the Ministry of Transportation;
- Mr. Mohamed Yeslem Ould Amhed representing the MPEM since 2007; and
- Mr. Cheikh Ould Tourad representing the MEDD since 2010.

The Comite de Suivi is tasked to approve the following:

- Overall SESA process and work plan;
- SESA contents;
- Draft report; and
- Monitoring, assessment and implementation of the final SESA results.

To assist the Comite de Suivi in these functions, a group of representatives was assigned by the government from IMROP, IUCN, PRCM, Banc d'Arguin and Diawling National Parks and also from the fishing community. This group of experts was further expanded with representatives of other national institutions, civil society and the private sector, to form the Comite de Suivi Elargi (Comite Elargi). The Comite Elargi represents the public consultation component during the public review phases of the SESA process.

The MPEM has been assigned Secretariat duties for the Comite de Suivi.

1.7 PUBLIC CONSULTATION

Regular consultations with the Expanded Steering Committee (Comite de Suivi Elargi) were held throughout the SESA process.

The Expanded Steering Committee was established along with the Steering Committee by joint inter-ministerial decree (Decree n. 1636 of 13/7/2007) to support the Steering Committee activities and represent stakeholders during public consultation.

List of organizations, institutions, NGOs and civil society and communities representatives in the Expanded Steering Committee included the following:

- Mauritanian Oceanography and Fishery Research Institute (IMROP);
- Regional Conservation Program for Marine and Coastal areas (PRCM);
- National Park of Banc d'Arguin;
- National park of Diawling;
- Representatives of Marine Regional Coastal Plan;
- World Wildlife Fund;
- Representatives of the fishermen community;
- National Federation of Fishery;
- International Union for the Conservation of Nature (IUCN);
- Petroleum companies including Société Mauritanienne des Hydrocarbures (SMH), Dana Petroleum, Gaz de France and Petronas;
- Harbour Authority of Nouakchott;
- Mauritanian Navy and Sea Rescue;
- Municipality of Nouakchott;
- Representatives of Ministry of Fishery and Maritime Economy;
- Representatives of Ministry of Industry and Mines;
- Representatives of Ministry of Transport; and
- Representatives of the Mauritanian Senate and Parliamentary Delegation responsible for Environment.

Meetings with the Expanded Steering Committee were not explicitly open to public participation. Stakeholder representation was assured by the Steering Committee, responsible for preparation of meeting invitation lists.

Consultations with the stakeholder were carried out through four meetings with the Expanded Steering Committee and two workshops as shown in Table 1-1.

Table 1-1: List of SESA Consultation Meetings 2008 - 2010

Meeting Dates	Location	Objectives
19 March 2008 (1 st Team in-country visit)	MPEM Nouakchott	Open dialogue with stakeholder; SESA scoping; Brainstorming on oil & gas related issues.
21 May 2008 (2 nd Team in-country visit)	MPEM Nouakchott	Present, discuss and approve the SESA Final Work Program
21-22 July 2008 SESA 1 Workshop (3 rd Team in-country visit)	Hotel Tfeila Nouakchott	What is SEA; Approach to SEA; SEA and Sustainability; Strategic framework for SEA; Case Studies; Attendees exercitation
14 April 2010 (4 rd Team in-country visit)	MPEM Nouakchott	Present SESA Draft Report; Present preliminary SESA key findings and recommendations.
18-19 April 2010 SESA 2 Workshop (4 rd Team in-country visit)	Hotel Wissal Nouakchott	Recall SEA principles; SESA preliminary results and strategic approach; Key decision factors; Strategic decision making; Attendees exercitation
22 February 2010 (4 rd Team in-country visit)	MPEM Nouakchott	Present Final SESA Report; Present and discuss final SESA key findings and recommendations; Present and discuss SESA Action Plan and Budget.

Most of the stakeholder participants in the Expanded Steering Committee also attended two workshops held in 2008 and 2010 as part of training on the SESA process. The main objective of these workshops was to maximize the SESA benefits by involving institutions in the process.

The results of the group exercises and workshops during these two training sessions provided the SESA Team with important and significant contributions of project stakeholders.

Stakeholder participation to Expanded Steering Committee meetings varied with time; in general, in reduced stakeholder participation was observed in 2010-2011.

1.8 SESA METHODOLOGY

Strategic environmental assessment is an important tool in integrating environmental considerations into the development and adoption of certain Plans, Policies, and Programs (PPP), which can have significant impacts on the natural and human environments. SEA ensures that impacts related to the implementation of these plans, policies and programs will be taken into account during planning phases, prior to adoption and implementation of the PPP.

Mauritania has yet to adopt a general policy regarding oil and gas development, and of energy resource use in general. Between 2010 and 2011, the government adopted several pieces of legislation aimed at regulating petroleum industry activities. However, despite this initiative, no plans or programs have yet been adopted, or are in the process of being adopted, in order to implement this policy. For this reason, the SESA methodology has been modified to take into account the lack of specific sectoral plans and programs, or an overarching policy on which to base the SESA process.

In this context, the Mauritania SESA is considered strategic, as it attempts to evaluate important factors, risks, opportunities, and constraints related to oil and gas development, which could have implications for environmental and social management.

This section describes the approach to the SESA and the methodology employed in its development and in the production of the final report.

A number of underlying key assumptions were made at the initiation of the SESA process as follows:

- Strategic environmental assessment is not a product or report, but a process with defined outputs throughout. Although a report on the results has been produced, the implementation and follow-up of SESA recommendations will be critical to the success of its adoption by the Mauritanian government.
- While the SESA has been led by the project team, it is an interactive process with stakeholder engagement and involvement in key decisions throughout its development. The contribution of key Mauritanian counterparts formed an important input in the development of the SESA.

The methodology employed in the SESA process was derived from the SESA terms of reference, suggestions and ideas from the SESA team and interaction with Mauritanian counterparts (Comite de Suivi) and modified from best SEA practice references (Dalal-Clayton and Sadler 2005); (OECD 2006); (Partidário 2007; Partidário n.d.).

The overall SESA process is shown in Figure 1-1: *The SESA Process*. A general schematic showing the approach and methodology employed in the Mauritania oil and gas sector SESA is shown in Figure

1-2: *Schematic of the Approach and Methodology Employed in the SESA of the Oil and Gas Sector in Mauritania*, as described by its three key phases: compile, assess and review. The following sections describe activities undertaken in each phase.

Figure 1-1: The SESA Process

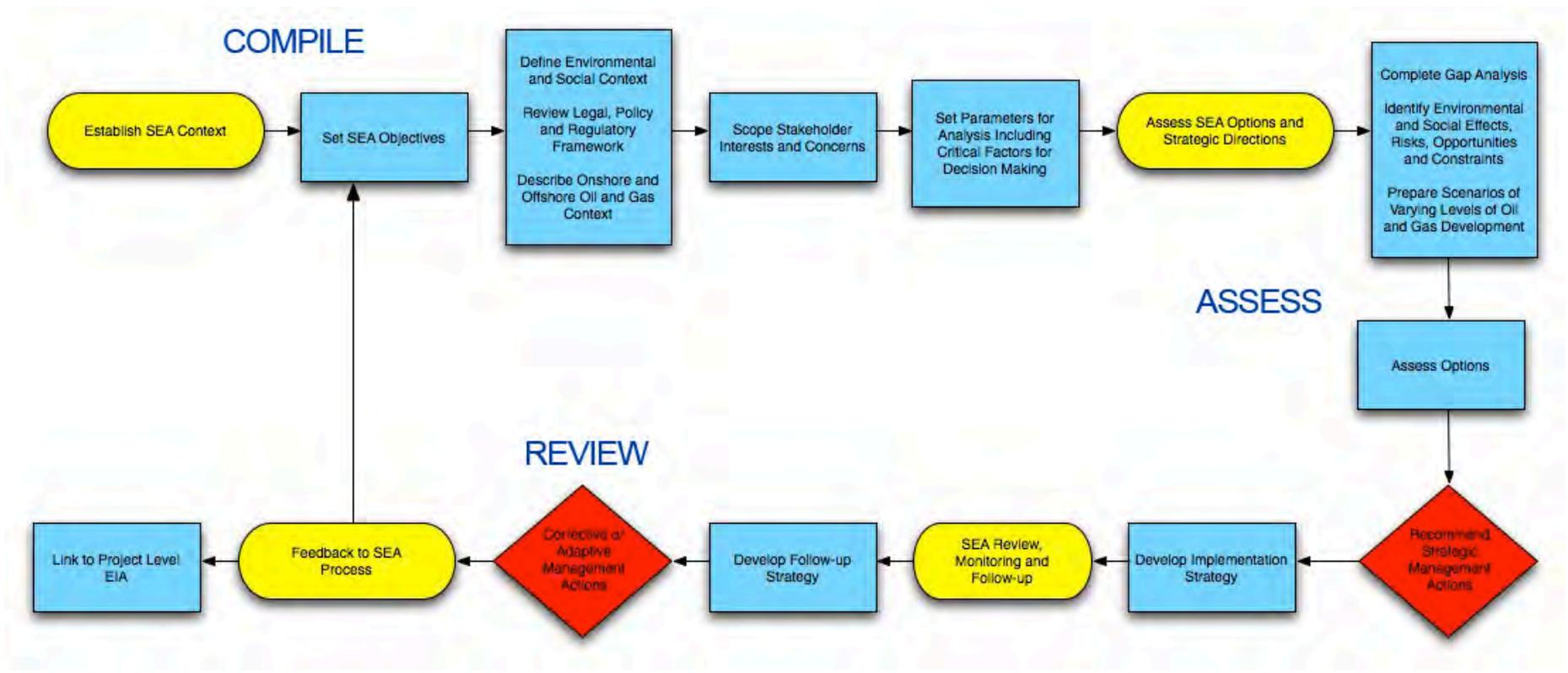
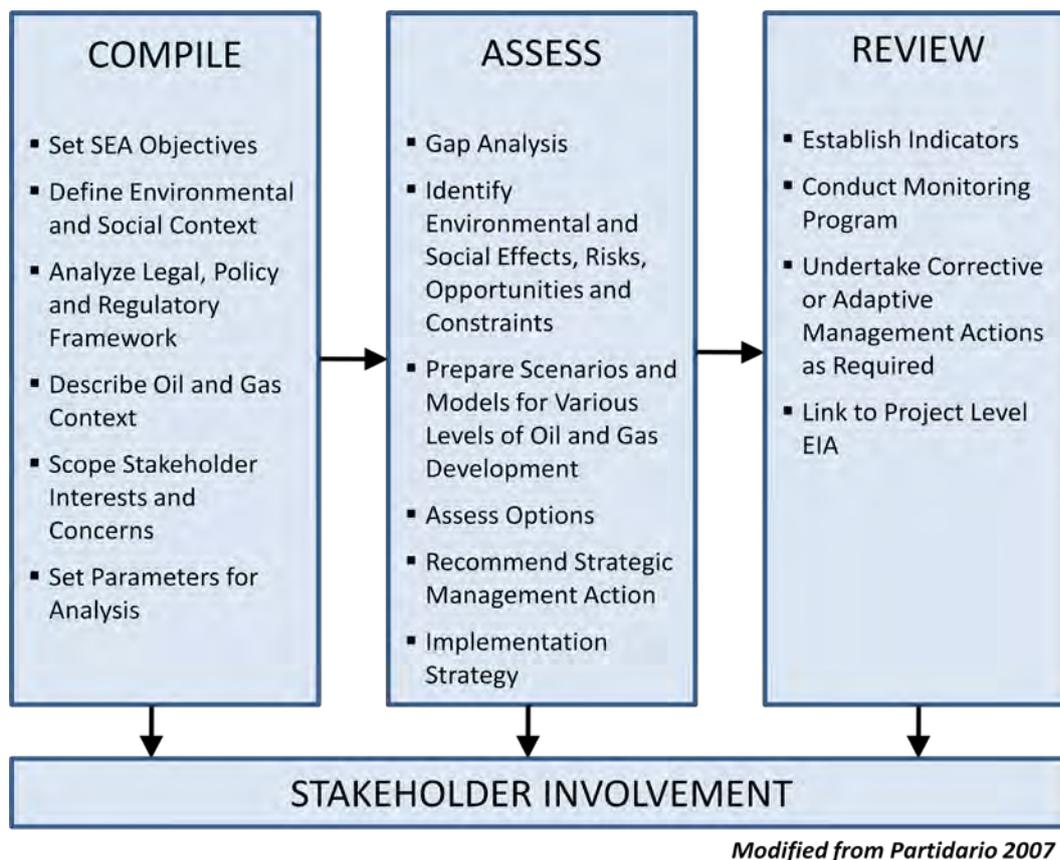


Figure 1-2: Schematic of the Approach and Methodology Employed in the SESA of the Oil and Gas Sector in Mauritania



RELATIONSHIP OF SESA TO OTHER TYPES OF ENVIRONMENTAL ASSESSMENT

1.8.1 COMPILE

This first stage includes the definition of a series of factors, which do not necessarily need to be linked, to establish the fundamental elements required to complete the SESA.

A first key component of the initial process was to establish a key set of objectives and goals related to development of oil and gas resource potential in Mauritania. These objectives and goals were framed by a key series of questions and corresponding desired outcomes, or from key strategic objectives, as follows:

- How can the use of natural resources be maximized in Mauritania while preserving environmental and social integrity at the same time?
- How can economic and social growth in Mauritania be promoted in accordance with sustainability principles?
- How can unforeseen detrimental environmental and social effects, or impacts, be prevented resulting from poor governance and management practices?

- How can effective stakeholder participation and involvement be incorporated into resource management decisions?
- How can the scale and pace of Government reform in Mauritania be aligned with the scale and pace of oil development in Mauritania?
- What is the future potential for oil and gas development in Mauritania and what corrective or mitigation actions are needed to manage this change?
- How can mitigating changes be monitored and responded to in order to allow for immediate corrective feedback action?
- How can all parties involved in or affected by oil and gas development in Mauritania be engaged throughout the SEA process?

KEY STRATEGIC OBJECTIVES

During initial engagement sessions with Mauritanian counterparts in 2008, a number of key objectives were developed regarding the SESA. These are listed in Table 1-2.

These key objectives formed the basis for the formulation of key critical decision factors that need to be considered during development of the strategic management actions presented in Chapter 5.

Table 1-2: Key Strategic Objectives for the Mauritanian SESA

Component	Strategic Objectives
Water	<ul style="list-style-type: none"> ▪ Protect quality of surface fresh water and groundwater ▪ Protect surface water and aquifer resources ▪ Ensure sustainable water resources management ▪ Protect and preserve marine water quality ▪ Prevent conflicts over water use, quality and quantity
Air	<ul style="list-style-type: none"> ▪ Enhance and/or maintain air quality ▪ Control GHG and pollutant emissions to acceptable standards
Geology and soils	<ul style="list-style-type: none"> ▪ Protect quality of seabed and sediments ▪ Preserve the hydrogeological environment ▪ Maintain / recover / improve soil quality
Biotic resources, biodiversity, habitats, flora and fauna	<ul style="list-style-type: none"> ▪ Preserve marine and terrestrial ecosystems and their biodiversity ▪ Preserve critical habitats and protected or endangered species ▪ Preserve fish stocks at sustainable harvest levels ▪ Protect and conserve coastal and marine areas ▪ Ensure that protected areas (e.g. parks) are not affected by oil and gas development ▪ Contribute to conservation of wildlife and wildlife habitats ▪ Implement an effective monitoring program
Social - economic	<ul style="list-style-type: none"> ▪ Preserve social structure integrity ▪ Sustain and enhance commercial and artisanal fisheries ▪ Enhance community development ▪ Ensure benefits from oil and gas development, not impacts ▪ Protect vulnerable groups
Health and safety	<ul style="list-style-type: none"> ▪ Prevent disruption, disturbance and nuisance to communities ▪ Ensure public and community safety in areas of oil and gas operations ▪ Ensure a safe work environment for oil and gas operators and employees
Institutional, legal and regulatory	<ul style="list-style-type: none"> ▪ Implement inter-institutional co-ordination ▪ Reduce and remove institutional barriers and duplication of effort ▪ Improve institutional capacity and training ▪ Establish clear, practical regulatory standards ▪ Implement an efficient environmental assessment process ▪ Implement monitoring, follow-up and compliance initiatives
Risk management	<ul style="list-style-type: none"> ▪ Ensure that risks associated with oil and gas development are identified and managed for ▪ Develop the National Oil Spill Contingency Plan ▪ Implement major hazards / Environmental risk management

Component	Strategic Objectives
Material assets, infrastructure	<ul style="list-style-type: none"> ▪ Improve energy efficiency ▪ Achieve balanced infrastructure development ▪ Reduce and manage waste
Cultural resources	<ul style="list-style-type: none"> ▪ Preserve and valorize cultural heritage
Regional	<ul style="list-style-type: none"> ▪ Manage trans-boundary effects ▪ Manage cumulative effects

RELATIONSHIP OF SESA TO OTHER TYPES OF ENVIRONMENTAL ASSESSMENT

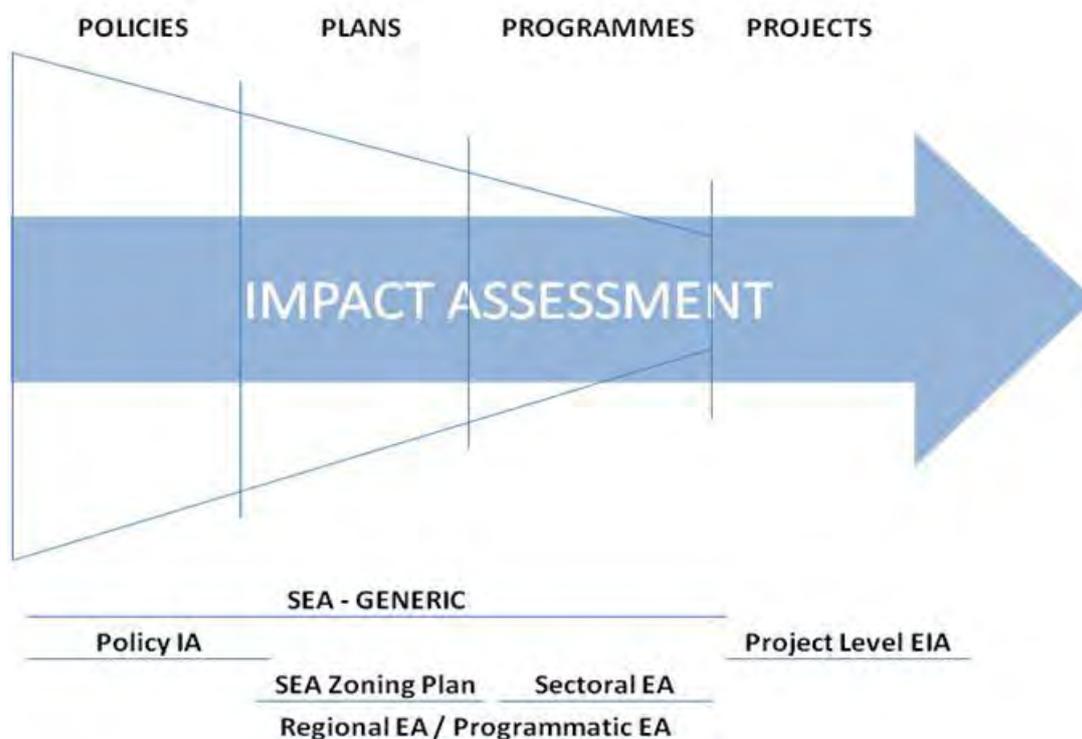
In order to define the context within which the SESA would be developed, it was also important to clarify the role of the SESA in relation to other forms of environmental and social impact assessment processes already being used in Mauritania. This was important as the concept of Strategic Environmental Assessment is relatively new within the country.

In this context, the Mauritania SESA is considered to be strategic as it attempts to assess key drivers, risks, opportunities and constraints affecting management of environmental and social issues arising from oil and gas development. As shown in Figure 1-3: *How SEA Fits Into the Environmental Assessment Process*, SEA is applied early on in the decision making process at the level of policies, plans and programs.

As there are currently no formal policies, plans or programs for oil and gas development in Mauritania, the SESA focused on two key elements:

- Review of the proposed new Hydrocarbon Code; and
- Review of the current context for oil and gas exploration and development in Mauritania in consideration of the legal, institutional and regulatory framework, baseline environmental and social conditions for the onshore and offshore, and scenarios for oil and gas development in both the onshore and offshore.

Figure 1-3: How SEA Fits Into the Environmental Assessment Process



SESA OUTCOMES

The outcomes of the SESA process within the scope of hydrocarbon sector development in Mauritania are considered to be the following:

- Identification of risks, constraints and opportunities in the Mauritanian oil and gas sector;
- Discussion of development options and selection of possible sustainability pathways towards effective environmental and social management of oil and gas activities;
- Improved governance through shared responsibility across agencies and identifying clear rules for engagement;
- Improved trust based on open and transparent stakeholder engagement and public consultation;
- Follow up monitoring and evaluation program; and
- Facilitation of adaptive management and implementation of required corrective actions.

COMPILATION

Compilation of existing background information and data was undertaken to prepare the background context for the SESA presented in Part B, including the following:

- Description of the institutional, legal and regulatory framework (Chapter 4);

- Development trends in the onshore and offshore (Chapter 5); and
- Description of the environmental and social baseline for the onshore and offshore (Chapter 6).

With respect to the above-mentioned relationship between SESA and other types of environmental assessments (such as EIA), it should be understood that the compilation of this information is not done in the same manner or to the same level of detail as for a project level environmental assessment. The review process and subsequent analysis considered the strategic objectives of the SESA from which the following Critical Factors for Decision Making are described.

CRITICAL FACTORS FOR DECISION MAKING

Critical Factors for Decision Making constitute the fundamental decision-making factors that underlie the focus on the SESA, since they identify those aspects that must be considered in the decision process concerning the strategic design and the implementation of actions for effective management of environmental and social issues arising from oil and gas development in Mauritania (Partidário 2007). These factors satisfy the scope of the SEA (legal requirements) and are generated out of an integrated analysis of the following:

- Objectives of the SEA;
- Legal, institutional and regulatory considerations;
- Environmental and social factors; and
- Current and future scenarios for oil and gas development in Mauritania.

The Critical Factors for Decision Making in the Mauritania SESA are presented in Table 1-3, including reasons for their inclusion.

Table 1-3: Key Critical Factors for Decision Making

Critical Factors for Decision Making	Reason for Inclusion
Legal and Regulatory Framework	<ul style="list-style-type: none"> ▪ Currently not fully developed in Mauritania ▪ Incomplete regulations for management of oil and gas sector ▪ Conflicting responsibility ▪ No capacity for regulation or compliance
Institutional Capacity	<ul style="list-style-type: none"> ▪ Conflicting roles and responsibilities for environmental protection and management ▪ Poor inter-institutional coordination ▪ Unknown training requirements and capabilities ▪ Capacity for SESA implementation unknown
Water	<ul style="list-style-type: none"> ▪ Protect onshore water supplies ▪ Protect onshore water quality ▪ Minimize conflicts between oil and gas industry and other users
Marine Fisheries	<ul style="list-style-type: none"> ▪ Key component of GDP ▪ Importance of local artisanal fishery ▪ Food and protein supply
Biodiversity	<ul style="list-style-type: none"> ▪ Importance of parks and protected areas ▪ Importance of critical species ▪ Capacity for protection of protected areas and biodiversity is questionable
Revenue management	<ul style="list-style-type: none"> ▪ Need for transparency of revenue flows ▪ Mechanisms for community development
Risk management	<ul style="list-style-type: none"> ▪ Minimize potential for oil spills ▪ Maximize oil spill response capacity ▪ Coordination of response
Social	<ul style="list-style-type: none"> ▪ Protect vulnerable groups ▪ Recognize cultural diversity ▪ Avoid resource conflicts ▪ Minimize expectations over benefits of oil and gas development

Critical Factors for Decision Making	Reason for Inclusion
Health and safety	<ul style="list-style-type: none"> ▪ Integrate with environmental and social assessment ▪ Ensure community safety ▪ Ensure worker safety
SEA implementation	<ul style="list-style-type: none"> ▪ Success of SESA depends on its implementation ▪ Follow up measures, indicators needed

1.8.2 ASSESS

During the assessment phase of the SESA, the following was completed:

- A gap analysis of the institutional, legal and regulatory, environmental and social baseline was completed;
- Scenarios were developed for oil and gas exploration and development in both the onshore and offshore;
- Environmental effects, or impacts, risks and opportunities were assessed for both the onshore and offshore including necessary mitigation or corrective actions;
- Options for the above were analyzed considering the aforementioned critical factors for decision making; and
- Recommended management actions were developed (see Chapter 5).

1.8.3 REVIEW

The review phase of the SESA, considered to be the most important as the success of the recommendations, hinges upon the capacity of the Mauritanian government to implement the recommendations.

Key components of review and implementation include the following:

- Development of an implementation strategy identifying responsibilities and timelines;
- Identification of indicators to measure the progress of successful SESA implementation will be a critical and difficult exercise;
- Identification of corrective actions and measures to undertake them;
- Development and implementation of an adaptive management approach; and
- Incorporation of a feedback approach to ensure that change is implemented.

1.9 MONITORING AND FOLLOW-UP

This section describes the required monitoring and follow-up procedures associated with implementation of the SESA for oil and gas development in Mauritania.

SESA MONITORING REQUIREMENTS

Good guidance for how the SESA should be monitored is provided by the European Strategic Environmental Assessment Directive which states that*“along with the implementation of the policy reform of the oil sector, strategic environmental process requires that the proceeding authority shall monitor the significant effects determined by the implementation of such policy in order, inter alia, to identify at an early stage unforeseen adverse effects and to be able to undertake appropriate remedial actions”*.³

Monitoring the actual impacts of a strategic action should aim to:

- Test whether the strategic action is achieving its objectives and targets;
- Identify negative impacts – predicted and not predicted – requiring remediation;
- Help ensure that mitigation measures proposed in the SESA are implemented; and
- Give feedback to assist in impact prediction for future SEAs.

Monitoring also provides the opportunity to examine and analyse the implementation phase of the policy development and to measure its level of success.

A coordinated environmental monitoring program should be established for the ongoing assessment of the environmental status of the marine ecosystem and terrestrial environmental components (mainly soil, subsoil, surface, water and groundwater) on the basis of the following environmental targets:

- Need to ensure the generation of information allowing the assessment against the SESA environmental baseline indicating environmental and social effects of petroleum sector policy reform;
- Need to include the activities to identify the cause of the change and hence possible corrective measures that would need to be taken to restore or improve the pre-existing environmental status;
- Need to provide information on chemical contaminants in fish species for human consumption;
- Need to include activities to confirm that corrective measures deliver the desired changes and not any unwanted side effects;

³ European SEA Directive 2001/42/EC

- Need to develop technical specifications and standardized methods so as to allow comparability of information;
- Need to ensure, as far as possible, compatibility with existing programs developed at the regional and international level with a view to fostering consistency between these programs and avoiding duplication of effort;
- Need to include an assessment of major changes in the environmental conditions as well as, where necessary, new and emerging issues;
- Need to monitor specific environmental indicators to be set out on the basis of the following requirements:
 - Control management measures that influence the amount of oil and gas related activity;
 - Control management measures that influence the degree of perturbation of an ecosystem component; and
 - Control management measures that influence spatial and temporal distribution of oil and gas activities.

Several texts in SEA literature explain in detail how to design an environmental monitoring program. A sample checklist for a monitoring program is provided by (Sommers 2005).

In order to achieve the above listed goals in Mauritania, it is necessary to overcome two types of constraints: institutional and technical. In fact, general constraints and limitations in resources, personnel and equipment, data reporting and data management may represent the major issues constraining proper implementation of an effective environmental monitoring program.

Currently there is no institution or technical body within Mauritania envisaged for managing monitoring and follow-up activities. Therefore, the actual environmental monitoring program can be properly designed only once the present institutional and technical limitations have been fully defined.

RESPONSIBILITY

The National Environmental Agency (as proposed in Section 5.4 Recommendation #3 of Theme 1 – More Efficient Institutions) would represent the ideal responsible authority charged with implementing a monitoring program and managing environmental data. Unfortunately, the establishment of National Environmental Agency along with the implementation of all the other recommended institutional changes will certainly take months to happen, while environmental monitoring should start immediately.

In order to ensure that an efficient monitoring program is available in the short term, at least until an efficient monitoring unit within the National Environmental Agency is operational, it is essential that the competent authority charged with managing the monitoring issue identifies the necessary resources as soon as possible.

It is recommended that this responsibility be assigned to the Comite de Suivi, which will have the duty of identifying the necessary expertise and technical structures currently available within Mauritanian research/scientific institutions to be employed for monitoring purposes.

The Comite de Suivi should also be empowered to co-ordinate, integrate and, if needed, expand roles and responsibilities of a technical team formed by personnel belonging to different institutions and organizations. Furthermore, the Comite the Suivi should also be responsible for identifying necessary funding for monitoring operations as well as presentation and dissemination of monitoring results.

In turn, the technical team will be responsible for identifying suitable environmental and social indicators (see following section), designing the monitoring program, carrying out field observations and measurements where required, analyzing and evaluating collected data and producing the monitoring report.

ENVIRONMENTAL AND SOCIAL INDICATORS

Environmental indicators are simple measures of what is happening in the environment, providing a practical and economical way to track the state of the environment than attempting to record every possible variable in the environment.

Firstly, indicators can work as a basis for assessment by providing information on sustainable development conditions and trends. Secondly, indicators can provide input to policy formulation processes. Thirdly, data presented as one representative number is commonly more simple to interpret than complex statistics, which can facilitate communication between different groups, for example between experts and non-experts (Segnestam 2002).

The purpose of an indicator is to indicate a change – not necessarily to disclose all aspects behind a change.

Many different types of indicators have been developed. They can be used to reflect a variety of ecosystems aspects, including biological, chemical and physical aspects. Due to this variety, the development and selection of ecological indicators is a complex process.

SELECTION CRITERIA

There is no universal set of indicators that is equally applicable in all cases. However, it is recommended to select a small set of well-chosen indicators. There are a number of selection criteria that can be applied when narrowing down the number of indicators. The selection criteria ensure that the indicators are useful and effective in their provision of information to the decision-makers. Indicator selection must be closely linked to the environmental issues being addressed. It is therefore important that the problem to be addressed in a well defined process.

PROPOSED INDICATORS

The following is a set of proposed environmental indicators for key issues selected on the basis of the SESA outcomes upon which a monitoring program should be framed.

The following is a list of initial environmental indicators should be selected:⁴

- Biodiversity
 - Newly designated protected areas (habitats/ecosystems) and no go-zones
 - Assessment of Mauritania commercial fish stocks
- Coast and Sea
 - Fishing fleet capacity and trends
 - Catches by major species and areas
 - Accidental oil spills from marine operations
- Inland water resources
 - Water resource consumption for oil operations
 - Intensity of use of freshwater resource
- Soils
 - Accidental oil spills from land operations
- Oil and Gas development scenarios
 - Number of new oil operators and oil industry trends
 - Total oil and gas production
 - GDP
- Governance
 - Participation in selected international environmental agreements

The above indicators can be used stand alone or in combination (complex index) and can also be integrated with other established indices e.g. representing poverty reduction, migratory bird species, etc.

1.10 REPORTING

Coherent and consistent environmental data should be collected and analyzed by the technical team. The Comite de Suivi should be responsible for the following:

- Presenting annual monitoring results;

⁴ http://www.eea.europa.eu/data-and-maps/indicators/#c7=all&c5=&c0=10&b_start=0
<http://unstats.un.org/unsd/environment/qindicators.htm>

- Informing other institutions and stakeholders (E.G. MEDD, MPEM and other key ministries) of monitoring outcomes;
- Coordinating report comments and observations; and
- If required, proposing corrective measures to the competent authority.

1.11 ORGANIZATION OF THIS REPORT

Due to the volume of information presented in the SESA, the report is organized into two parts. Part A (this document) is a summary of key information and presents detailed recommendations arising from findings of the SESA process. It is structured as follows:

- Chapter 1 presents an introduction to the SESA process and its objectives;
- Chapter 2 discusses key environmental and social challenges affecting development of the oil and gas;
- Chapter 3 summarizes two scenarios for future onshore and offshore development that were used to develop strategic recommendations;
- Chapter 4 presents key findings of the SESA;
- Chapter 5 outlines a series of recommendations; and
- Chapter 6 is an implementation plan for the SESA.

Supporting information to the SESA, including a regulatory review, the environmental and social baseline, and background to the oil and gas development scenarios are presented in Part B.

2. HYDROCARBON POTENTIAL TREND SCENARIOS

This section presents a framework of possible scenarios for hydrocarbon exploration and production in Mauritania in order to predict the degree of petroleum industry development and associated environmental and social impacts in the medium and long term. This analysis is constrained by the limited available knowledge of oil and gas potential in Mauritania.

Two future hydrocarbon development scenarios for Mauritania in the coming years are presented. The scenarios are based on existing data collected during the course of the project study and from information provided by the Ministry of Petroleum Energy and Mines (MPEM). The data are depicted in Chapter 4 of Part B.

Unfortunately, much of the information describing the E&P work programs that various oil companies plan to undertake in their respective license life cycle is largely incomplete and subject to change; therefore the presented scenarios are poorly constrained and should not be considered robust or indicative of what will actually occur. They have been developed on the basis of existing information at the time of writing and should be modified as more definitive information becomes available.

Two different scenarios (base case and accelerated case) were developed based on the following assumptions:

BASE CASE SCENARIO (CONSERVATIVE)

This scenario postulates:

- Limited commercial success of the currently planned oil development projects;
- Marginal technical and commercial success of exploration and production operations planned in the next five years; and
- No gas projects being developed within the same period.

ACCELERATED CASE SCENARIO

This scenario postulates:

- Rapid growth of the oil and gas development and successful results of the E&P operations currently planned;
- Positive results from E&P operations over the next five years and from further oil and gas activities to be conducted in the medium to long term period; and
- Development of offshore gas projects.

These scenarios are of purely demonstrative value due to previously cited data limitations and the uncertainty of proposed company work programs. For this reason, the hypothetical scenarios are limited to the two extreme possibilities: the first being very limited oil and gas development and the second, very prolific oil and gas activity.

Indeed, a wide range of intermediate scenarios may also develop and are likely to occur in Mauritania. The intent of the above two trend scenarios is to identify the main environmental and social concerns associated with the two extremes of potential oil and gas development.

Amongst the many factors to be considered in delineating possible future E&P scenarios, the successful results of the exploration and appraisal wells planned during the next 5 years are considered to be most critical. It is assumed that encouraging results from exploration drilling would likely produce an accelerated oil development scenario, while unsatisfactory drilling outcomes would probably slow down the overall exploration activity in the country.

Other factors affecting the oil development scenarios in Mauritania include the following:

- Global oil market trend scenarios;
- Successful E&P project results in analogous oil plays in the West Africa Region (i.e. Ghana, Ivory Coast, Sierra Leone);
- Country security level;
- Political stability; and
- Effectiveness of the hydrocarbon regulatory framework.

BASE CASE SCENARIO

Time span:

- Short term scenario - Five years.

Basic assumptions:

- No significant oil discoveries achieved in the forthcoming years in the offshore;
- Inconclusive results from onshore drilling campaigns; and
- Present day oil and gas production figures essentially unchanged or immaterially increased.

Other considerations supporting the Base Case Scenario include:

- Only Chinguetti field is on stream, based on a total of six discoveries in the offshore basin achieved to date;
- Chinguetti field oil reserves downsized;
- Sizeable but not commercially economic gas fields in the offshore remain unexploited;
- Oil company presence and commitments in the country underrepresented; and
- In spite of the offshore and onshore basins significant potential, economics of hydrocarbon exploitation projects might be strongly biased by remoteness of operational areas and lack of infrastructure.

Economic value:

- Minimal economic value added to country economy.

Remarks:

- Missed opportunity for the growth of the country economy;
- Reduced pressure from oil and gas activities on present environmental conditions;
- No positive benefits from oil income available to other sectors of Mauritania economy and civil society; and
- Unchanged country economy perspective if no alternative development strategies are developed.

ACCELERATED SCENARIO

Time span:

- Medium to long term scenario – 10-20 years.

Basic assumptions:

- Significant discoveries from current exploration cycle in the offshore and onshore oil plays will generate further E&P activity for the following decade;
- Economic gas reserves discovered either onshore or offshore; and
- Estimated average production profile of 100,000 bbls/day in the short-medium term, increasing to 300,000-400,000 boe/day⁵ in the long term. These figures are compatible with Mauritania onshore and offshore reserve estimates reported in Chapter 4 of Part B.

Supporting factors:

- Global energy demand growth leads to increased interest in West Africa;
- Attractive and transparent financial and regulatory system in place;
- Oil and Gas transport/marketing infrastructure available at national and regional level;
- International agreements in place to allow the construction of trans-national oil and gas transportation infrastructure;
- Political stability and security achieved;
- Efficient and technically competent institutions;

⁵ In terms of forecasted work program quantities, factoring in limitations associated with speculative calculations, figures provided could be considered sufficiently reliable for the purposes of the present study.

- New foreign oil companies enter Mauritania;
- Presence and role of established operators strengthened; and
- Critical volumes of gas exploited (joint gas field development projects) feeding Liquefied Natural Gas (LNG) export facilities.

Economic value:

- Oil revenues add significant value to Mauritanian economy; and
- Gross Domestic Product (GDP) increased. Dimension of increment difficult to calculate.

Remarks:

- Increased pressure on environmental resources and social conditions;
- Increased environmental and social risk;
- Potential interferences with commercial and artisanal fishery fleets;
- Interference/synergies (negative or positive) with onshore mining activities;
- Financial resources available to support poverty reduction and public health programs, domestic natural resources sustainable development, agriculture and sustainable fishing development programs, environmental resource preservation, education and training, general country modernization and access to technology;
- Positive synergies with other sectors of Mauritania economy realized;
- Opportunity for improving/developing domestic energy production facilities and infrastructure;
- New job and training opportunities created;
- Centralized and accessible environmental and social data information system implemented; and
- Involvement of public research institutions (Universities, IMROP etc) in research programs.

3. CRITICAL ENVIRONMENTAL AND SOCIAL RISKS

The following section identifies critical environmental and social challenges facing the development of the oil and gas sector in Mauritania. The importance of these challenges can vary significantly on the basis of oil and gas development scenarios and may result in critical issues, concerns and potential impacts if proper management actions are not taken.

To meet these challenges, Section 3.4 “Operational Control and Mitigation” includes measures to reduce environmental and social impacts using existing international best practices and guidelines for oil and gas sector operational standards.

This section highlights the main environmental and social risks associated with the two oil and gas development scenarios described in the previous section.

It is likely that the actual oil and gas development trend in Mauritania will be an intermediate case between these two extreme scenarios (positive and negative)

However these development scenarios may be purely speculative due to the following reasons:

- Lack of a clear understanding of actual and proposed company work programs;
- Unavailability of official or other scientific public data concerning the hydrocarbon potential estimates of both onshore basin and coastal basin in terms of hydrocarbon generation potential, expected products (liquid vs. gaseous hydrocarbons), possible field size distribution (from other play type analogue studies); and
- At the present stage, the licensed offshore and onshore acreage are rather limited in terms of areal extension and work commitments, but there are no indications where future E&P activities are likely to develop.

3.1 EVALUATION OF ENVIRONMENTAL AND SOCIAL EFFECTS IN SEA

The SEA process concerns a strategic level evaluation of the general environmental and social consequences resulting from the implementation of a certain plan, program or policy (such as a policy for development of the hydrocarbon sector), while the EIA process assesses the specific environmental and social impacts associated with the implementation of a particular project and identifies specific mitigation measures for each impact (such as the realization of a specific O&G exploration project).

Currently, Mauritania is developing a policy which aims to value the hydrocarbon reserves of the country. There are currently no formal policies, plans or programs designed to allow the oil and gas development in Mauritania. Consequently, the SESA focused on a review of the current context for E&P Development in Mauritania considering the existing legal, institutional and regulatory framework, environmental and social baseline conditions for the onshore and offshore and oil and gas development scenarios for the offshore and onshore.

In order to understand the relationships, linkages and consequences of oil and gas development in Mauritania between project level EIA on one hand and the strategic level of an SEA on the other

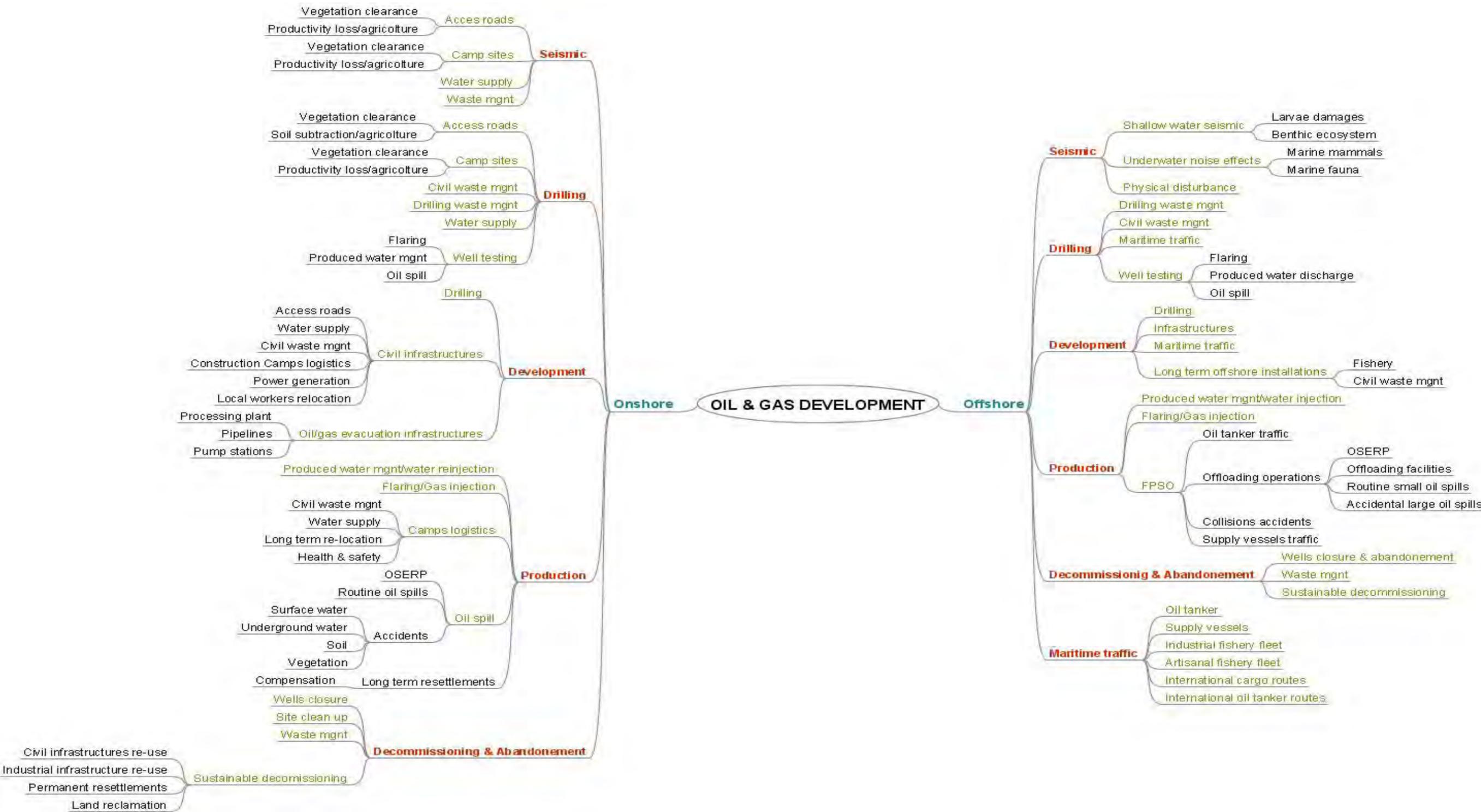
(refer also to Section 2.4 of Part B), a Mind Mapping exercise was undertaken.⁶ The Mind map presented in Figure 3-1: Operational Aspects related to Onshore and Offshore Oil and Gas E&P Activities synthesizes the onshore and offshore oil & gas exploration and production operational issues likely to have potential detrimental effects on certain environmental and social aspects.

Key environmental and social issues for the onshore and offshore are discussed in the following sections.

⁶ A mind map is a diagram used to represent words, ideas, tasks, or other items linked to and arranged around a central key word or idea. Mind maps are used to generate, visualize, structure, and classify ideas, and as an aid in study, organization, problem solving, decision making, and writing.

en.wikipedia.org/wiki/Mind_map. Freeplane mind open source mapping software was used - http://freeplane.sourceforge.net/wiki/index.php/Main_Page

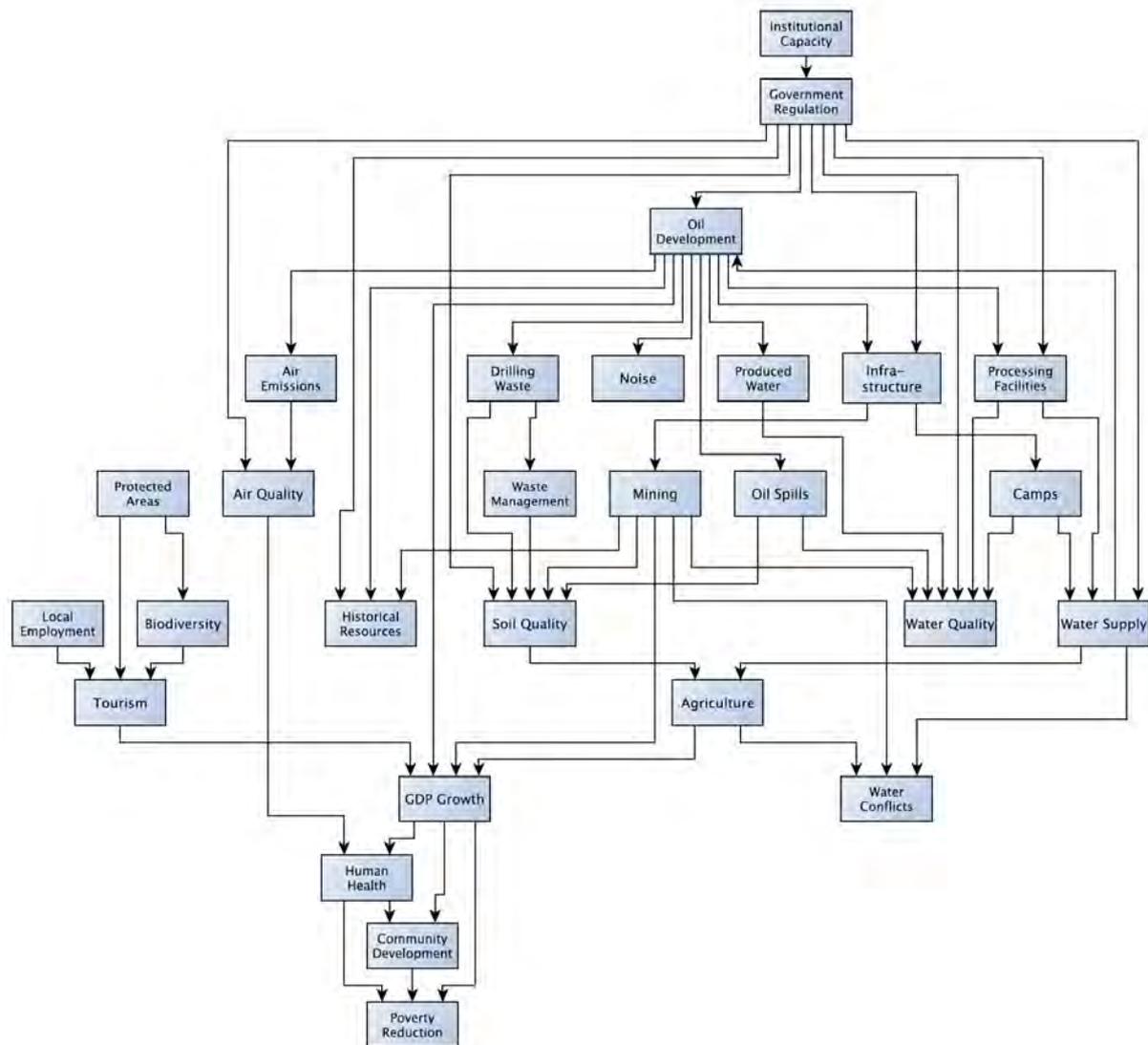
Figure 3-1: Operational Aspects related to Onshore and Offshore Oil and Gas E&P Activities



3.2 ENVIRONMENTAL AND SOCIAL RISKS FOR ONSHORE OPERATIONS

Onshore operations associated with oil and gas exploration and production can lead to physical disturbance, damage, alteration or contamination of natural ecosystems, degraded soil and subsoil quality and impacts to surface and groundwater quality and quantity with potential consequent effects on vegetation, fauna, aquatic resources and human health. Significant social effects may also impact the cultural identity of local communities. These linkages associated with onshore oil and gas exploration are presented in Figure 3-2: *Linkage Diagram for Onshore Oil and Gas Activity* below.

Figure 3-2: Linkage Diagram for Onshore Oil and Gas Activity



These relationships are further examined in terms of the two scenarios below.

BASE CASE SCENARIO

The main sources of environmental and social concerns in the base case scenario for onshore operations are as follows:

- Solid and liquid waste production and disposal;
- Water resources management;
- Land use and land tenure;
- Agriculture;
- Community development;
- Access roads and camp sites;
- Interaction with cultural identity of local communities; and
- Possible synergistic effects with social-environmental impacts resulting from mining activities

Considering the reduced level of onshore oil and gas exploration projects in the short term, the level of magnitude, extent and duration of the above potential impacts can be considered to be low.

With specific reference to those blocks that are currently active (refer to (Figure 3-3: *June 2010 Acreage Map*),) it is noted that:

- The active blocks are located in the Central part of the Taoudeni Basin, in the Arid eco-climatic zone where potential impacts could result in relation to groundwater resources, waste management, access roads and camp sites construction and decommissioning. There is also potential for cumulative impacts associated with mining activities.
- Possible interactions of E&P operations may occur with the tourism and cultural heritage and with related local communities within the UNESCO protected “Anciennes Villes” sites of Chinguetti and Ouadane in the Adrar Region. These sites are located in the vicinity or within active blocks Ta8 (Total operated) and Ta30 (SIPEX/SMH operated) in the northwestern part of the Taoudeni Basin;

ACCELERATED TREND SCENARIO

Main sources of environmental and social concerns for the accelerated scenario onshore are as follows:

- Solid and liquid waste production and disposal;
- Water conflicts;
- Land use and land tenure;
- Agriculture and agro-pastoral;
- Community development;
- Access roads and camp sites;

- Interaction with cultural identity of local communities;
- Interaction/overlap of impacts with mining activities;
- Construction of processing facilities; and
- Emissions into air.

Due to the postulated increase and extent of E&P activities, the resulting environmental and social potential impacts listed above are considered to be high in relation to magnitude, extent and duration without taking into account the potential for cumulative effects.

With specific reference to potential sensitive areas in the onshore potentially subject to significant social-environmental impacts generated by future oil activities (although no active licenses are currently present) (Figure 3-3: *June 2010 Acreage Map*), it is important to note that:

- Blocks 10 and 9, respectively in the onshore and offshore portion of the Coastal Basin fall entirely within the Banc d'Arguin National Park (UNESCO World Heritage Site) the richest and by far the most important protected area in Mauritania (and West Africa) for flora and fauna biodiversity ;
- Block 20 in the southernmost part of the onshore portion of the Coastal Basin, includes sensitive areas (Ramsar site) and significant biodiversity within the Dwialing National Park in the proximity of Senegal River delta;
- Block 20 lies also in the Senegal River Eco-System Zone, important for agricultural and pastoral activities and subject to potentially extensive floods. Potential conflicts may arise with agriculture, pastoral, land and water use, waste management and detrimental effects to community development, population and human health (Trarza and Brakna Regions);
- Blocks Ta21 and Ta 68 in the central and SE of Taoudeni Basin include the two Unesco World Heritage "Anciennes Villes" sites of Oualata and Tichitt (Hodh Ech Chrgui and Tagant Regions respectively); and
- All of not licensed yet blocks in the Assaba, Hodh El Gharbi and Hodh Ech Chargui (southern part only) are located in the Sahelian Eco-System Zone with possible impacts to agro-pastoralism and possible sedentary agriculture.

Provisions to set limitation or regulate E&P activities in these blocks are provided in Recommendation # 13 in Section 5.4.

Figure 3-3: June 2010 Acreage Map

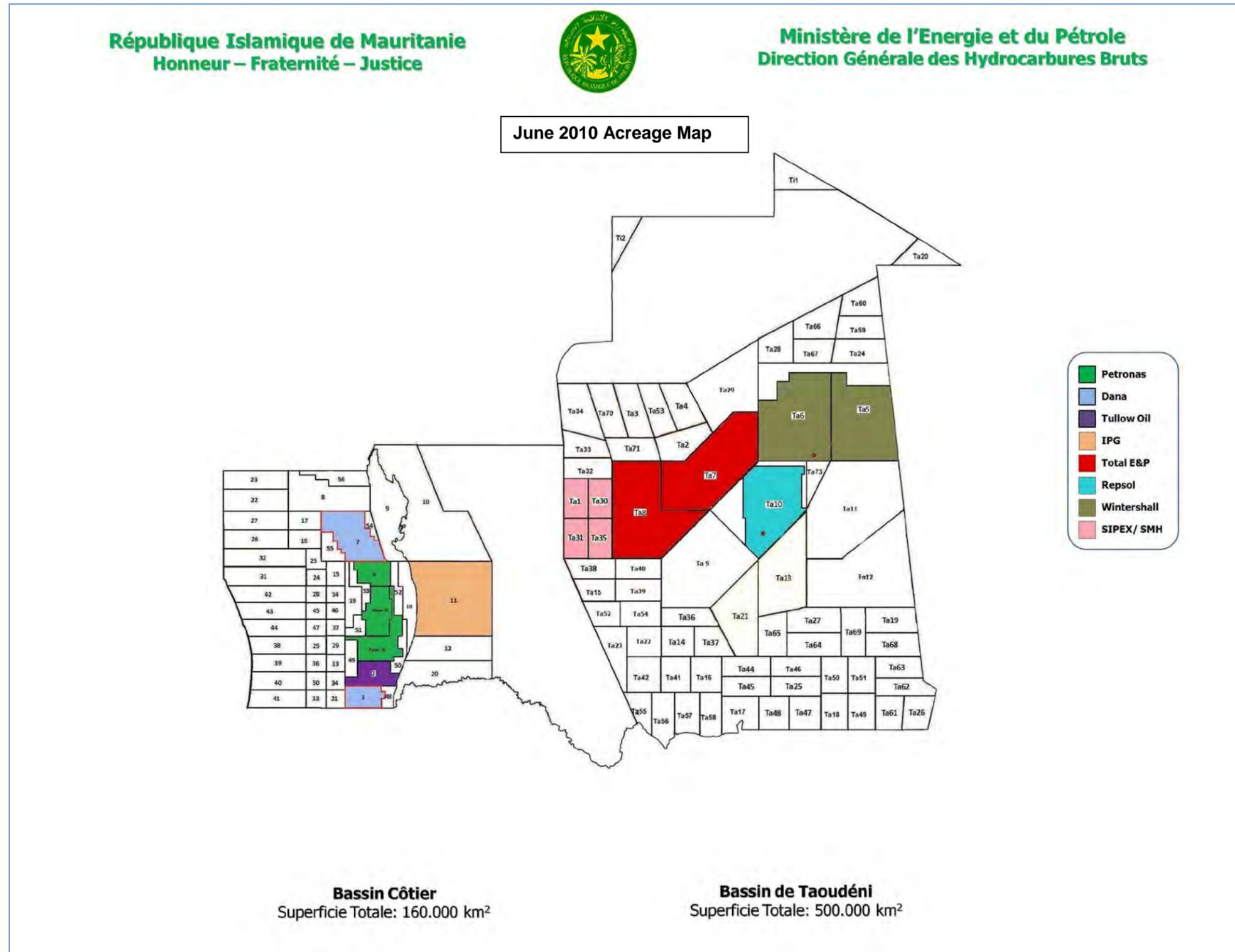


Table 3-1: *Environmental and Social Impacts - Onshore* summarizes the list of key environmental and social impacts either likely to occur either in the Base Case Scenario or in the Accelerated Trend Scenario with differing grades of magnitude, extension and duration.

At the SEA stage, operational controls and mitigation measures presented in Section 3.4 are the required tools to be used in the implementation of a coordinated control system to eliminate or prevent undesirable environmental and social effects.

Environmental and social impacts in Table 3-1: *Environmental and Social Impacts - Onshore* should be addressed at the EIA level for each individual onshore exploration and production project.

Table 3-1: Environmental and Social Impacts - Onshore

Main sources of Environmental and Social Impacts	Potential Issues and Concerns	Mitigation Standards
Solid and liquid waste discharges	<ul style="list-style-type: none"> ▪ Physical damage to biotopes ▪ Soil and subsoil contamination ▪ Surface water, potable water, and underground water contamination ▪ Requirements for domestic and process water treatment system and operation 	<ul style="list-style-type: none"> ▪ Set solid and liquid discharge quality standards e.g. IFC Onshore Oil & Gas Development Guidelines ▪ IFC Environmental, Health, and Safety (EHS) Guidelines for Onshore Oil and Gas Development ▪ IPIECA Best Practice Guidelines
Waste management	<ul style="list-style-type: none"> ▪ Requirements for landfill construction and operation 	<ul style="list-style-type: none"> ▪ Enforce waste management policy
Water conflicts	<ul style="list-style-type: none"> ▪ Desertification / Climate change – sectors of population migrating to urban areas ▪ Potable water availability ▪ Trans-boundary issues along the Senegal River 	<ul style="list-style-type: none"> ▪ Develop an integrated water management policy aligned with other national plans and priorities e.g. AGIRE
Air quality - Gas emissions	<ul style="list-style-type: none"> ▪ Local air quality effects resulting from exhaust emissions, flaring and venting ▪ Emissions of acid gases ▪ Air quality effects of a major gas release or volatile oil spill ▪ GHG emissions from gas flaring 	Implementation of: <ul style="list-style-type: none"> ▪ IFC Onshore Oil & Gas Development Guidelines ▪ IFC Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development

Main sources of Environmental and Social Impacts	Potential Issues and Concerns	Mitigation Standards
Oil Spills	<ul style="list-style-type: none"> ▪ Major oil spill effects and associated damage to habitats and ecosystem function. ▪ Oil spills – risks of effects on all faunal groups, vegetation and agriculture ▪ Oil spills – extensive contamination of soil, subsoil, surface and underground waters. 	Implementation of : <ul style="list-style-type: none"> ▪ IFC Onshore Oil & Gas Development Guidelines ▪ IFC Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development ▪ Compulsory implementation of Oil Spill emergency response Plan (OSERP)
Oil Spills	<ul style="list-style-type: none"> ▪ Major oil spill effects and associated damage to habitats and ecosystem function. ▪ Oil spills – risks of effects on all faunal groups, vegetation and agriculture ▪ Oil spills – extensive contamination of soil, subsoil, surface and underground waters. 	Implementation of: <ul style="list-style-type: none"> ▪ IFC Onshore Oil & Gas Development Guidelines ▪ IFC Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development ▪ Compulsory implementation of Oil Spill emergency response Plan (OSERP)
Land use and land tenure	<ul style="list-style-type: none"> ▪ Allocation of land for oil and gas activities ▪ User rights ▪ Government / private lands ▪ Surface and subsurface rights ▪ Conflicts with mining rights and operations 	<ul style="list-style-type: none"> ▪ Screen all land sales for possible social and environmental conflicts
Community development	<ul style="list-style-type: none"> ▪ Job creation and revenue sharing ▪ Diversification livelihood strategies ▪ Disturbance to family networks, community structures and cultural and ethnic identities ▪ Urbanization, loss of cultural identity ▪ Resettlement of nomadic people 	<ul style="list-style-type: none"> ▪ Look at impact benefit agreements so that communities can share benefits of oil and gas development
Agriculture	<ul style="list-style-type: none"> ▪ Water conflicts ▪ Surface run-off ▪ Land compensation ▪ Reclamation 	<ul style="list-style-type: none"> ▪ Consider impact compensation measures ▪ Enforcement of damage compensation law (Polluter pays) ▪ Establish regulatory framework for site clearance and site clean up

Main sources of Environmental and Social Impacts	Potential Issues and Concerns	Mitigation Standards
Access roads and infrastructures	<ul style="list-style-type: none"> ▪ Vegetation cut and site clearing ▪ Productivity loss ▪ Fragmentation of habitats ▪ Exclusion zones/compensation ▪ Desertification ▪ Inhabitants displacements ▪ Road sharing agreement ▪ Road traffic ▪ Reclamation of access roads 	<ul style="list-style-type: none"> ▪ IFC Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development ▪ Adopt international best practices
Camp sites	<ul style="list-style-type: none"> ▪ Increased demand for infrastructures and utilities ▪ Sanitation service ▪ Demand for potable water ▪ Demand for community services (medical, emergency, safety, etc) ▪ Security ▪ Waste disposal ▪ Integration/interference with local communities ▪ Competition for local resources access 	<ul style="list-style-type: none"> ▪ Implement contractor control plans ▪ Implement waste management plan ▪ Establish operational standards
Processing facilities	<ul style="list-style-type: none"> ▪ Discharge of contaminants ▪ Water and air pollution ▪ Energy requirements ▪ Accidents and unplanned events ▪ Equipment maintenance and storage 	<ul style="list-style-type: none"> ▪ Implement waste management plan ▪ Possible requirements for oil and gas waste landfill ▪ Adopt international best practices ▪ Establish operational standards
Protected areas and biodiversity	<ul style="list-style-type: none"> ▪ Exploration and production activity in or surrounding protected areas ▪ Loss of biodiversity ▪ “No go” zones ▪ Protected areas buffer zones 	<ul style="list-style-type: none"> ▪ Definition of No go areas and buffer zones to preserve protected areas
Mining	<ul style="list-style-type: none"> ▪ Proximity issues ▪ Land use/land tenure ▪ Sharing of infrastructures ▪ Competition for resources 	<ul style="list-style-type: none"> ▪ Adequate mining vs. petroleum regulatory framework ▪ Adequate cadastre

Main sources of Environmental and Social Impacts	Potential Issues and Concerns	Mitigation Standards
Population and human Health	<ul style="list-style-type: none"> ▪ Positive socio-economic effects of potential activities, in terms of employment, expenditure, tax revenue infrastructure development ▪ Potential for significant effects on human health – associated with effects on local air quality resulting from atmospheric emissions ▪ Potential food chain effects of major oil spills ▪ Socio-economic consequences of oil spills 	<ul style="list-style-type: none"> ▪ Consider impact compensation ▪ Implementation of IFC Environmental Health and Safety Guidelines for Oil and Gas development ▪ Enforcement of damage compensation law (Polluter pays)
Protected areas, Tourism and Cultural Heritages	<ul style="list-style-type: none"> ▪ Safeguard of National Parks onshore and coastal areas ▪ Loss or alteration of cultural, archaeological and historical sites ▪ Protection of Cultural Heritage sites ▪ Potential conflicts between cultural and economic interests 	<ul style="list-style-type: none"> ▪ Introduce the precautionary principle ▪ Establish regulatory system that excludes oil& gas activities in the proximity of protected cultural heritages ▪ Define “no go” zones
The inter-relationship between the issues	<ul style="list-style-type: none"> ▪ Multiple effects – biodiversity and faunal effects associated with habitat disturbance; contamination of soils, and groundwater; oil spill risks ▪ Cumulative effects ▪ Implications for Spatial Land Planning ▪ Waste management ▪ Potential pollution of remote uncontaminated areas 	<ul style="list-style-type: none"> ▪ Develop a cumulative effects management framework

3.3 ENVIRONMENTAL AND SOCIAL RISKS FOR OFFSHORE OPERATIONS

The Mauritanian offshore is characterized by significant biodiversity and an economic dependence on abundant yet increasingly compromised natural capital. Expansion of oil and gas operations may escalate the pressure on the marine and coastal environment which is already under stress by an intensive commercial fishery.

If not properly managed, the nature of E&P operations and associated emissions and pollutant discharges to the marine environment can pose a threat to the short and long term sustainability of local marine and coastal ecosystems. The need to address these operational effects will only intensify over time, so preventive measures are needed now as a cost-effective solution.

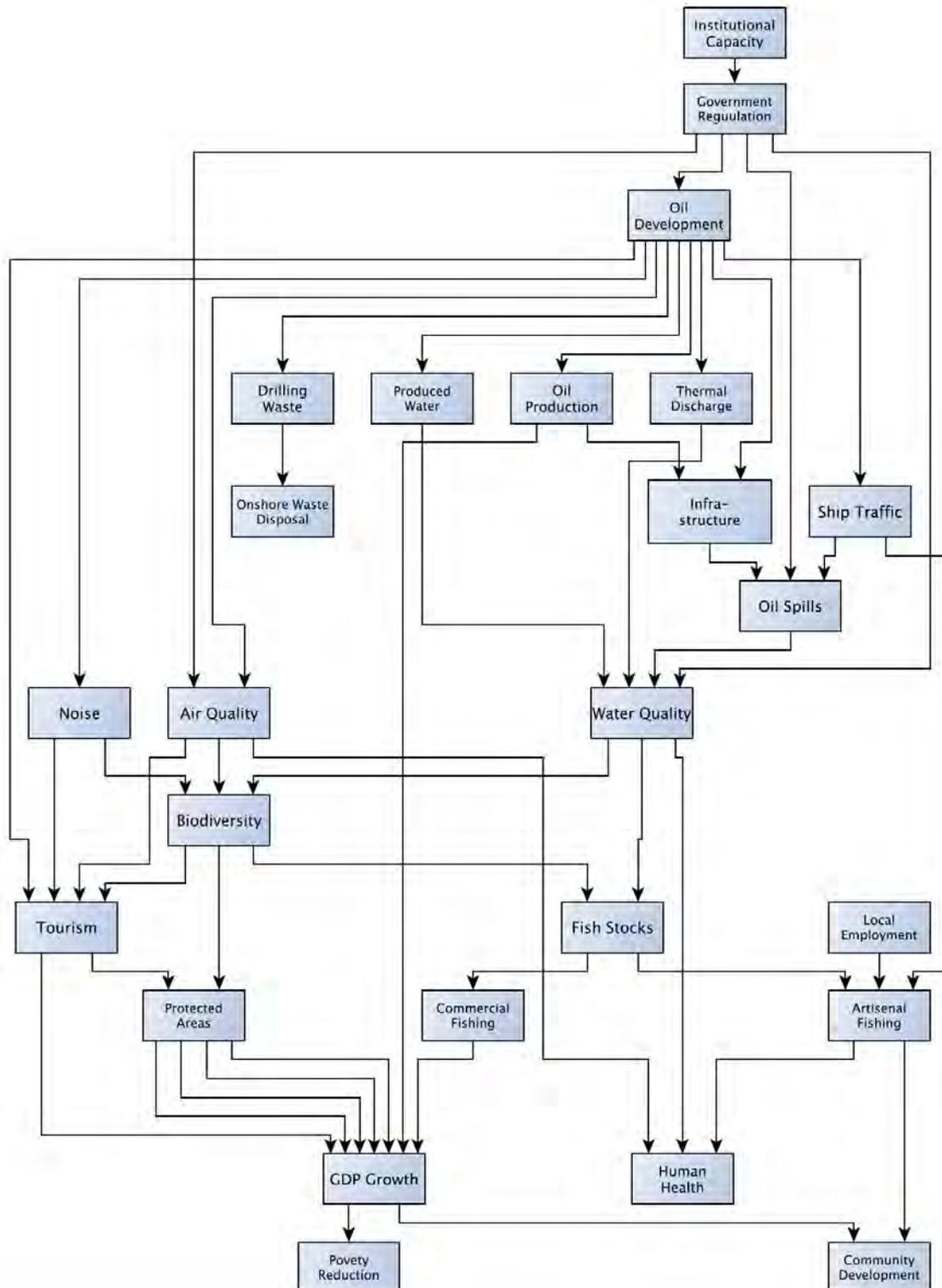
While technological advances have reduced the risk of environmental damage associated with oil and gas activity, disturbances of marine and coastal ecosystems are foreseeable.

Unclear rules governing offshore oil r development may result in potential conflicts with both artisanal and commercial fisheries that can be both directly and indirectly affected as follows:

- Direct effects on fisheries mainly occur during construction and operations by the establishment of no-fishing zones around oil and gas production facilities located in prime fishing grounds;
- Indirect effects on artisanal and industrial fisheries may arise, potentially affecting breeding, migration and survival of marine resources that may be impacted by petroleum development;
- Routine operations carried out during the exploration cycle may also cause impacts on marine resources, such as seismic surveys, E&P operations such as mud and cuttings disposal, increased water turbidity from disturbance of benthic sediments, and non-catastrophic oil and chemical pollution;
- Species that have near-surface or shallow water shoreline life history stages (eggs and larvae), or local, non-migratory species with low stress thresholds will be most affected by potential perturbations caused by offshore oil and gas development; and
- Seismic acquisition survey cause underwater noise affecting navigation of marine and interferences with fishery fleet and other maritime traffic.

The aforementioned impacts and interactions are foreseeable regardless of the future level of offshore oil activity. The linkages associated with offshore oil and gas exploration are presented in Figure 3-4: *Linkage Diagram for Offshore Oil and Gas Activity* below.

Figure 3-4: Linkage Diagram for Offshore Oil and Gas Activity



A description of related project impacts under each of the two scenarios follows:

BASE CASE SCENARIO

Considering the currently operated active blocks (refer to Figure 3-3: June 2010 Acreage Map and Chapter 4 of Part B), the Base Case Scenario takes into account the following E&P operations:

- Tiof discovery has been appraised with five wells (PSC “B”);
- One appraisal well has been drilled on the Tevet discovery (PSC “B”);
- Two appraisal wells were drilled on the Banda Oil and Gas Field in 2008 (PSC “A” and “B”);
and
- Two production wells drilled by Petronas in the Chinguetti field (PSC “B”).

Exploration activities carried out in the coastal basin in 2010 include:

- Drilling of Cormoran-1 well in Block 7 by Dana Petroleum;
- Appraisal of Gharabi-1 in Block 6 par Petronas; and
- Preparation for a seismic survey on Block C-2 by Tullow Oil.

Regarding offshore activities planned for the forthcoming five years, the MPEM indicates that approximately 15 wells will be drilled in the Coastal Basin.

Main environmental and social potential concerns associated to the Base Case Scenario include (see Figure 3.2 – *June 2010 Acreage Map*) the following:

- Most of the E&P operations in the next five years take place in the PSC “A” and “B” blocks with foreseeable interferences with industrial fishery;
- Interactions of E&P operations may occur with artisanal fisheries in the eastern sectors of blocks 1 (Dana operated), C- 2 (Tullow Oil operated) and PSC “A” (Petronas operated);
- Interactions with industrial activity may occur over the all active exploration licenses. Drilling operations and limited oil production can lead to localized detrimental effects on the marine ecosystem as consequence of discharge of drilling fluids, formation water, domestic waste, drill cuttings;
- Potential impacts to biodiversity may occur within Dana Petroleum Block 7 (adjacent to Banc d’Arguin National Park);
- Potential impacts to water quality may also result from continuation of Chinguetti oil field development in PSC B and further expansion in the coming years; and
- Accidental Oil Spills during drilling, installation, production, offloading and transportation of crude oil, or resulting from blowout or other accident/unplanned event may occur.

On the basis of the last update of approved offshore E&P work programs, this scenario is likely to occur in the short to medium term as a result of a relatively low level of the offshore activities presently forecasted.

ACCELERATED TREND SCENARIO

At present time, no data on future E&P activities beyond the next 5 years is available. Potential impacts associated with the accelerated trend scenario and in particular those most sensitive offshore areas not currently licensed are as follows (see Figure 3.3 – *June 2010 Acreage Map*):

- Future E&P activities in blocks adjacent to the coastline (e.g. Blocks 18, 50, 2 and 48) may significantly interfere with the artisanal fishery and potentially lead to deteriorated marine ecosystem conditions;
- Interactions with industrial activity may occur over all active exploration licenses. Drilling operations and increased oil production can lead to detrimental effects on the marine ecosystem as consequence of discharge of drilling fluids, formation water, domestic waste and drill cuttings;
- Operations in Block 7 (currently active license) and Blocks 8 and 56 (currently no active licenses) may pose a threat to biodiversity in Banc d'Arguin National Park area and its immediate surroundings; and
- Expanded oil production increases risks of accidental oil spills during drilling, installation, production, offloading and transportation of crude oil, or from a blowout or other accident/unplanned event.

For the aforementioned reasons, the Mauritanian Government should immediately set the basic key mitigation measures for the base case scenario while a comprehensive set of regulation and standards are developed to properly manage the accelerated case scenario.

Table 3-2: *Environmental and Social Impacts – Offshore* summarizes the list of key environmental and social impacts and indicates mitigation measures to be implemented. At the SEA stage, operational controls and mitigation measures are the required tools to be used in the implementation of a coordinated control system to eliminate or prevent undesirable environmental and social effects.

Table 3-2: Environmental and Social Impacts – Offshore

Environmental and Social Impacts	Potential Issues and Concerns	Mitigation Standards
Solid and liquid marine discharges	<ul style="list-style-type: none"> ▪ Physical damage to biotopes ▪ Effects on zooplankton, fish and benthos ▪ Water quality deterioration for produced water disposal ▪ Drilling wastes effects on benthos ▪ Sediment modification and contamination by particulate discharges ▪ Marine discharges – Permanent effects of reinjection of produced water and cuttings 	<ul style="list-style-type: none"> ▪ Set solid and liquid discharge quality standards ▪ Implementation of: <ul style="list-style-type: none"> ▪ relevant international treaties (MARPOL, etc) ▪ IFC Offshore Oil & Gas Development Guidelines ▪ IFC Environmental, Health, and Safety Guidelines for Offshore Oil and Gas Development ▪ IPIECA Best Practice Guidelines
Waste management	<ul style="list-style-type: none"> ▪ Onshore waste disposal – requirement for landfill construction and operation ▪ Offshore incineration – Air pollutant emissions 	<ul style="list-style-type: none"> ▪ Enforce waste management policy ▪ Implementation of relevant international treaties (MARPOL, Ospar, etc)
Underwater noise	<ul style="list-style-type: none"> ▪ Potential behavioral and physiological effects on sensitive species like marine mammals associated with piling, seismic surveys and other noise-generating activities. ▪ General marine fauna disturbance ▪ Shallow water seismic surveys may damage benthic ecosystem 	<ul style="list-style-type: none"> ▪ Implementation of JNCC's Guidelines for minimizing acoustic disturbance to marine mammals from seismic surveys
Oil Spills	<ul style="list-style-type: none"> ▪ Major oil spill effects and associated damage to habitats and ecosystem function. ▪ Oil spills – risks of effects on all faunal groups ▪ Oil spills – risks of effects of beached oil on intertidal algal and macrophyte populations ▪ Oil spills (with or without chemical dispersion) – risk of sediment contamination ▪ Risk of damages to protected areas 	<ul style="list-style-type: none"> ▪ Implementation of <ul style="list-style-type: none"> ▪ OCIMF - Guidance for Oil Terminal Operators on the international Maritime Organization -International Ship and Port Facility Security Code. ▪ Compulsory implementation of Oil Spill emergency response Plan (OSERP)

Environmental and Social Impacts	Potential Issues and Concerns	Mitigation Standards
Water quality	<ul style="list-style-type: none"> ▪ Solid and liquid marine discharges – contamination by soluble and dispersed discharges ▪ Oil spills (with or without chemical dispersion) –contamination risk of the water column by dissolved and dispersed hydrocarbons 	<ul style="list-style-type: none"> ▪ Set solid and liquid discharge quality standards ▪ Implementation of IFC Environmental, Health, and Safety Guidelines for Offshore Oil and Gas Development
Air quality - Gas emissions	<ul style="list-style-type: none"> ▪ -Local air quality effects resulting from exhaust emissions, flaring and venting ▪ -Emissions of acid gases ▪ -Air quality effects of a major gas release or volatile oil spill ▪ -GHG emissions from gas flaring 	<ul style="list-style-type: none"> ▪ Implementation of: ▪ IFC Environmental, Health, and Safety Guidelines for Offshore Oil and Gas Development ▪ IFC Offshore Oil & Gas Development Guidelines
Physical presence of infrastructure and support activities	<ul style="list-style-type: none"> ▪ Behavioral disturbance to fish, birds, marine mammals ▪ Air and water pollutant emissions ▪ Physical damage to biotopes – potential effects on benthos, associated with infrastructure construction and anchoring. ▪ Interference with artisanal or industrial fishing fleet ▪ Risk of collisions ▪ Exclusion zones/compensation 	<ul style="list-style-type: none"> ▪ IFC Environmental, Health, and Safety Guidelines for Offshore Oil and Gas Development ▪ Double hull oil trading tankers and FPSOs
Offshore production installations (FPSO)	<ul style="list-style-type: none"> ▪ Oil tanker traffic - Potential effects of non-native species introductions in ballast water discharges ▪ Interference with long range international cargo and tanker routes 	<ul style="list-style-type: none"> ▪ Implementation of relevant international treaties (MARPOL, Oskar, etc) ▪ IMO recognition of Particularly Sensitive Sea Areas (PSSA)
Protected areas and biodiversity	<ul style="list-style-type: none"> ▪ Exploration and production activity in the vicinity or in protected areas ▪ Loss of biodiversity ▪ No go zones ▪ Protected areas buffer zones 	<ul style="list-style-type: none"> ▪ Definition of “no go” areas and buffer zones to preserve protected areas

Environmental and Social Impacts	Potential Issues and Concerns	Mitigation Standards
Population and human Health	<p>Interactions with other users:</p> <ul style="list-style-type: none"> ▪ Commercial implications of exclusion of fishing activities in vicinity of infrastructure, and safety risks of interactions between fishing gear and subsea infrastructure ▪ Interactions with shipping, military and other human uses of the offshore environment ▪ Socio-economic consequences of oil spills ▪ Positive socio-economic effects of potential activities, in terms of employment, expenditure, tax revenue and security of energy supply ▪ Potential for significant effects on human health – associated with effects on local air quality resulting from atmospheric emissions ▪ Potential food chain effects of major oil spills 	<ul style="list-style-type: none"> ▪ Implementation of HSE OSPAR Guidelines ▪ Consider impacts compensation ▪ Implementation of IFC Environmental Health and Safety Guidelines for Oil and Gas development ▪ Enforcement of damage compensation law (Polluter pays)
The inter-relationship between the issues	<ul style="list-style-type: none"> ▪ Multiple effects – biodiversity and faunal effects associated with habitat disturbance; contamination of water, sediment and fauna; oil spill risks ▪ Cumulative effects ▪ Implications for Marine Spatial Planning 	<ul style="list-style-type: none"> ▪ Develop a cumulative effects management framework
Protected areas and Tourism	<ul style="list-style-type: none"> ▪ Safeguard of National Park areas and other marine and coastal protected areas 	<ul style="list-style-type: none"> ▪ Comprehensive risk analysis ▪ Introduce the precautionary principle ▪ Re-consider licensing inside or in the proximity of National Parks and protected areas ▪ Define No go zones and buffer zones

3.4 OPERATIONAL CONTROL AND MITIGATION

The environmental impacts discussed in the preceding paragraphs can be avoided or minimized through the implementation of a suitable legal and regulatory framework.

The success of the SESA to manage the environmental and social impacts from oil and gas development can be measured as a function of the government's ability to put in place the necessary regulatory and control mechanisms for enforcing and governing how offshore and onshore oil and gas development will occur.

The first measure of doing this will be the implementation of an appropriate legislative and regulatory framework. For Mauritania, discharge standards for emissions into air, water and soil, related to oil and gas operations, have to be established. This has to be coupled with private sector initiatives towards the implementation of best practices already adopted in other oil producing countries.

To date, the most conservative practice the Mauritanian Government has adopted in this regard is to compel oil companies to operate within their respected blocks according to established environmental standards, while assuming that these standards are robust enough to minimize environmental effects. In most cases this is true, but this method should be considered only as a temporary transition towards a defined national environmental standards framework. Environmental performance standards can vary from country to country, resulting in potential equivocal and inconsistent performances between oil companies operating in adjacent blocks.

The enforcement of existing best practices and operational standard guidelines for the oil and gas sector would represent a step forward towards the definition of a working set of national standards.

The majority of the measures, techniques and regulations that should be adopted in Mauritania are included in the reference lists in the following paragraphs.

3.4.1 ONSHORE MITIGATION MEASURES

Mauritania has signed and ratified numerous international agreements and conventions:

- Convention for the Protection of the World Cultural and Natural Heritage (Paris, 1972);
- Convention establishing a Permanent Inter-State Drought Control;
- Committee for the Sahel (Ouagadougou, 1973);
- Convention on Biological Diversity (Rio de Janeiro, 1992);
- Convention on the Control of Transboundary Movements of Hazardous;
- Wastes and their Disposal (Basel, 1989); and
- United Nations Framework Convention on Climate Change (New York, 1992).

Furthermore the International Financial Corporation (IFC, member of World Bank Group) has released The Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development.⁷

IFC's Environment, Health, and Safety (EHS) guidelines for onshore Oil and Gas development include information relevant to seismic exploration; exploration and production drilling; development and production activities; transportation activities including pipelines; other facilities including pump

⁷ <http://www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines>

stations, etc. Application of these guidelines can help minimize risks associated with onshore oil and gas activities. The EHS guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable cost (IFC 2007).

From a preliminary standpoint, the IFC's EHS Guidelines for Onshore Oil and Gas Development represents a good first step for Mauritania to adopt as part of development of a national legislative framework related to onshore oil and gas development. Due diligence on the part of Mauritanian officials involved in oil and gas development will be needed if such a framework is going to be successful. Considering onshore development is still in its early stages, application of EHS guidelines to existing facilities will be limited.

Enforcement of EHS guidelines will be a key factor in ensuring that oil companies conduct themselves within the framework put forth by the RIM.

3.4.2 OFFSHORE MITIGATION MEASURES

Mauritania has ratified the MARPOL Convention which defines a response mechanism to combat marine pollution due to marine accidents, either offshore or onshore, and regulates navigation and transportation of hydrocarbons and chemical products.

Furthermore the International Financial Corporation (IFC, member of World Bank Group) has released The Environmental, Health, and Safety (EHS) Guidelines for Offshore Oil and Gas Development. These guidelines contain performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them.

The EHS Guidelines for Offshore Oil and Gas Development include information relevant to seismic exploration, exploratory and production drilling, development and production activities, offshore pipeline operations, offshore transportation, tanker loading and unloading, ancillary and support operations, and decommissioning. It also addresses potential onshore impacts that may result from offshore oil and gas activities.

The above documents represent the basic elements that can be transposed into a national regulatory system. Where necessary, the quality standards listed in the guidelines may be adequate for specific environmental or social requirements, before adopting more restrictive parameters.

The enforcement of best industry practices applied elsewhere ensures that oil companies operate with homogeneous and consistent standards. For specific mitigation measures please refer to Table 3-2: *Environmental and Social Impacts – Offshore*.

4. KEY SESA FINDINGS

This section describes key findings that are considered essential in defining a general normative and regulatory framework that could efficiently govern oil and gas development activities in Mauritania. Key findings consider the following aspects:

1. Institutional capacity;
2. Policy, legal, and regulatory framework; and
3. Oil and Gas Development context for both onshore and offshore.

The key findings described in this chapter are derived from data review and a gap analysis carried out by the SESA team.

Within the adopted SESA framework, the strategic assessment of these risks, in conjunction with scenario analysis and consideration of the critical decision factors form the building blocks upon which the strategic recommendations of the SESA Work and Implementation Plan (Chapters 5 and 6) are built.

Key findings are discussed in the following sections.

4.1 INSTITUTIONAL CAPACITY

- There is a lack of a clear definition of the roles and responsibilities of the Ministry of Environment and Sustainable Development and its inter-institutional coordination with interdepartmental sectoral authorities for environmental and social management of oil development projects;
- There is a lack of coordination and capacity for the implementation of effective EIA processes;
- Institutional development for sector management by the Government of RIM and associated education and skills development face significant challenges; and
- There is the need to support the growth of indigenous (in-country) technical and professional skills and to develop training institutions for development of programs focused on technical skills development for the oil and gas industry.

4.2 POLICY, LEGAL AND REGULATORY FRAMEWORK

- There is an incomplete legal framework in Mauritania with which to set overarching intentions regarding environmental management of the oil and gas industry. The regulatory framework regarding compliance performance in relation to specific regulations is also not well developed.
- A sectoral policy, or strategy, governing the oil and gas sector development is in the process of being defined, although that policy is being developed outside of the framework previously identified.

- Strategic elements of oil sector development are stated in the Poverty Reduction Strategy Program (PRSP) and a consultative group exists within the MPEM to implement these strategic elements. This group is also delegated with the development of a sectoral oil policy. Effectiveness of these initiatives needs to be verified and integrated with the SESA
- Insufficient weight is given to biodiversity concerns, which are not mainstreamed into the oil and gas sectoral policy framework, unless specifically targeted.
- There is a lack of consistency and uniformity in the quality of EIAs submitted for oil and gas projects.

4.3 OIL AND GAS DEVELOPMENT CONTEXT

- There is a high degree of uncertainty regarding the actual Mauritania onshore and offshore hydrocarbon potential reserves; however a certain potential, to be further confirmed, can be recognized at present.
- Both the Taoudeni and Coastal basins are immature from the exploration and production standpoint (e.g. the basins' hydrocarbon potential has yet to be assessed and developed).
- Exploration of the Taoudeni Basin is at a very early stage.
- International oil industry presence in the country is not well established at present. There has been variable interest by international oil and gas companies in Mauritania, as witnessed by the number of blocks licensed in both onshore and offshore, followed by withdrawals.
- Only a few foreign oil companies among the majors have been directly involved in the country (Woodside, Total, Petronas, Repsol, Wintershall and just recently Tullow Oil). Most E&P activities to date have been undertaken largely by small and some medium oil companies. RIM has high financial and technical risk in a logistically challenging context.
- Lack of significant offshore reserves discovered so far (instead of what is occurring in other countries in the Western Africa region) capable of triggering the real interest of the oil companies in the country has reduced foreign interest and investment.
- Political instability and a lack of a clear regulatory process may have further jeopardized foreign investment.
- Mauritania was admitted as an EITI candidate country in September 2007. On 14 December 2010, the EITI Board designated Mauritania as an EITI Candidate country that is "close to compliant" and was granted six months to achieve compliance (12 June 2011), or undergo a new validation process.

4.4 ONSHORE

- There has been no production to date onshore, although there appears to be good geological potential based on analogue models. Large portions of onshore acreage remain unexplored.

- Interactions and potential conflicts or benefits with mining activities have yet to be fully evaluated. There is an overall lack of coordination between mining and oil and gas activities.
- Lack of infrastructure (e.g. roads) is an impediment to development of the oil and gas industry.
- There is a lack of permitting or a regulated system for control of discharges to air, soil and water and a management process for disposal of municipal and industrial wastes.
- There is a lack of, or apparent inconsistency, in the application of best management practices for the onshore, in particular for remote areas.
- There are no restrictions or limitations to operations in protected areas e.g. World Heritage sites. Restrictions were recently introduced in National Parks, but not in other sensitive areas.
- There is a centralized cadastral information system for mining, but not for hydrocarbon activities; and
- There is a lack of social information and data for the Taoudeni basin and understanding of impacts of oil and gas development on local communities.

4.5 OFFSHORE

- In the absence of significant additional finds, current offshore production in RIM is projected to last no more than 10-20 years.
- The country's long-term economic health is highly dependent on functioning coastal and marine environments.
- The major threats to the coastal and marine environment in Mauritania can be roughly grouped into three main categories: depletion of biological resources by overexploitation; pollution; and climate change.
- If not properly managed, development of the offshore oil sector could affect both artisanal and industrial fishery activity.
- There is no capability at the national level to respond to a major oil spill. There is a lack of enforcement of the MARPOL and FIPOL Conventions, even though they have been ratified by RIM.
- There is a lack of clear understanding regarding impacts of the oil and gas industry on fisheries.
- There is a lack of best practice for offshore operators and no apparent coordination between private oil companies.
- There is no definition of sensitive areas that are off limits to oil and gas development, or "no go" zones outside of the National Parks.

- There is a lack of permitting or a regulated system for control of discharges to air and the marine environment.
- There is little readily available information relating to the control of the FPSO and measures taken to prevent small spills when offloading.
- There is no routine follow-up and monitoring by environmental regulatory authorities. Informal checks are rather done by the SMH.
- There is a reduction in fishing areas where oil and gas activity occurs and interference with commercial fishery fleet.
- EIA does not appear to be done on a regular basis for all phases of oil and gas development, e.g. seismic operations.
- There is a lack of institutional capacity in both the MEDD and MPEM regarding assessment of environmental and social impacts relating to offshore oil and gas operations. Improved capacity appears to exist in the Ministry of Fisheries.

4.6 CONCLUDING REMARKS

- Geologically, Mauritania holds reasonably good potential reserves of oil and gas that, if properly developed and duly governed, can provide the country with significant future revenues;
- Independent of the future level of E&P activity the country may face in the short and long term period, the core responsibility of RIM Authorities is to implement an overarching policy aimed to promote and govern the oil industry development in the country;
- Implementation of an overarching legal and regulatory framework for the oil industry is of prime importance to the successful development of domestic hydrocarbon resources, while not compromising the integrity of the natural, social and cultural environments;
- In the absence of proper reforms and their effective implementation, the rapid development of the oil and gas sector in Mauritania in the coming years will likely take place without due consideration of biodiversity conservation or sustainable management of critical natural ecosystem goods and services;
- The failure or success of a policy promoting and regulating petroleum sector development, is strictly dependent on Government capabilities and capacity to implement an efficient regulatory and control system able to:
 - Minimize undesired environmental and social effects;
 - Undertake necessary corrective actions, as required;
 - Allow transparent financial management of oil revenues; and
 - Improve stakeholder participation

- Environmental and social effects from oil activities will likely superimpose over existing environmental and social challenges. Interaction of effects to be fully assessed include the following:
 - Offshore: fishery overexploitation and climate changes; and
 - Onshore: mining exploitation and progressing desertification.
- Even assuming no catastrophic oil spills or accidents, E&P development activity, if not properly regulated, could place significant stress on the marine environment with potential negative effects on Mauritania fisheries, both artisanal and commercial;
- A lack of understanding of the importance of onshore ecosystem goods and services, may lead Government authorities to underestimate the real importance of potential environmental and social impacts in the onshore;
- The SESA alone cannot effectively determine how and what degree of impacts will result from E&P offshore operations on fishery activities;
- The SESA outlines the critical decision factors to enable Mauritania Government to make strategic decisions; and
- The success of the SESA will depend on its effective implementation and the political will of the Government of RIM to act on its recommendations.

5. SESA WORK PLAN

This chapter presents a work plan for implementation of strategic recommendations for the SESA, derived from the analysis and evaluations in the preceding chapter. The SESA Action Plan was designed to meet two main requirements:

- Organization of the recommendations around four strategic themes, which consider strengthening institutions and developing a regulatory framework (Themes 1&2) and effective protection of environmental and social conditions (Themes 3&4); and
- Identification of effective actions and requirements for SESA implementation.

It is important to note that the implementation stage for the recommendations in this chapter constitutes the final act for the strategic assessment carried out within the SEA framework and it is imperative that they be completed in order to attain the specific objectives defined by the SESA.

5.1 PLAN OBJECTIVES

The objectives of the SESA work plan are as follows:

- To present a series of recommendations arising from key findings of the SESA;
- To suggest a priority timeline for implementation of the recommendations;
- To identify who (which agency) is responsible for implementation;
- To provide some preliminary costs that will require confirmation and adjustment by Mauritanian authorities; and
- To identify needed implementation measures (see Chapter 6).

5.2 PLAN ORGANIZATION AND STRUCTURE

The SESA Implementation Plan is structured into four overall themes which are presented below in the following sections.

- Theme 1: More Efficient and Effective Institutions;
- Theme 2: Strengthening the Policy, Legal and Regulatory Framework for Oil and Gas Development;
- Theme 3: Ensuring Safe Oil and Gas Operations; and
- Theme 4: Ensuring Social Benefits from Oil and Gas.

Each theme contains the related recommendations organized as follows:

- **Finding** – refers to a summary of the SESA key finding described in Chapter 4 and forms the basis for the Recommended Actions.

- **Priority** – organized in three priorities a) immediate – 2011-2012, b) short-term – in the next three years (2012-2013) and c) medium to long term – in the next three to five years (2013-2015). These priorities define the ideal time span within which to follow up on the Action Plan, and therefore the implementation of the recommendations.
- **Justification** – represents the justification for implementing the action.
- **Recommended Action** – a series of action(s) which should be undertaken to implement the recommendations.
- **Anticipated Outcomes** – describes the anticipated outcome if the action is fully implemented.
- **Responsibility** – assigns the responsibility for implementation of the action.
- **Cost** – presents a preliminary cost estimate which should be re-determined by the responsible Mauritanian authority.

A general summary of the Plan, its four themes and their associated subthemes are as follows:

Theme 1: More Efficient and Effective Institutions – 7 recommendations

- Institutional Organization and Structure ;
- Expanded Environmental Governance ;
- Environmental Monitoring and Follow-up ;
- SESA Implementation ;
- Improved Capacity and Environmental Awareness;
- Access to Information and Data; and
- Coordinated Spatial Planning.

Theme 2: Strengthening the Policy, Legal and Regulatory Framework for Oil and Gas Development – 3 recommendations

- Improved Legal and Regulatory Framework;
- Involvement of the Private Sector; and
- Regional SEA Cooperation.

Theme 3: Ensuring Safe Oil and Gas Operations – 6 recommendations

- Effective Response to Oil Spills and Incidents;
- Development of a National Emergency Response Plan;
- Maintaining Healthy Oceans and Biodiversity;

- Funding for Biodiversity Conservation;
- Management of environmental damages; and
- Insurance and Liability Reduction.

Theme 4: Ensuring Social Benefits from Oil and Gas – 4 recommendations

- Improving Dialogue between Government, Civil Society and Industry;
- Benefitting Stakeholders and Communities from Oil and Gas Development;
- Wise Use of Water; and
- Linkages to Poverty Reduction.

5.3 DETERMINATION OF COSTS

Preliminary cost determinations for SESA implementation for immediate, short-term and medium term priorities are described above in Section 5.2. These costs shall be reassessed by the Comité de Suivi during initial implementation of the SESA and adjusted according to Mauritanian costs for services. They should be considered as preliminary estimates only.

Costs are presented in US dollars and represent estimates considering European or North American professional rates for similar services. Costs are broken down as follows:

- Human resources – salaries and fees in locally estimated prices;
- Material and Transport – costs of equipment;
- Training – costs for external training and capacity building;
- Administration – administrative costs associated with implementation;
- External consultancy – cost of foreign technical assistance; and
- Other – costs not included in the above.

RECOMMENDATION #1:

**STREAMLINING ENVIRONMENTAL RESPONSIBILITY –
INSTITUTIONAL ORGANIZATION AND STRUCTURE**

5.4 THEME 1: MORE EFFICIENT INSTITUTIONS

This theme contains a series of recommendations directed towards facilitating the development of an efficient administrative structure to manage environmental and social impacts arising from oil and gas development in Mauritania. It also addresses capacity building and training, information storage and dissemination issues.

FINDING

There is a lack of clear definition of the roles and responsibilities of the Ministry of Environment and Sustainable Development and inter-institutional coordination with interdepartmental sectoral authorities for environmental and social management of oil development projects.

PRIORITY

Immediate

JUSTIFICATION

As of 2010, the Ministry of Environment and Sustainable Development (MEDD) is the competent ministerial authority responsible for establishing government policy and programs for the environment, monitoring environmental quality, reviewing environmental impact assessments, promoting public participation, education and information dissemination, managing environmental risks, conducting environmental change studies, among other functions. It is not, however, charged with issuing environmental approvals and permits for the oil and gas sector which is under the responsibility of the MPEM, specifically the Directorate for Promotion of Hydrocarbons and Monitoring of Operators. It is not clear under the current regulatory regime as to which government agency is responsible for environmental performance post approval, including monitoring, compliance and enforcement, which for the most part is completely lacking in Mauritania.

This division of environmental responsibility between MEDD and other sectors persists, in part due to the fact that this was considered the norm prior to the creation of the Ministry of Environment and Sustainable Development in 2008. This dual continuance of environmental competencies is common in other jurisdictions that have undergone a similar transformation whereby a Ministry of Environment and Sustainable Development was created on top of other persistent environmental competencies and responsibilities at the sectoral level. This dual environmental responsibility results in the following:

1. Conflicts of interest persist within the Ministry of Petroleum Energy and Mines, although they were reduced due to the approval of the new decree “setting the responsibilities of the Minister of Energy and Petroleum and the organization of the central administration of his

Department". The Directorate Oil Geology and Data and Promotion of Hydrocarbons and Monitoring Oil and Gas Operators is responsible for the development of the oil and gas sector, while at the same time charged with managing EIAs for the sector, and environmental aspects in general;

2. Conflicting regulatory functions and sectoral responsibilities between the MEDD and the Ministries of Fisheries and Marine Economy (sectoral environmental approvals);
3. Confusion and overlapping responsibility for regulating environmental performance post approval, specifically monitoring, follow-up and compliance activities; and
4. Difficulties in creating standardized norms or legislation for environmental compliance and protection, in that no such legislation regulating the oil and gas sector currently exists.

This division of sectoral environmental responsibility between MEDD and MPEM creates unnecessary confusion and overlap that impedes development of an efficient regulatory control system for the oil and gas sector.

RECOMMENDED ACTION

It is recommended that the Government of Mauritania take steps to more clearly define the institutional structure for environmental management whereby MEDD is the authority responsible for establishing the national environmental policy, while sectoral environmental departments within other ministries are responsible for the policy's implementation and sectoral regulation. In addition, a National Environmental Agency should be established to ensure effective follow-up, monitoring and compliance with established government policy and legal instruments.

The responsibilities of each organization should be as follows:

1. MEDD (Ministry of Environment and Sustainable Development)

In particular, among its other competencies, the Ministry of Environment and Sustainable Development should:

- Address the national environmental policy and the objectives for environmental protection, preservation and improvement;
- Establish the overall discipline and enforce pollutant discharge limits in order to protect the quality of water (surface water, marine and groundwater), soil, subsoil and air;
- Facilitate the environmental approval of hydrocarbon E&P related projects;
- Manage and coordinate the activities of the Technical Committee for Environment and Sustainable Development (Groupe Technique pour les Evaluations Environnementales, GTEE), responsible for conducting environmental impact assessment and strategic environmental assessment of plans, programs or policies at the national level ; and
- Coordinate activities of the National Environmental Agency.

It is recommended that MEDD be supported by and benefit from GTEE technical advice (see Recommendation 2). The role of GTEE is already provided in the existing Environment Code as well as in the proposed new Environmental Code (Article 30). It is also recommended that technical representatives of other ministerial sectoral departments are represented in the GTEE committee.

2. Sectoral Environmental Units

Over and above the activities defined by law, sectoral environmental units of each government department should:

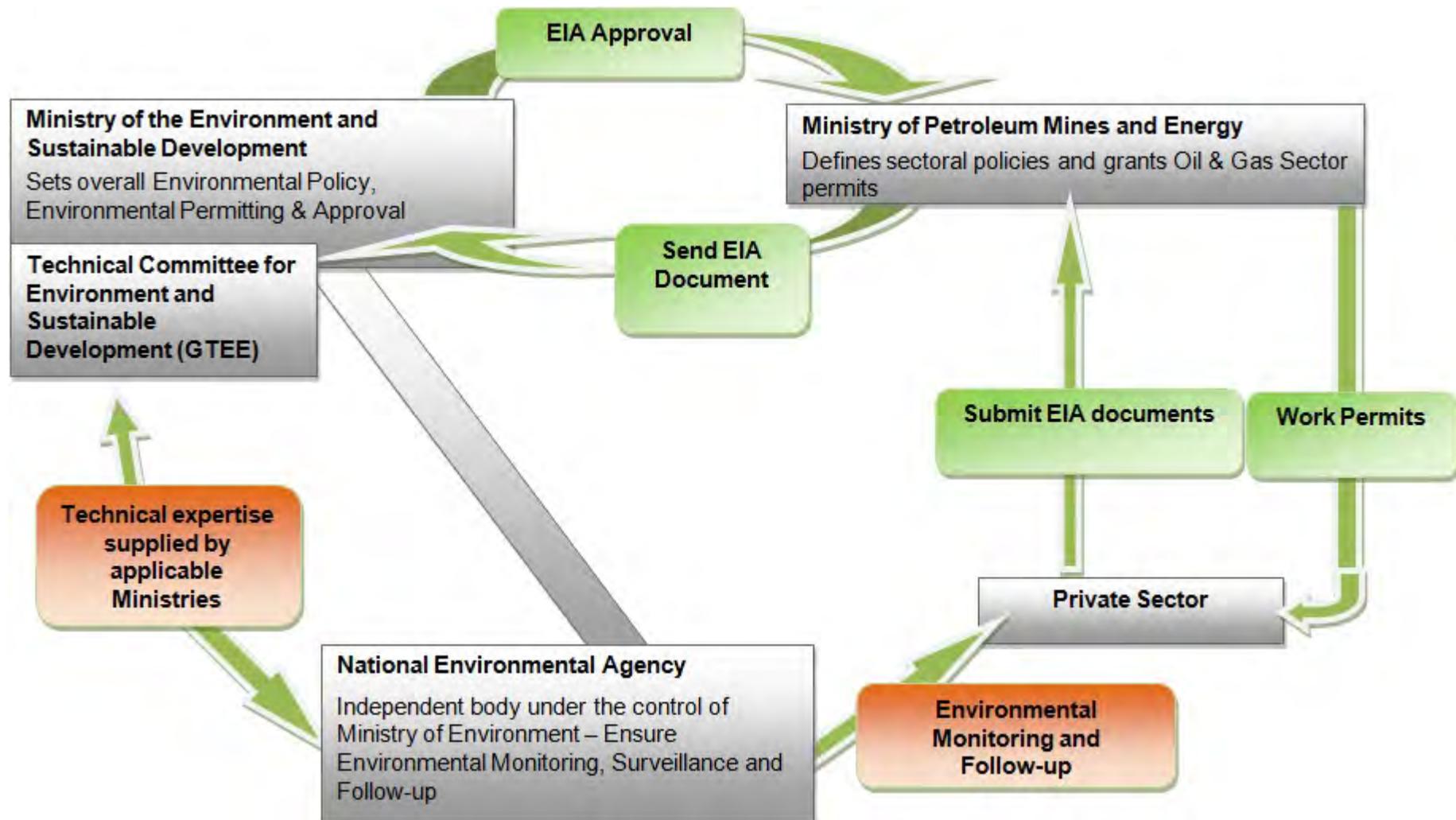
- Coordinate the issuance of environmental discharge and other permits (for example, discharges to sea, atmosphere, waste management, etc); and
- Provide technical support to the GTEE for environmental assessment review through its representatives in the Committee.

3. National Environmental Agency

Environmental surveillance, monitoring, follow-up and control is recommended through a National Environmental Agency to be established as an independent body, under the control of MEDD. For the purpose of the environmental monitoring, the National Environmental Agency should make use of existing technical expertise and scientific resources at the sectoral level.

The relationship of these three agencies is shown below in Figure 5-1: *Relationship for Environmental Control of the Mauritanian Oil and Gas Sector*.

Figure 5-1: Relationship for Environmental Control of the Mauritanian Oil and Gas Sector



ANTICIPATED OUTCOME

Once implemented, this transfer of responsibility should result in a number of immediate benefits including a) an improved environmental approval and licensing process b) removal of any conflict of interest for environmental protection and resource development at the sectoral level c) strengthened environmental management capability within MEDD, beyond the permitting and approval level d) improved sectoral performance and regional planning across multiple sectors and e) effective monitoring, surveillance and follow-up functions.

RESPONSIBILITY

Government, MEDD and Sectoral Environmental Departments

COST

Costs for this activity are to set up the National Environmental Agency and to realign the Sectoral Environmental Departments. Costs are estimated at 72 person months, which is equal to approximately \$150,000.

RECOMMENDATION #2:

**EXPANDED ENVIRONMENTAL GOVERNANCE –
IMPROVED MANAGEMENT OF THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS**

FINDING

There is no formal unit within MEDD responsible for environmental assessment of oil and gas projects.

PRIORITY

Immediate

JUSTIFICATION

Currently, there is no formal environmental unit within the MEDD charged with the responsibility of guiding the overall EIA process in general, and oil and gas industry projects in particular, although recommendations have been previously made to establish a dedicated unit within MEDD (UNESCO 2004; SESA team). At the present time, the Environmental Control Department of MEDD (Direction du Contrôle Environnementale) is responsible for reviewing EIAs as part of its' GTEE function.

RECOMMENDED ACTION

It is recommended that a dedicated environmental unit be established within the Ministry of Environment and Sustainable Development (MEDD) to manage the EIA approval process for oil and gas projects.

A suggested EIA review process for oil and gas projects follows:

- The MEDD EIA Unit shall undertake the EIA administrative procedure for hydrocarbon E&P projects, while GTEE, its technical support committee, shall provide a coordinated technical review and validation of EIA documents.
- At the conclusion of the EIA process, MEDD shall submit their conclusions regarding the EIA approval to the environmental unit of MPEM responsible for granting the final authorization of the oil and gas project. Final authorization shall include, the environmental approvals and related permit conditions (or reasons for refusal) resulting from the EIA approval process at MEDD.
- It is recommended that the MEDD EIA Unit is technically supported by the Technical Committee for Environment and Sustainable Development (GTEE) for the mandatory review of the environmental impact assessment studies produced within the EIA process. It is recommended that technical representatives of different sectoral departments of concerned ministries are included in the GTEE.
- Representatives in the GTEE should be adequately trained; and GTEE should assume the following responsibilities:
 - Environmental impact assessment validation of all the projects subject to EIA provisions (Appendix A, Part B - Decree no. 2007/105 (2nd decree on EIA));
 - Technical Review of Environmental Management Plans for oil sector projects and other projects where this is required;
 - Technical support to MEDD on specific environmental issues and assistance for preparation of Strategic environmental assessment of plans, programs or policies at national level; and
 - Advice to the MEDD regarding environmental issues.
- GTEE technical members should be selected on the basis of technical skills developed in the following fields: biology, geology, chemistry, engineering, natural sciences, and medicine. They should be selected from specialists and experts from research institutes and universities and integrated with representatives of environmental departments from other ministries.

ANTICIPATED OUTCOMES

A dedicated environmental unit within MEDD will gain additional capability in managing EIA processes and increased capacity towards a life cycle compliance function.

By establishing the GTEE, the MEDD will fulfill specific provisions included in the current Environment Code (Law n. 45/2000) and in the new draft Code on Environment and Sustainable Development.

GTEE will advise MEDD and other Government agencies responsible for environmental assessments. GTEE represents the ideal solution to maximize technical skills and expertise within sectoral departments ensuring at the same time that coherent and consistent criteria for EIA assessment and validation are applied across Mauritania for a number of different projects types subject to EIA processes, not only the oil and gas sector.

RESPONSIBILITY

Government and MEDD

COST

Preliminary setup costs are estimated at around \$200,000 - could be operational in 6-12 months.

RECOMMENDATION # 3:

ESTABLISH THE NATIONAL ENVIRONMENTAL AGENCY DEDICATED TO MONITORING AND FOLLOW-UP BEYOND ENVIRONMENTAL APPROVAL

FINDING

There is no process for monitoring, follow-up and compliance of oil and gas projects following project approvals.

PRIORITY

Immediate

JUSTIFICATION

There is currently no monitoring, follow-up, compliance or regulation of the performance of Mauritania's oil and gas industry. The Hydrocarbon Code (Law No. 2010/33) stipulates that an environmental management plan is required to be submitted as part of the Production Sharing Agreement, but the structure, format and compliance requirements of the plan are unknown. Also, the competence function of who is responsible for carrying out compliance functions is not clear between MEDD and MPEM.

Currently, oil companies conduct environmental monitoring of emissions during E&P operations and routine activities (self-monitoring) as established by conditions in the PSA. SMH have access to monitored data, but there is no independent verification or control.

In order to avoid potential conflict of interest between the control authority and the oil and gas company, it is recommended that an independent third party organization be responsible for monitoring, follow-up and enforcement of control measures included in the Environmental Management Plan. The establishment of a National Environmental Agency (NEA) was envisaged as the most viable solution early on in the SESA process in 2008⁸.

The responsibilities of the National Environmental Agency should be the following:

- Responsible for carrying out key environmental controls of E&P activities and for ensuring that operators comply with environmental legislative requirements and ensuring that new licence applicants have satisfactory procedures in place to operate in a manner which reflects best environmental practice;
- Responsible for monitored data management and the implementation of the environmental information system (See Theme 11);
- Endowed with adequate human, logistic and financial resources funded through specific agreements with the oil companies; and
- Operating in coordination and cooperation with Universities and research institutions.

Furthermore, the National Environmental Agency should be responsible for gathering the necessary data to assess the state of the environment in Mauritania in the upcoming years, e.g. to assess the evolution of the level of integrity and conditions of the ecosystem and natural resources subsequent to the development of oil activities and also those generated by other industrial activities such as fisheries, mining, and transport.

RECOMMENDED ACTION

It is recommended that the National Environmental Agency be established under the control of MEDD. The National Environmental Agency shall be charged with developing an auditing and compliance function to ensure conformance of the oil and gas industry with newly developed guidelines and regulations. Environmental monitoring and compliance functions should include the following:

- Establishment of a technical and institutional structure for monitoring;
- Adequate training of inspectors;
- Independent review and auditing of environmental performance of individual oil and gas operators;

⁸ SESA Team - Suivi de la videoconference du 9 juillet 2008 (2008)

- Review of monitoring reports submitted by oil and gas operators;
- Under the MEDD mandate, inspection of case incidents, reported violations and public complaints;
- Assessment and environmental damages and ecosystem services loss, assignment of fines and sanctions for environmental non-compliance;
- Continued sampling and monitoring of baseline conditions; and
- Monitoring cumulative impacts and impacts following the post decommissioning phase.

In the offshore, monitoring efforts should build on existing capacity and expertise by a number of organizations including IMROP, local academic institutions and international organizations such as WWF and IUCN.

ANTICIPATED OUTCOMES

The establishment of a National Environmental Agency will provide a competent regulatory authority capable of monitoring the performance of the oil and gas industry throughout all development phases. It will also allow for the establishment of a compliance based regulatory system in place of the approval based system currently in place.

The National Environmental Agency would be a general resource for RIM providing technical activities and scientific research programs for preserving biodiversity, safeguarding of the marine environment and water resources and protection of soil and air quality. It would be also charged with the preparation of State of the Environment reports for Mauritania.

RESPONSIBILITY

Government and MEDD

COST

Setup costs are estimated at around \$400,000 with potential cost sharing and funding mechanisms from industry. The NEA could be operational in 6-12 months.

RECOMMENDATION # 4:

EXTEND ROLE OF THE COMITE DE SUIVI IN SESA IMPLEMENTATION

FINDING

The SESA will fail unless there is a dedicated organization to ensure its implementation.

PRIORITY

Immediate

JUSTIFICATION

At the present time, there is no coordinated agency or responsible authority tasked with the overall responsibility for implementation of the SESA for sustainable oil and gas development in Mauritania. While the Comite de Suivi has been created for the purpose of overseeing development of the SESA, its function beyond completion and implementation of the SESA is uncertain. It is important to have one agency or coordinating group responsible in this regard for the following reasons:

- The Comite de Suivi has effectively been operating in an inter-institutional coordination capacity since the beginning of the SESA project and has benefitted from capacity building with the SESA team, sectoral knowledge and understanding of the organizational structure and function within the Mauritanian institutions;
- As a result of this capacity and also its breadth of ministerial representation, it is fully capable of ensuring that SESA recommendations and implementation measures are fully carried out; and
- The Comite de Suivi would be an effective liaison between the various ministries that are either responsible for, or affected by oil and gas development, namely Energy and Petroleum, Environment, Mines, Transport, Fisheries.

RECOMMENDED ACTION

It is recommended that the role of the Comite de Suivi be extended from 2011-2012, or as necessary, to act as an overall coordinating body for ensuring the proper and timely implementation of SESA outcomes and its recommendations for the sustainable development of the Mauritanian oil and gas sector.

A capacity building program is recommended to ensure that members of the Comite de Suivi receive a high level of training within the framework of the disciplines that make up the Action Plan.⁹

Finally, considering the tasks that the Comite de Suivi will carry out, it would be ideal if MEDD and MPEM could, through the Comite de Suivi, ensure that Mauritania becomes part of NORAD's Oil for Development Program.

ANTICIPATED OUTCOMES

Enhanced SESA follow-up coordination will have the following benefits, amongst others:

- Reduced conflicts between agencies;
- Improved decision making and actions;

⁹http://www.regjeringen.no/en/dep/ud/selected-topics/development_cooperation/oil-for-development.html?id=446108

- Maintenance of capacity in strategic environmental assessment and potential application to other sectors;
- Reduction of SESA implementation times and promotion of a more streamlined endorsement process; and
- Effective implementation of SESA recommendations.

RESPONSIBILITY

Comite de Suivi, PRISM, MEDD, MPEM and other government departments willing to participate

COST

The Costs are estimated at \$390,000. Extension of participant costs for 2011-2012.

RECOMMENDATION # 5:
IMPLEMENT COMPREHENSIVE ENVIRONMENTAL, HEALTH, SOCIAL AND SAFETY TRAINING ACROSS ALL PHASES OF OIL AND GAS DEVELOPMENT

FINDING

Weak institutional structures and lack of local competence pose major challenges for Mauritania to effectively manage its petroleum resources. Training and capacity building should be an integral component of effective environmental management.

PRIORITY

Immediate

JUSTIFICATION

The SESA Team recognizes the recommendations of both IUCN and UNESCO/GTZ towards implementation of additional training and capacity building relating to environmental management as applied to the oil and gas industry.

The development of a capacity building program represents an important and critical step towards the successful implementation of the institutional and legal upgrading as described in Themes 1 and 2. In fact, only a complete technical understanding of E&P activities, full grasp of environmental and social issues and the capacity to effectively supervise, control and measure potential environmental and social effects will enable the RIM Government to put in place an efficient oil governance system

No less important is that the benefits of an extensive training program will also positively extend to other sectors of Mauritania institution and civil society that are not necessarily linked to oil industry development. Besides the need of setting the appropriate training objectives and the identification

of the major technical and organizational gaps within the institutions involved, the SESA Team has initially identified the following areas where training should be undertaken:

- General petroleum technical training (“Petroleum 101”);
- Environmental and social impact assessment;
- Oil spills and oil spill response;
- Other topics – monitoring, compliance, regulations, audits etc.;
- Environmental and social monitoring methods and practice;
- Database development and management
- Environmental Damage and Environmental Risk Assessment;
- Public consultation and involvement; and
- Resettlement, Land Acquisition and Compensation.

In addition to these general topics, training and capacity building is recommended across a number of levels including:

- In-country training through courses, seminars and workshops;
- On the job training;
- Technical conferences;
- Out of country training – regional and international;
- External (out of country) advisors and technical assistance providing in-country training; and
- Site visits to see good and worst operating practices.

(Goodland 2006) recommended that Production Sharing Agreements normally specify that each oil concessionaire will finance and promote training across all sector aspects and activities.

Ideally, funding for training purposes shall be identified among oil operators by means of duly constituted trust funds, or alternatively, through international financial institutions and other interested donors.

RECOMMENDED ACTION

Training and capacity building within the Mauritanian oil and gas sector needs to be designed in terms of a) financing b) scope, breadth and extent c) coordination and d) record keeping.

It is recommended that one central coordinating body be charged with the identification of training and capacity building requirements. This in practice could be the Inter-Ministerial Council (currently the Comite de Suivi). This group would be responsible for managing overall training but more

importantly ensuring that records are adequately kept of who received training, in what subjects and over what time.

In regard to financing, it is important that monies earmarked for training from production sharing agreements should be accounted for, managed and properly dispersed. It would also be useful to allocate a portion of other financial mechanisms, such as signing bonuses, or other windfall revenues, specifically for training and capacity building purposes.

Furthermore, donor efforts should also be coordinated through the Inter-Ministerial Council to avoid duplication of training efforts and unnecessary over-expenditure of precious training monies.

In regard to breadth of training, it is recommended that a training needs assessment be conducted across the Ministries of Environment and Sustainable Development, Energy and Petroleum, Fisheries and Transport to determine what specific training needs are required, who should be trained, what type of training should be received etc. Further to that assessment, a training plan should be developed. Some of the training topics could include the following:

- Environmental and social impact assessment at the project level;
- Strategic assessment and regional assessment;
- Cumulative effects assessment;
- Environmental management and management systems;
- Environmental supervision and inspection;
- Environmental monitoring and follow-up;
- Environmental auditing;
- Environmental sampling;
- Environmental data management, GIS and remote sensing;
- Route and site selection;
- Linear development planning and management (pipelines);
- Environmental regulations, compliance and enforcement;
- General oilfield environmental management;
- Waste management (solid and liquid);
- Air emissions, modelling and management;
- Surface and groundwater management;
- Soils and reclamation issues;
- Spills, accidents, contingency and risk management;

- Decommissioning and abandonment;
- Public consultation and engagement;
- Conflict resolution and mediation;
- Social impact assessment;
- Community development;
- Resettlement and Land Acquisition;
- Environmental and social issues by development phase (seismic, drilling, production – offshore and onshore); and
- Oilfield safety, security and first aid.

Records of those receiving training should be systematically recorded in a centralized training registry.

ANTICIPATED OUTCOMES

It is expected that the implementation of a comprehensive training system with training records will greatly improve the capacity of the MEDD and MPEM to effectively manage the oil and gas sector. It could also reduce turnover in those organizations.

RESPONSIBILITY

Comite de Suivi, PRISM, MEDD, MPEM, and other applicable governmental departments

COST

The estimated costs for a capacity building program are around \$200,000.

RECOMMENDATION # 6:

THE GOVERNMENT OF RIM SHOULD MOVE TOWARDS ESTABLISHING A DEDICATED SPATIAL INFORMATION SYSTEM TO ASSIST IN THE INTEGRATED PLANNING OF OIL AND GAS ACTIVITIES

FINDING

There is a centralized cadastral information system for mining, but for the system for hydrocarbon activities is in development. There is no coordinated spatial information system that contains data on all extractive industries, which could then be used in the planning of oil and gas development as well as the mining industry.

PRIORITY

Short Term

JUSTIFICATION

As mentioned previously there is no centralized information system within government for the storage, retrieval and dissemination of environmental and social information. Localized initiatives such as the Banc d'Arguin have been initiated.

The establishment of a dedicated spatial information system will have a number of benefits including the following:

- Storage and disclosure of all regulatory submissions such as EIAs;
- Public disclosure of blocks in operation by various oil companies and information about their activities;
- Serve as a centralized repository for map based information arising from a number of sources in Mauritania, not strictly related to oil and gas;
- Reduce duplication of effort in collecting unnecessary baseline information;
- Identification of critical areas of biodiversity, fisheries or other environmental and social resources;
- Help improve the public consultation and review process;
- Could be supported by a variety of donors and private sector contributors; and
- Minimize environmental and social impacts and ensure efficiency of Emergency and Oil Spill Response Plans.

RECOMMENDED ACTION

The Government should move towards establishing a centralized spatial information system, perhaps with support and contribution on a regional basis outside of Mauritania (e.g. Senegal). This system could be used to store and disclose all regulatory submissions, most suitably through a web based storage and retrieval system. The information system could also be used by various government agencies to house and disseminate legal, regulatory and institutional information pertaining to the oil and gas industry. Such information systems are currently under consideration by the World Bank (Integrated Environments 2009).

Finally, it is recommended that the recent project for the creation of a spatial information system for the oil and gas sector, that MPEM has just started, be integrated with the existing system for the mining industry in order to create an integrated information system for the Mauritanian extractive industries.

ANTICIPATED OUTCOMES

The immediate benefit to a centralized information system is the establishment of ready access to environmental and social information and activities of the oil and gas industry in Mauritania. It will

also help in the understanding of where oil and gas is permitted and not permitted within the country.

RESPONSIBILITY

The primary responsibility for the integrated spatial information system should be MEDD, or some dedicated government authority.

COST

Accounting for the fact that a project has already begun to establish a spatial information system for oil and gas activities, the estimated costs for an integrated spatial information system would be around \$250,000 over 12 months.

RECOMMENDATION # 7:

UNDERTAKE COORDINATED SPATIAL PLANNING TO AVOID LAND AND RESOURCE CONFLICTS WITH THE OIL AND GAS INDUSTRY

FINDING

There is an overall lack of inter-institutional coordination with interdepartmental sectoral authorities for environmental and social management of oil development projects.

PRIORITY

Short Term

JUSTIFICATION

If not properly planned, uncoordinated oil and gas activity can lead to conflicts with other resources and their development. Key examples of these types of conflicts are impacts of fishing offshore and impacts on potable water resources onshore.

It is important that coordinated land use planning be implemented including coordination between responsible ministries to avoid land use and resource conflicts with the oil and gas industry.

RECOMMENDED ACTION

It was recommended that the Comite de Suivi expand their role to coordinate activities of the oil and gas industry with other sectors. It is recommended that this role could also include measures to coordinate oil and gas activities both onshore and offshore as follows:

- Completing a cumulative effects assessment of oil and gas activities in both onshore and offshore to identify where conflicts occur with other resource development;
- Undertake a mapping exercise to identify spatially where these conflicts occur; and

- Introduce a land use zoning process to plan for coordinated development and look for synergies for shared development responsibilities (e.g. road construction).

ANTICIPATED OUTCOMES

Implementation of a coordinated land use planning process should result in improved sectoral coordination and development and lead to a reduction in public conflicts over shared resource use, such as water.

RESPONSIBILITY

Comite de Suivi and MEDD.

COST

Estimated costs are \$100,000

RECOMMENDATION # 8:
**IMPROVE THE POLICY, LEGAL AND REGULATORY FRAMEWORK GOVERNING OIL AND GAS
ACTIVITIES**

5.5 THEME 2: STRENGTHENING THE POLICY, LEGAL AND REGULATORY FRAMEWORK FOR OIL AND GAS DEVELOPMENT

FINDING

There is an incomplete legal framework in Mauritania that sets overarching intentions regarding environmental management of the oil and gas industry.

PRIORITY

Immediate

JUSTIFICATION

The SESA legal and regulatory review concluded that there is an ineffective regulatory regime in place for managing the environmental and social impacts of oil and gas development. This fact was already recognized when the need for an SEA based approach was identified to ensure an early evaluation of environmental and social risks in the absence of appropriate PPPs coordinated set of legislation and regulation.

There is a need for improved environmental regulation specific to the oil and gas industry.

The Environmental Code and Environmental Impact Assessment Law sets out general provisions for environmental protection and how environmental impact assessment of projects should occur. The draft Petroleum Code (only recently approved) lays out more general provisions for environmental

protection such as the need for an environmental management plan (Art. 36), the implementation of international best practices (Art. 31), responsibility for environmental damage (Art. 32), flaring reduction (Art. 40), reclamation plan (Art. 41) etc. While the intent of these general provisions is recognized, they still lack specificity and details as to how an effective management framework can be implemented throughout all phases of oil and gas development.

Main gaps in the legislative and regulatory framework are as follows:

- There is a lack of guidelines or regulatory limits on discharges for the offshore oil and gas industry, including the following: drill cuttings, drilling mud, excess cement, produced water, completion and well workover fluids, produced sand, cooling water, sewage waste, food waste, deck drainage and other wastes. Similar guidelines for onshore operations are also lacking.
- There is a need to standardize best practices between operators.
- There are no regulations regarding fines and sanctions for environmental non-compliance. Monitoring, audits and compliance evaluations by regulatory authorities are non-existent.
- The “Polluter Pays Principle” while described in the Environmental Code is not fully elaborated as to how exactly how environmental damages will be determined, how enforcement will take place and how fines will be assessed and collected.
- The environmental impact assessment legislation, while in its infancy, is still not fully developed. In particular, there are no sectoral guidelines for EIA preparation specific to the oil and gas industry. The timing of EIA review is defined by law but many times the review cannot be completed on time by regulatory authorities and the project receives approval without full review. It is also not clear who undertakes the EIA review within MEDD, as the GTEE has not been legally constituted by decree and as a result is not operational. The capacity of regulatory authorities to adequately review EIAs with specific knowledge of oil and gas activities, impacts and mitigation measures is also lacking. Furthermore, the terms of reference for EIAs are generic, lack scoping and details specific to each oil and gas project.
- There is no capacity in place for environmental monitoring, follow-up and compliance once an environmental license has been granted.

The current legislative framework was recently modified and is still being defined. The effectiveness and the applicability of these adopted decrees, or those that could be adopted in order to protect and conserve marine, coastal and terrestrial biodiversity, (particularly in relation to protected areas) remains to be seen. Provisions defining where the oil and gas industry can develop in relation to protected areas, particularly in the offshore, require verification.

RECOMMENDED ACTION

It is clear that the development of the oil sector represents an opportunity for RIM. It is also clear that the Government of Mauritania needs to develop an appropriate Policy aimed to promoting the safe exploitation of the domestic hydrocarbon potential reserves, whilst preserving the environment and the civil society from potential damages. To this end, it is necessary that the oil development

policy include the coordinated review of the general existing rules (e.g. the environmental code, contract code and marine pollution codes) supplemented and integrated by the implementation of relevant decrees to make the legal framework fully operational.

In particular, MEDD needs to fully implement the EIA law with a set of clear regulations and procedures, while improving internal capacity to carry out evaluation, permitting, monitoring and compliance. The following recommendations are suggested for consideration:

- First and foremost, a set of guidelines or standards is required for establishing discharge limits for the oil and gas industry. This could be readily put in place by adopting such standards such as the IFC onshore and offshore guidelines (IFC 2009¹⁰) and other discharge guidelines such as those of Canada, Norway, U.K., USA, and those of international organizations such as the E&P Forum or IPIECA.
- Regulations should be put in place for all phases of the oil and gas process from seismic exploration through to decommissioning and abandonment both onshore and offshore.
- Guidelines for EIA preparation should also be put in place for both the onshore and offshore. Standard terms of reference for EIA should be developed.
- A national sectoral strategy specific for oil and gas development should be adopted with the help of two decisive tools: Strategic Environmental Assessment (SEA) and zoning. The role of SEA is to push development processes to move towards sustainability, enabling the integration of social, economic and biophysical aspects into the policy, programming and planning process. Zoning activities, on the other hand, will build on the existing work of the Mapping Project “Biodiversity and Hydrocarbons in Mauritania”, which pin-pointed sensitive areas of high biodiversity (high concentration of species) as well as areas that play a key role in sustaining marine biodiversity (such as nurseries, spawning areas, shellfish banks and deep sea corals). This information was overlaid onto geo-based information showing activities of the oil and gas industry.
- Transposition into national law of relevant international treaties and conventions such as Polmar, Fipol, CLC that have been signed by RIM but not yet ratified.
- The Government of RIM should ensure proof that adequate security provisions for environmental damage can be established by the operator as part of the application for the exploration or exploitation licence award. This could be done by way of a trust fund, financial security or any other equivalent financial instrument. This is in order to ensure that all permit obligations are met, including closure and decommissioning requirements.

¹⁰See [http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_OffshoreOilandGas/\\$FILE/Final+-Offshore+Oil+and+Gas+Development.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_OffshoreOilandGas/$FILE/Final+-Offshore+Oil+and+Gas+Development.pdf)

- Clear delineation of “go” and “no-go” zones for oil and gas activity should be established, including the definition of “buffer” zones where restrictions on oil and gas activity are made (refer also to Theme 6 Healthy Oceans and Biodiversity).
- The Government should commit to the establishment of a centralized information system that could be used for a variety of purposes, including dissemination of EIAs and other regulatory requirements. This information could also include maps identifying critical areas for biodiversity protection and protection of fisheries resources (refer also to Theme 11, Access to Information and Data).
- The Government should also commit to establishing a clear monitoring and compliance authority that looks at environmental performance beyond regulatory approval on a life cycle basis (refer to Recommendation #3).

ANTICIPATED OUTCOMES

The outcome of this process will be many-fold including the following:

- A strengthened regulatory process that is driven by environmental performance and resource protection, rather than environmental approval;
- Clear, consistent defined rules for oil and gas operators; and
- Transparency in the dissemination of environmental and social information.

RESPONSIBILITY

MPEM in conjunction with MEDD and other institutions as required.

COST

Costs are estimated at around \$250,000. These costs will need to be redefined by the appropriate ministries.

RECOMMENDATION # 9:

CREATION OF A MAURITANIA OPERATORS GROUP TO COORDINATE IMPLEMENTATION OF BEST PRACTICE STANDARDS FOR OIL AND GAS OPERATIONS

FINDING

At present, there appears to be little coordination of the private sector and the Government of RIM to implement best practice standards for the oil and gas industry.

PRIORITY

Medium to Long Term

JUSTIFICATION

Improvements to the environmental and social performance of the oil and gas industry in Mauritania also depend on the actions and response of the private sector in addition to the Government. At the present time, it appears that most oil and gas companies operate in a regulatory vacuum, complying with regulatory standards pertinent to their country of operation, or best international practice. In the past, oil companies have also assisted the government in improving environmental performance such as Woodside, Dana Petroleum and Total.

While petroleum companies have a legal responsibility to comply with the laws and regulations pertinent to their operations in Mauritania, they have a further corporate and moral/ethical responsibility to operate at a higher level of standard. The difficulty at present is that there are no national guidelines as to how this could be accomplished.

RECOMMENDED ACTION

It is recommended that oil and gas operators form a Mauritanian Association of Petroleum Producers (Operations Group) to work with government in improving the legal, regulatory, social and operative frameworks for the oil and gas industry. The association could also act as a central lobbying industry group to government, a practice common in many oil producing countries.

Activities of the group could be as follows:

- Development of unified operating standards towards environmental and social performance in Mauritania;
- Introducing a National Scoring System modeled on U.S. Occupational Health and Safety Administration (OSHA), or some other standards organization, to grade the companies according to their EHS performance and their commitment to adopt Voluntary Protections Programs suggested by MEDD;
- Monitoring of individual operator performance;
- Dissemination of information about oil and gas activities to the public;
- Working with government to establish a unified regulatory framework;
- Allowing operators to understand what other operators are doing; and
- Conducting research relating to clean production and environmental protection;
- Funding industry wide initiatives such as training and establishment of a centralized information system; and
- Supporting a standardized approach to corporate social responsibility and community development.

ANTICIPATED OUTCOMES

The creation of a Mauritania Operators Group would not only benefit overall industry performance but also lead to enhanced environmental and social performance through the promotion of consistent and unified environmental and social operating practices. Anticipated benefits of such a group are as follows:

- Coordinated sectoral development and conflict avoidance;
- Ensuring benefits to local communities;
- Expanding consultation and involvement; and
- Managing environmental and social risk.

RESPONSIBILITY

MPEM in conjunction with MEDD and the Comite de Suivi. Participation in this initiative should also be sought from the private sector.

COST

Estimated costs are \$50,000 over a period of 24 months.

RECOMMENDATION # 10:

THE GOVERNMENT OF RIM SHOULD WORK WITH GOVERNMENTS OF OIL PRODUCING REGIONS IN AFRICA IN A REGIONAL SEA COOPERATION PROGRAM

FINDING

There are numerous SEA initiatives underway for the energy sector in Africa, notably Ghana and Uganda (both currently in progress) and Zambia (Geological Survey Department Zambia 2010).

PRIORITY

Short Term

JUSTIFICATION

Regional SEA training in West Africa has been underway for a number of years supported by WWF and IUCN. This training has largely focused on SEA principles and practices with some reference to the WAMMSA Mining sector SEA for West Africa (personal communication, Paul Siegel, WWF; Fernando Loayza, World Bank). These training initiatives have been very useful in introducing the value of SEA to a number of environmental assessment practitioners across West Africa and its linkages and relationship with project level environmental impact assessment.

In addition, there are four SEAs currently underway or recently completed for the oil and gas sector in Africa:

- Mauritania SESA (this report) – supported by the World Bank and Government of Norway;
- Ghana – supported by the World Bank and Government of Norway;
- Zambia – completed by the Zambian Geological Survey with the support of the Government of Norway; and
- Uganda – supported by the Government of Norway.

While these SEAs all address oil and gas sector issues in each country, they differ substantially due to differing political, legal, environmental and social contexts, and also the state of oil and gas development within each country. It would be a valuable exercise to share the results of these efforts across all four countries, and a wider audience as warranted, because all are underway or will be completed within the next one to two years.

This initiative also builds on the Joint Declaration of Conference of Parties (COP 8) to the Abidjan Convention of November 2007 to undertake strategic environmental assessments prior to the exploitation and production of hydrocarbons.¹¹

RECOMMENDED ACTIONS

It is recommended that a Regional SEA Cooperation Initiative for the African Extractive Industry be established to disseminate and share the results and lessons learned of these four SEAs for the oil and gas sector, with other recent SEA initiatives such as WAMSSA and other SEAs underway for different sectors in Africa.

The initiative could take many different forms including:

- Regional working groups to discuss results of work in progress, methodologies and lessons learned;
- Presentations at regional conferences;
- Establishment of a web page, blog or other internet based form of communication;
- Training workshops in SEA development and implementation;
- Presentations to energy and environment ministers of the benefits of using SEA as a tool for sustainable oil and gas and mining development;
- Peer review of documents and reports;
- Including results of the work into the World Bank Structured Learning Program for Strategic Environmental Assessment¹²; and

¹¹http://www.unep.org/AbidjanConvention/The_Convention/COP/index.asp

¹² See World Bank website

- Furthering country commitments to the Abidjan Convention concerning the use of strategic environmental assessments prior to undertaking hydrocarbon activities.

ANTICIPATED OUTCOMES

Outcomes of this initiative are expected as follows:

- Assist in implementation of the Mauritanian SESA by exchange of experiences in other jurisdictions;
- Build on existing SEA training programs underway in west Africa by WWF, UNEP, NCEA, WB and other institutions;
- Share results, challenges, methodologies and lessons learned in completing SEA in a real world setting of four case studies;
- Establish an on-line communication system to share findings, results; and
- Apply these lessons to new SEA initiatives for other oil producing countries, e.g. Angola, Nigeria, Equatorial Guinea and Gabon.

RESPONSIBILITY

Comite de Suivi and MEDD in conjunction with external institutions such as WWF, WB, UNEP, NCEA etc

COST

Costs to be determined, initial budget should be in the order of \$100,000 for 2011-2012.

5.6 THEME 3: ENSURING SAFE OIL AND GAS OPERATIONS

RECOMMENDATION # 11:

A COMPREHENSIVE APPROACH TO OIL SPILL PREVENTION AND RESPONSE SHOULD BE IMPLEMENTED

FINDING

There is no national level capacity in RIM to effectively respond to an oil spill, blowout, other accident, or unplanned event.

PRIORITY

Immediate

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/0,,contentMDK:20274476~menuPK:549265~pagePK:148956~piPK:216618~theSitePK:244381,00.html>

JUSTIFICATION

The explosion of the Deepwater Horizon drilling rig in the Gulf of Mexico on 20 April 2010 and the subsequent massive crude oil leak from a deepwater well located over 1500 m depth on the sea bottom caused significant environmental, economic and social damage. Eleven lives were lost in the explosion and an estimated 4.9 million barrels of oil had been released into the ocean before the leak was halted after 85 days, affecting some 450 km of US coast.¹³

As offshore waters in Mauritania are in part exploited for the production of oil and gas (particularly at the Chinguetti field) and the national economy is largely dependent on fishing, Mauritania has a vital interest in preventing a similar disaster. Although investigations into the causes of the accident are still underway, first lessons can already be learned and acted upon.

The scale and gravity of the Deepwater Horizon accident prompted a thorough security debate, particularly in the United States and the European Union. The results of this debate can greatly benefit Mauritania and its' neighbors to join efforts and reframe spill prevention and response mechanisms to mitigate risks inherent to the development of offshore oil and gas finds in north-western Africa.

A first look at the Mauritania offshore reveals that international regimes for offshore oil and gas operations are not fully developed and lack effective enforcement mechanisms, while national legislation fails to cover various relevant aspects of the sector.

There are different options to solve this gap, such as amending pieces of existing legislation individually, designing consolidated legislation for offshore activities, or developing soft legal instruments complementing existing legislation. The risks at stake, the need for legal certainty and the principles of good regulation speak in favor of a single new piece of specific legislation for offshore oil and gas activities, possibly supported by soft legal measures (guidelines).

The following is a list of key points that are consistently considered fundamental to address the challenge of improving safety for offshore hydrocarbon operations:

- Improving licensing procedures considering environmental and social risks;
- Defining a specific regulatory regime;
- Defining a specific liability regime;
- Improving industry cooperation;

¹³ <http://www.doi.gov/news/pressreleases/US-Scientific-Teams-Refine-Estimates-of-Oil-Flow-from-BP-Well-Prior-to-Capping.cfm>
<http://www.deepwaterhorizonmemorial.com/condolences.asp>
<http://www.washingtonpost.com/wp-dyn/content/article/2010/08/02/AR2010080204695.html>;
<http://online.wsj.com/article/SB10001424052748704271804575405992789059342.html>;
<http://www.nytimes.com/2010/08/03/us/03flow.html>;

- Public authorities' oversight;
- Regional cooperation; and
- International cooperation.

Improvement in all these areas can only be achieved through determined action by the Government authorities and through the creation of a strong partnership between all actors involved - institutions, industry, NGOs and other stakeholders. These initiatives should be aligned with the principles of the new Environmental and Marine pollution draft codes.

RECOMMENDED ACTIONS

The following is a list of key actions that need to be implemented to meet the goal of ensuring safe offshore operations.

A. ENSURE RESPONSIBLE LICENSING

The environmental, economic and social damages caused by a major oil spill affect marine and coastal areas irrespective of national borders. It is therefore crucial that licensing procedures anywhere in the region conform to certain basic common criteria and norms.

National licensing procedures should be coordinated among countries in the North Western African coastal region to reflect recognized best practices and to include international obligations for safety, health and environmental performance, risk management and independent verification. Lessons could also be learned by examining procedures in place for the Gulf of Guinea or offshore Angola.

The licensing regime needs to be backed up by an unequivocal liability regime which must include adequate financial security requirements (bonding, insurance, guarantees, etc.) to cover major incidents and their environmental and social consequences. While any decision to suspend offshore drilling operations is left to the discretion of Mauritania's Government, the MEDD should advocate for a rigorous application of a precautionary approach in the licensing of new complex oil or gas exploration operations in light of the Deepwater Horizon accident. In any case, key requirements for the licensing of hydrocarbon exploration and production should include the following:

- Reviewing health and safety documentation for each operation to make sure the Contingency and Emergency Response Plans for dealing with critical events abide with best practice standards;
- Assessing the technical capacity of prospective operators to take all appropriate measures to prevent and respond to critical events, taking into account the operating conditions of the given location and the character of activities for which an operating license is sought; and
- Making sure that Operators have financial capability to handle the consequences of unforeseen events, including suitable insurance schemes or risk-coverage instruments. This should not only include risk coverage for loss, but also for environmental damages and social consequences resulting from a spill or accident.

B. INTRODUCE A SPECIFIC REGULATORY REGIME FOR OFFSHORE OPERATIONS

State of the art best practice standards must be introduced and updated through regulation and appropriate goal-setting concerning worker safety, maintenance and regular upgrading of production facilities and prevention and response plans in case of accidents or unplanned events.

Implementation of these best practice standards should not only apply to future operations and installations but also existing production facilities, such as the Chinguetti Field.

Existing environmental legislation addresses a number of issues relevant to offshore installations (e.g. environmental impact assessment) and certain aspects of offshore operations (e.g. emissions from vessels). Yet the law on marine pollution prevention is still a draft and spills related to installations such as FPSOs are currently not covered. This draft law should be approved immediately to deal specifically with offshore oil and gas installations and state minimum protection standards for the workers in the field, taking in to consideration isolated working conditions and the logistical and technical challenges of working offshore.

C. ESTABLISH STRICT LIABILITY REGIMES

Clear provisions on the responsibility for clean-up and the ultimate liability for any caused damage would discourage Oil and Gas Operators from underestimating risks/consequences of accidents or spills, or similarly compromising on safety measures. This deterrent effect would be better achieved taking the following actions:

- Ensuring without any ambiguity that offshore operators are under strict liability, not only for damage caused to protected species, natural habitats, but also to all marine areas under Mauritania's jurisdiction, including compensation for social consequences on economic livelihoods and well-being;
- Reviewing safety standards for equipment used on mobile offshore units by consideration of implementation of the European MODU Code and the IMO standards (The Deepwater Horizon rig was classified as MODU);
- Keeping up-to-date with evolving international practices for well design and control measures as developed by standardization organizations such as CEN, CENELEC, ISO and IEC; and
- Building on the precautionary and polluter pays principles as clearly laid out in the draft code on Environmental and Sustainable Development to assure a strict liability regime for marine oil spills, including clean-up costs.

D. ENHANCE INDUSTRY COOPERATION AND RESPONSE MECHANISMS FOR OFFSHORE ACCIDENTS

While the safety of citizens and protection of the environment cannot rely on industry's discretionary initiative and self-regulation alone, private operators ultimately bear the primary responsibility for the safety of their operations. Therefore investments in spill and blowout prevention, accident response and oil recovery capacities should be duly encouraged through tax breaks and other incentives, which would balance the requirements for financial guarantees.

However, a working liability scheme and an environmental insurance policy are not enough to cover the risks connected to hydrocarbons operation, especially offshore.

In case of a serious offshore accident, the first priority is to secure the source of environmental damage and mitigate its consequences. This requires technical and economic capacities often beyond the means of the responsible party. The Gulf of Mexico oil spill provides a lesson also in this regard as even a major operator such as BP could not solve the crisis alone. Finally a consortium of specialized oil and gas service was created companies to help find a way to stop the leak.

One of the most effective response mechanisms currently available in the hydrocarbon sector is the Global Response Network, now involving seven major oil industry funded response organizations cooperating to maximize their intervention capacities worldwide.¹⁴

Being part of such a network would allow the private operator as well as Mauritania's authorities to rely on much larger resources and technical capabilities to prevent, mitigate and respond to environmental disasters of a similar kind.

It is therefore recommended that oil companies operating in Mauritania be required to be involved in the Global Response Network sharing know how and providing technical and financial capabilities to face oil spill crises.

E. INTRODUCE A NEW MODEL FOR PUBLIC OVERSIGHT

Public authorities bear crucial responsibility for establishing a correct regulatory framework for offshore activities. In doing so, they must take into account the principles of Maritime Spatial Planning, a key tool to manage zone allocation in intensively used maritime areas by specifying each zone with a suitable activity or activities and ensuring their long-term compatibility. These principles must also ensure operators' full compliance through effective oversight consisting of communication, advice, control and enforcement. It is also necessary to grant an active engagement with the general public and stakeholders representing potentially affected economic and social interests.

Transparency and inclusion in decision-making and oversight should be promoted in line with best practice in maritime governance. In this direction, the following points should be implemented:

- Defining state-of-the-art practices to be applied by the regulatory and supervisory authorities in offshore licensing, inspections and compliance monitoring;
- Establishing a voluntary consultation/reporting mechanism as part of licensing of complex offshore operations;

¹⁴<http://www.globalresponsenetwork.org/members.htm>

<http://www.oilspillresponse.com/>

- Requiring operators to submit individual action plans, as well as joint industry roadmaps, detailing the timing, nature, content and resources needed to implement self-regulatory actions;
- Working together with industry, NGOs and other stakeholders to provide the public with easy access to continuously updated information on safety measures, risk management, contingency plans and company-specific statistics on key safety indicators; and
- Establishing a monitoring and information call centre for emergency response to environmental disasters, available on a 24/7 no-cost basis.

F. ENCOURAGE REGIONAL COOPERATION

Mauritania needs to pay close attention to offshore areas adjacent to its territory where offshore drilling and hydrocarbon shipping also occurs.

The efficiency and speed of any offshore emergency response also depends on the availability of instantaneous information on the state of the water column and sea-bottom at the time of the accident. These data do not appear to be fully available at present in the region and could not be assembled quickly from fragmented public and private sources to appropriately monitor the progress of an offshore incident in Mauritania.

The following measures are recommended to promote regional cooperation:

- Bringing the wealth of expertise and resources - available at local, national and regional levels - together into a strengthened regional disaster response system;
- Deploying emergency response equipment in each relevant site in Mauritania and in nearby northwest African countries;
- Creating an open architecture for sharing data on the state of the water column and sea bottom among the other countries along the North Western African coast;
- Intensifying dialogue with neighboring countries on offshore safety, aiming at implementation of new common initiatives establishing emergency information channels, information sharing on exploration and production, promotion of high levels of safety and prevention, and joint enforcement measures such as inspections of installations;
- Making sure that regulatory frameworks and industry supervision in neighboring coastal jurisdictions provide equally high levels of safety and protection; and
- Exploring the potential of regional conventions. There are good examples on this field which might provide a model: the North Sea Offshore Authorities Forum, the Mediterranean Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from Exploration and Exploitation of the Continental Shelf and the Seabed and its Subsoil; the Convention for the Protection of the Marine Environment in the North-East Atlantic; the Convention for the Protection of the Marine Environment of the Baltic Sea Area (Helsinki

Convention); the Convention on the protection of the Black Sea against pollution (Bucharest Convention).

G. ADDRESS GAPS OF INTERNATIONAL LAW ON MARINE POLLUTION AT THE NATIONAL LEVEL

Although the impact of offshore accidents knows no borders, the coverage and enforcement of international law governing prevention, emergency planning, and oil spill response is uneven and incomplete. UNCLOS foresees the obligation for states to protect the marine environment from pollution, to establish contingency plans and adopt laws and regulations to prevent, reduce and control pollution in areas within and beyond national jurisdiction¹⁵. Nevertheless, compliance and enforcement mechanisms are not included and implementation relies on the good will of states and of bodies such as sectoral organizations and regional seas conventions. This accounts for major differences in compliance with these obligations, including in African waters.

Moreover, existing conventions on emergency planning in case of a serious offshore accident such as the International Convention on Oil Pollution generally focus only on oil pollution from ships, but not on offshore installations. In addition, financial liability for oil and gas pollution from offshore installations is not covered by any international convention.

It is then clear that while abiding by the existing international conventions on marine pollution is necessary as duly recognized in the new draft code on Environmental and Sustainable Development, it is not enough to rely on a minimalistic implementation approach. However, the first step in this direction is providing full implementation to the marine conventions of which Mauritania is already formally part of such as the Brussels CLC and the FIPOL 92 Convention. Both conventions were signed by Mauritania in 1996, but never implemented.

ANTICIPATED OUTCOMES

The outcome of this process will ensure the following:

- That the oil and gas licensing regime within Mauritania include a strict liability regime for environmental damages arising from oil and gas operations;
- That existing gaps in national legislation regarding oil operations in the offshore are addressed, including approval of the Marine Pollution Code;
- That the role of Government oversight over offshore oil and gas operations is fully understood and implemented;
- That measures for regional cooperation in countering oil spills are put in place; and
- Together, these recommendations will improve public confidence that livelihoods will be compensated in the event of a serious oil spill or unplanned event.

¹⁵United Nations Convention on Law of the Sea

http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm

RESPONSIBILITY

MPEM in conjunction with MEDD

COST

Cost estimated at around \$100,000 over a period of 24 months.

RECOMMENDATION # 12:

FINALIZE DEVELOPMENT OF A NATIONAL OIL SPILL CONTINGENCY PLAN

FINDING

There is no National Oil Spill Contingency Plan in place.

PRIORITY

Immediate

JUSTIFICATION

At the present time, Mauritania has ratified the MARPOL Convention and a plan has been developed for responding to oil spills in the marine environment in accordance with MARPOL requirements. A draft Marine Environmental Code has been adopted but is not yet in force.

However the MARPOL plan has not been made fully operational and no National Oil Spill Contingency Plan currently is in place.

Similarly, there is no coordinated MARPOL plan for onshore spills that could affect the marine environment.

RECOMMENDED ACTION

The following recommendations are made to improve Mauritania's response to MARPOL and put in place contingency and response measures for Class II and Class III spills both in the terrestrial and marine environment

Specifically the following recommendations are made:

- Creation of a national authority for oil spills, which will coordinate of the Ministries Fishery and Marine Economy, MEDD, and MPEM;
- Implementation of a MARPOL compliant a National Oil Spill Contingency Plan (OSNCP), including equipment and necessary resources;
- Coordination of the National Oil Plan with contingency plans of individual oil and gas operators;

- Simulations and training exercises to test oil spill response capabilities;
- Implementation of a MARPOL “onshore” compliant plan for land based oil spills;
- Completing an external review of the effectiveness of land and sea based oil spill response measures;
- Mapping of critical sensitive areas with respect to oil spills should be undertaken and included in oil spill response plans;
- Development of a National Oil Spill Research Centre, responsible for researching best practices for oil spill response, including a national policy on the use of dispersants. This institution will also be responsible for oil spill material management;
- Creation of a Department of Maritime Affairs (prefecture maritime) responsible for coordinating state activities within the marine environment; and
- Requirement for Companies to submit a conceptual oil spill contingency plan and undertake a risk assessment as part of the environmental assessment process.

ANTICIPATED OUTCOMES

Implementation of the above will lead to the following:

- Minimization of spills through a focus on prevention rather than response;
- Coordinated effective oil spill response for Class II and III spills;
- Identification of critical areas subject to high risk; and
- Measures for determining environmental damages resulting from oil spills.

RESPONSIBILITY

Ministry of Fishery and Marine Economy, MPEM and MEDD

COST

Estimated costs related to development of a national oil spill response plan are around \$800,000 over 24 months.

RECOMMENDATION # 13:

DEVELOP A MARINE STRATEGY TO ENSURE SUSTAINABLE USE AND AVOID CONFLICTS WITH OIL AND GAS OPERATIONS

FINDING

The country’s long-term economic health is highly dependent on functioning coastal and marine environments. The major threats to coastal and marine environment in Mauritania can be roughly

grouped into three main categories: depletion of biological resources by overexploitation; pollution; and climate change.

PRIORITY

Immediate

JUSTIFICATION

Artisanal and commercial fisheries are crucial to the Mauritanian economy and play a unique role as a food reserve for almost the entire population in the country.

Therefore, use of the marine environment must be kept at a sustainable level that safeguards potential uses and activities by current and future generations. This means the structure, functions and processes of marine ecosystems have to be fully understood and considered, marine species and habitats must be protected and human-induced decline of biodiversity prevented.

RECOMMENDED ACTION

To achieve the objective of a sustainable marine environment, Mauritania needs to develop a Marine Strategy which serves as an action plan for applying an ecosystem-based approach to the management of human activities and, in particular to oil and gas activities.

In order to reduce the risk of possible detrimental effects to the areas of the Banc d'Arguin National Park and Diawling National Park, the RIM Government should also consider establishing a moratorium on E&P activities surrounding protected areas (please refer also to Theme 2).

No-Go Zones to be established in the offshore are:

- Blocks 9&10 (Banc d'Arguin Park area);
- Block 48 (Offshore portion of Diawling Park); and
- Block 20 (the area encompassing the Diawling National Park to be excluded from Block 20).

In addition, the government should consider establishing a moratorium on E&P activities in the blocks surrounding these protected areas as follows:

- Block 7 (currently operated by Dana in the Banc d'Arguin Park area);
- Blocks 8, 9 and 56 (Banc d'Arguin Park area); and
- The area of Diawling National Park surrounding Block 20.

RESPONSIBILITY

MEDD

COST

Costs are estimated at \$150,000. Could be implemented in 3-6 months. These costs are for administration only. Additional start-up fund costs will be required in the form of a trust account.

RECOMMENDATION # 14:

ESTABLISHING A TRUST FUND FOR BIODIVERSITY CONSERVATION

FINDING

There is no coordinated funding mechanism to support marine and coastal biodiversity conservation in Mauritania.

PRIORITY

Short term: (2011-2013)

JUSTIFICATION

Currently, funding for environmental protection is mostly provided through the national budget of Mauritania allocated to Parc National du Banc d'Arguin (PNBA) and Parc National du Diawling (PND) and supplemented by several donor-funded projects. However, the existing level of funding is not sufficient and, in the case of development partners, the 'project-based' model is not sustainable in the long term. Therefore, it is important for Mauritania to develop new sustainable financial mechanisms to protect and conserve marine and coastal biodiversity, a process which is already underway.

RECOMMENDATION

It is recommended that Mauritania establish a Conservation Trust Fund, similar to others in use in West Africa. Conservation Trust Funds (CTFs) have been established in more than 50 developing countries and transition economies over the last 15 years. CTFs are private, legally independent grant-making institutions that provide sustainable financing for biodiversity conservation and often finance part of the long-term management costs of a country's protected area (PA) system. They can serve as an effective means for mobilizing large amounts of additional funding for biodiversity conservation from international donors, national governments and the private sector.

Similar initiatives are also underway in West Africa, such as establishment of a Conservation Trust Fund for Biodiversity Conservation in Guinea Bissau.

An assessment should be carried out to explore financial mechanism alternatives for establishing or expanding existing conservation trust funds in close collaboration with key stakeholders, particularly the Government through MEDD and the MPEM, the oil and gas industry and the PNBA Trust Fund Board.

Solutions should consider the following:

- Any environmental compensation or fine should be deposited in the funds;
- The funds should not be restricted to financing protected areas but may also be used to afford protection to specific biodiversity features;
- The funds could also be applied to make fisheries in Mauritania more sustainable; and
- How private companies could benefit from making contributions to the fund, such as advertising or promotion.

Different types of trust funds could be considered. This includes endowment funds (The Banc d'Arguin and Coastal and Marine Biodiversity Trust Fund), sinking funds (where the entire principal and investment income is disbursed over a long period until it is completely spent) and a revolving fund (where income from taxes, fees, fines or payments for ecosystem services that are specially earmarked regularly go into the funds to be used for specified purposes).

In addition to setting up a trust fund or expanding the existing trust fund to finance biodiversity conservation, financial compensatory mechanisms based on oil and gas concession royalties may offer an important contribution in the same direction. They include:

- **Production Sharing Contracts:** These contracts are established between each oil company and the State of Mauritania. They define the terms and conditions for oil and gas exploitation, including the share of financial profits to be transferred to the government. Some of these contracts also include a financial contribution for capacity development and training. However, they do not include compensation for losses of economic activities due to the development of this industry such as fishing and conservation of biodiversity. An opportunity cost could be introduced in these contracts.
- **Environmental Royalties:** Similar to the above mechanism, an environmental royalty mechanism could be instituted within production sharing contracts, including the subsidy for capacity development that some companies are already contributing. A joint management system involving both the industry and the government would need to be created to invest these financial contributions in biodiversity conservation.
- **Ecological Tax:** establish a tax on the use of ecosystem services; particularly the oil and gas sector exploring and exploiting offshore, to compensate for the loss of economic values of the marine and coastal biodiversity.

ANTICIPATED OUTCOMES

Implementation of the above will lead to the following:

- More grants available to non-governmental organizations (NGOs), community based-organizations (CBOs) and governmental agencies (such as national parks agencies);
- Agencies can act in a more transparent, accountable and effective manner as a result of independent funding; and
- Improved support for biodiversity and conservation initiatives outside of government.

RESPONSIBILITY

MEDD in conjunction with MPEM

COST

Costs are estimated at \$80,000 over a period of 48 months.

RECOMMENDATION # 15:

ESTABLISH ENVIRONMENTAL DAMAGE LIABILITY PROVISIONS FOR OIL AND GAS OPERATIONS

FINDING

There are no provisions in place to establish environmental damage liability for oil and gas operations.

PRIORITY

Short Term

JUSTIFICATION

Presently, Mauritania does not have the capacity to value its own natural resources. This affects its ability to evaluate the risks linked to environmental damage and the possible costs of remediation and compensation (particularly in terms of interim losses, meaning the loss of natural resource enjoyment in the time between the onset of damages to the time of clean-up and remediation completion).

This lack of valuation of natural capital reduces the Government's capacity to assess the financial benefits of enhancing the network of marine protected areas, thereby reducing incentives for investing on biodiversity protection and conservation

RECOMMENDED ACTION

It is recommended that the Government undertake the following actions regarding environmental liability for oil and gas operations:

- Provisions should be required concerning liability for damage to the local environment resulting from any technical failure of infrastructure or due to negligence on behalf of oil and gas operators. Liability for environmental damage (damage to protected species and natural habitats, water and land) should be regulated.
- Liability provisions should establish the obligation of the oil company operating the license to take corrective measures in the event of spills or other accidents. A contingency plan outlining prevention and response measures should be submitted by the operator for approval by the competent national authority, and then annexed to the PSA. Where the operator fails to take the necessary corrective measures, these measures should then be

assumed by the competent authority, which should recover all associated costs from the operator.

- The 'Polluter Pays Principle' should be incorporated as one of the guiding principles for allocating liability for environmental damages. The principle requires the responsible party to remediate or compensate the Government and any affected third party for environmental and other related consequential damages originating from their actions.
- There should be a broader use of criminal responsibility and sanctions to dissuade environmental violations
- Oil and gas proponents should be required to hold compulsory environmental liability insurance with minimum coverage established by law.
- Punitive damages should be applied to prevent systematic polluters from drawing any economic advantage from malicious environmental violations or gross negligence.
- Fines and sanctions should be determined and linked to environmental damage assessment. Penalties should be multiplied whenever the responsible company has already committed a previous violation of the same kind, or any other environmental violation.

ANTICIPATED OUTCOMES

The outcome of this process will ensure the following:

- That oil and gas operators carry sufficient liability insurance to remedy any environmental and other related damage resulting from a spill, accident or any other adverse consequence of oil and gas activities;
- That this responsibility be included in the PSA with a binding Oil Spill Contingency and Response Plan;
- That penalties for environmental infractions, including potential criminal action, be consistent with the consequence of damages to the Government of RIM and any affected third party; and that
- The 'Polluter Pays Principle' be incorporated into law assigning responsibility and sanctions for environmental damages to the responsible party.

RESPONSIBILITY

MEDD, in conjunction with other institutions as required.

COST

Estimated costs related to the definition of administrative and legal responsibilities in the event of environmental damage are around \$150,000 over 12 months.

RECOMMENDATION # 16:

REQUIRE ENVIRONMENTAL INSURANCE COVERAGE TO COVER ACCIDENTAL DAMAGES FROM OIL AND GAS OPERATIONS

FINDING

There are no measures in place at this time in Mauritania to cover the costs of environmental damage and clean-up resulting from an oil spill or blowout.

PRIORITY

Short Term

JUSTIFICATION

The development of an environmental insurance market in Mauritania is paramount for every activity related to development of the hydrocarbon sector. As a matter of fact, clean-up costs are often unbearable for the company responsible for the environmental damage. This is true both for small and very big companies as the BP oil spill in the Gulf of Mexico recently confirmed.

RECOMMENDED ACTIONS

It is recommended that the Government of Mauritania include as a condition of the PSA, the obligation to subscribe to an insurance policy, bond or other financial instrument to cover environmental damages resulting from spills, blowouts and other accidents that may occur during E&P operations. It would also be advisable to encourage other industries or polluters to sign up for similar coverage, using a variety of fiscal incentives.

There are a number of financial instruments to be considered include the following:

- Pollution legal liability;
- Commercial pollution legal liability;
- Commercial real estate pollution liability;
- Cleanup cost cap coverage;
- Contaminated property development;
- Contractor's pollution liability and errors and omissions insurance; and
- Finite risk.

More details are presented in Part B of this report.

ANTICIPATED OUTCOMES

The establishment of clear requirements for mandatory insurance coverage for environmental liability associated with oil and gas operations will protect the Government of Mauritania from companies who may forfeit their responsibility of clean up costs in the event of a spill or other accident.

RESPONSIBILITY

PME and MEDD

COST

Preliminary cost estimates are around \$150,000 over a period of 12 months.

5.7 THEME 4: ENSURING SOCIAL BENEFITS FROM OIL AND GAS DEVELOPMENT

RECOMMENDATION # 17:

THE GOVERNMENT OF RIM SHOULD IMPLEMENT A TRANSPARENT REVENUE COLLECTION DEVELOPMENT FLOW BACK TO THE PRODUCING REGION IN SUPPORT OF COMMUNITY DEVELOPMENT

FINDING

There are little or no mechanisms currently in place in Mauritania that are directed to flow revenues from oil and gas activities to community development programs within the producing region.

PRIORITY

Medium to Long Term

JUSTIFICATION

One of the biggest challenges to oil and gas operators and governments alike is how to ensure that the benefits of oil and gas development accrue to local communities, rather than them being the recipients of negative direct and induced impacts. Governments use the taxes, royalties and other revenues gained from oil and gas activities to support community and regional development that ideally should be aligned with national, sub-national and regional planning initiatives. Companies on the other hand, implement their own community development initiatives based on their area of interest, support and perceived need, while at the same time balancing that contribution against the expectations for more support, particularly in areas where government support is lacking.

Effective community development is therefore based on the capacity of local communities to receive and implement long term benefits of oil and gas development in combination with a transparent revenue accrual and distribution process on behalf of governments that clearly demonstrates that funds are being adequately directed to this effect. Individual companies have a corporate

responsibility to support community development in areas that they operate, but are only willing to do so when they are not being perceived as a replacement for an inefficient or absent government.

Ensuring local community benefits therefore depends on an efficient tripartite sharing process with clearly defined responsibilities and actions.

RECOMMENDED ACTION

Previous reports have recommended against establishing a dedicated “petroleum fund” to benefit communities in oil and gas production areas (unless revenues exceeded a set portion of GDP)(IUCN, 2009; GTZ 2006). Rather, it has been felt that it would be best to implement an efficient and transparent revenue collection and distribution process to track the proceeds of oil and gas development, reduce or inhibit the opportunity for corruption and follow the flow of revenues to the community, including follow-up of community development efforts.

It is therefore recommended that the Government of Mauritania continue to implement a transparent revenue collection and distribution program and work with communities and individual oil and gas operators to maximize community development programs. This can also form part of Mauritania’s commitment to becoming an EITI Compliant Country.¹⁶

Where possible, it would be most beneficial to target community development programs around specific themes of importance to Mauritania, notably agriculture, fishing and water management.

Companies could begin by a needs assessment and identification of opportune community investment programs in consultation with communities and community representatives. This should be done as part of the environmental and social impact assessment process and described in an individual company’s environmental management plan. Companies could be encouraged to work with local organizations to benefit local communities and to work in conjunction with governments towards maximizing local community benefits.

Government should also work in conjunction with sectoral development programs and work in conjunction with private companies once the regulatory process and environmental and social assessment outcomes have been determined.

This could occur through a three pronged approach:

- Mitigation and compensation programs arising from the impact assessment;
- Identification of those programs where companies are willing to fund or partially fund community development in conjunction with governments; and
- Identification of those programs that are the full responsibility of government for funding and implementation.

¹⁶ Extractive Industries Transparency Initiative – see <http://eiti.org/implementingcountries>

ANTICIPATED OUTCOMES

Maximizing benefits back to local communities will ensure the following:

- That there is adequate compensation if fully realized by communities to offset the impacts of oil and gas development;
- That added benefits from oil and gas development are fully realized through a coordinated and transparent revenue flow;
- Build trust between companies, governments and civil society;
- Reduce community company conflicts;
- Clearly identify the roles and responsibilities of each party; and
- Depend upon a transparent process for tracking revenue flows and benefits coupled with a follow-up process to evaluate the effectiveness of community development programs.

RESPONSIBILITY

Government and MEDD in conjunction with MPEM

COST

Based on preliminary estimates, costs will be around \$140,000 over a period of 60 months.

RECOMMENDATION # 18:

THE GOVERNMENT OF RIM SHOULD WORK WITH OIL AND GAS OPERATORS IN IMPROVING THE CONSULTATION AND COMMUNITY ENGAGEMENT PROCESS FOR OIL AND GAS PROJECTS

FINDING

Consultation processes for oil and gas are undertaken in Mauritania but they are not done on a consistent basis or follow established guidelines or procedures.

PRIORITY

Short Term

JUSTIFICATION

In Mauritania, consultation regarding oil and gas development is a requirement of the environmental assessment law (Article 17), but there are no guidelines or established procedures as to how consultation should take place. Companies undertake consultation on a voluntary basis towards obtaining project approvals, rather than to engage stakeholders in a coordinated and meaningful process over the life of the project.

RECOMMENDED ACTIONS

Consultation regarding oil and gas operations in Mauritania should be undertaken in a culturally appropriate manner taking into account local customs, ethnic background, approach to business interactions, knowledge of extractive industries and their effects and lessons learned from similar experiences in the Middle East and Africa.

It is recognized that consultation over oil and gas development is a relatively new process in Mauritania, particular for onshore projects. Recommendations for improving the current process are as follows:

- Companies should be encouraged to take a more proactive approach to consultation through a variety of means such as a) community outreach representatives b) building local relationships and c) providing more information on the project, its benefits and impacts at the earliest point possible in the project, in the most appropriate manner considering local language and literacy needs.
- Public consultation guidelines should be developed for both onshore and offshore projects.
- Consultation records should be kept, wherever possible, and the synopsis of the issues arising from the consultation meeting should be included as part of the environmental assessment document. Companies should be encouraged to utilize a formal consultation tracking software as a means of keeping an accurate consultation record which could easily be disseminated, as required.
- Companies should be encouraged to prepare a consultation plan as part of the environmental management plan.
- Government representatives should coordinate consultation efforts with oil and gas companies, particularly during discussions about community development programs in order to fully understand responsibilities, timing and program delivery.
- At the present time, the need for consultation for oil and gas projects is included in environmental assessment legislation, but consultation is not necessarily undertaken in all cases. Environmental assessment reports should not be approved without inclusion of the public consultation process and its results.

ANTICIPATED OUTCOMES

Improved consultation procedures should result in the following benefits:

- Local community support and awareness of the positive and negative effects of pending development;
- Reduced conflicts;
- Improved trust between companies, government and local communities; and
- Identification of community development needs.

RESPONSIBILITY

MEDD

COST

With external assistance this could be set up in 3-6 months at a cost of \$50,000.

RECOMMENDATION # 19:

ENSURE LINKAGES TO WISE USE OF WATER

FINDING

Sustainable use of water was identified as a critical decision factor. Water management is also considered as one of the four development priorities of the Strategic Framework for the Fight against Poverty (CSLP 2006-2010).

PRIORITY

Medium to Long Term

JUSTIFICATION

The AGIRE Project (*Aménagement et Gestion Intégrée des Ressources en Eau*) was established to develop a working framework for the integrated, sustainable, and fair management of water resources and related infrastructure as a key instrument in the fight against poverty. The project has three components a) strengthening governance and capacity for water resource management b) undertaking a pilot demonstration project for decentralization of water resources and c) developing modern tools and methods for information management and decision making support in support of GIRE and PANAGIRE as required by the Water Code.

It is important that water use by the onshore oil and gas sector be considered and integrated into the AGIRE Project and PANAGIRE. Furthermore, within the Joint Poverty and Environment project,¹⁷ Mauritania and United Nations Environmental Program (UNEP Nairobi Office) had the mandate to carry the Strategic Environmental Assessment of Water and Rural Development Sectors in Mauritania.

RECOMMENDED ACTIONS

The oil and gas sector should develop a water management strategy that links directly to AGIRE and PANAGIRE. The strategy should consider the following:

- Make a commitment of the oil and gas sector to conserve water usage in its activities;

¹⁷ <http://www.unpei.org/PDF/Mauritania-IPE-MR.pdf>

- Develop strategies for water sourcing and to minimize the use of potable water sources, wherever possible;
- When sourcing water for camps and potable purposes, ensure that there are no conflicts with surrounding water users; and
- Minimize water use and recycle water use whenever possible – e.g. closed tank systems.

ANTICIPATED OUTCOMES

The outcomes of this strategy will be to:

- Foster a commitment of the oil and gas sector to water conservation aligned with the goals of AGIRE and PAGIRE;
- Promote the use of new technologies and processes for minimization of water usage – examples could be obtained from other Middle Eastern operators;
- Reduce conflict with local water users; and
- Develop a consistent best practice approach to water use in the oil and gas industry.

RESPONSIBILITY

Ministry of Water and Sanitation in conjunction with MEDD and Ministry of Rural Development

COST

Based on preliminary estimates, the costs will be up to \$90,000 over a period of 48 months.

RECOMMENDATION # 20:

LINKAGES WITH NATIONAL POVERTY REDUCTION PLAN (PSRP)

FINDING

Oil and Gas sector development represents a key strategic factor in the Poverty Reduction Strategy Program (PRSP). There are direct linkages of SESA related environmental and social issues with environmental and socio-economic aspects considered within the poverty reduction strategic framework.

It is important that the two scenarios presented in the SESA be considered as to their impact on petroleum revenues and subsequently government initiatives to reduce poverty in the country.

PRIORITY

Immediate

JUSTIFICATION

Mauritania has adopted a Poverty Reduction Strategy Paper (PRSP), a key component of its' economic and social development policy and based on a long-term (2015) vision to achieve the Millennium Development Goals (MDGs). The PRSP is closely linked to the UNDP-UNEP Poverty and Environment Initiative (PEI), which aims to contribute to poverty reduction by mainstreaming environmental sustainability into the national development process.

The initial achievements of the PSRP (2001-2004) were recently reviewed by the International Monetary Fund (IMF) and an action plan was established for 2006-2010 (International Monetary Fund 2006). The PRSP focuses on four national priorities – education, health, water and infrastructure and tow priority zones – dry rural areas and underprivileged neighborhoods.

The PSRP Action Plan (2006-2010) places a high reliance on revenues from oil and gas development. The Plan states that annual production will rise 27 million barrels (75,000 bpd) providing \$163.6 million in revenue to the Mauritanian government.

The plan refers to three key aspects for optimal management of petroleum income:

- Transparency of information about production, the composition of associated revenues, the criteria used to allocate government revenues, and the effective utilization of those revenues;
- The design and implementation of an appropriate strategy for allocating petroleum revenues; and
- Monitoring and analysis of the petroleum industry's economic and financial impact.

It is important that the links to the PSRP take into consideration the possible scenarios for oil and gas development in this SESA, particularly in the time frame 2010-2015.

RECOMMENDED ACTIONS

One of the main criteria for the PRSP relating to oil and gas development is to implement a transparent and integrated management and reinvestment process for oil and gas revenues. The SESA scenarios for oil and gas development should be integrated with strategic actions of the PRSP in order to make full use of actual oil industry incomes.

Key environmental and social issues arising from the SESA should also be closely linked with socio-economic considerations and strategies developed within the PRSP. Consultation with key stakeholders should mainstream environmental oil development related issues directly into existing or future poverty reduction strategies and programs.

Direct operational linkages should also be established with fishery, agriculture, water management and grazing management (pasture) programs and strategies identified both in the Environmental Management Cost-Benefit Economic Assessment project (EcoEnv project) and the Strategic Environmental Assessment (EES project) of the Water and Rural Development in Mauritania. Both

these projects form part of the UNEP Environment and Poverty Initiative (Projet d'Articulation entre Pauvreté et Environnement – APE).

ANTICIPATED OUTCOMES

Sound implementation of oil revenues management in concert with strategic actions of the PRSP will provide a balanced redistribution of benefits to the population directly and indirectly affected by oil and gas activities.

The coordinated implementation of the PRSP and oil and gas related PPPs will allow Mauritanian institutions to realize synergy among the existing policies and programs finalized to fight against poverty and environmental degradation. Furthermore, it will increase the awareness of existing links between poverty and environment in Mauritania and should help focus monitoring in those areas in the country where these linkages are more critical.

RESPONSIBILITY

Primary responsibility should be undertaken by MEDD and Ministry of Rural Development, supported by Ministry of Finance, MPEM, Ministry of Economic Affairs and Development, and Ministry of Water and Sanitation.

COST

Based on preliminary estimates, costs will be around \$120,000 over a term of 60 months. At any rate, these costs should be redefined in accordance with the budget allocated by the existing programs and action plan in the PRSP.

6. SESA IMPLEMENTATION

The success of the SESA with respect to managing environmental and social impacts related to the oil and gas sector can be measured by the capacity of the Mauritanian government to implement regulatory mechanisms and necessary follow-up in order to govern onshore and offshore development.

This chapter proposes the outline of an Action Plan that should be implemented as immediate follow-up to the SESA. As recommended, the Comite de Suivi should be responsible for implementing the SESA.

6.1 PRIORITIES OF THE ACTION PLAN

In order to encourage practical application of the SESA findings, the recommendations from Chapter 5 were categorized in order of their priority of implementation. The first of the three tables below shows the recommendations which are considered top priority in order to create conditions and acquire the regulatory and institutional framework that will allow application of the other recommendations; while the second and third tables show the recommendations which should be adopted respectively over the short and medium to long term.

PRIORITY 1: IMMEDIATE ACTION

- R1 : Streamlining Environmental Responsibility;
- R2 : Improved Management of EIA Process;
- R3 : Establish National Environmental Agency;
- R4 : Extend Role of the Comite de Suivi in SESA Implementation;
- R5 : Implement Comprehensive Training;
- R8 : Improve the Policy, Legal and Regulatory Framework;
- R11 : Implement Oil Spill Prevention and Response;
- R12 : Finalize Development of a National Oil Spill Contingency Plan;
- R13: Develop a Marine Strategy; and
- R20: Linkages with National Poverty Reduction Plan (PSRP).

PRIORITY 2: SHORT-TERM ACTION

- R6: Establish a Dedicated Spatial Information System;
- R7 : Undertake Coordinated Spatial Planning;
- R10 : Regional SEA Cooperation Program;
- R14 : Establish a Trust Fund for Biodiversity Conservation;

- R15 : Establish Environmental Damage Liability;
- R16 : Require Environmental Insurance Coverage; and
- R18 : Improve the Consultation and Community Engagement Process.

The following table shows estimated time frames for Priority 1 actions:

Table 6-1: Action Sequence – Priority 1

#	Recommendation	2011				2012				2013				2014				2015			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Priority 1																					
R1	Streamlining Environmental Responsibility																				
R2	Improved Management of EIA Process																				
R3	Establish National Environmental Agency																				
R4	Extend Role of the Comite de Suivi in SESA Implementation																				
R5	Implement Comprehensive Training																				
R8	Improve the Policy, Legal and Regulatory Framework																				
R11	Implement Oil Spill Prevention and Response																				
R12	Finalize Development of a National Oil Spill Contingency Plan																				
R13	Develop a Marine Strategy																				
R20	Linkages with National Poverty Reduction Plan (PSRP)																				

PRIORITY 2: SHORT-TERM ACTION

- R6: Establish a Dedicated Spatial Information System;
- R7 : Undertake Coordinated Spatial Planning;
- R10 : Regional SEA Cooperation Program;
- R14 : Establish a Trust Fund for Biodiversity Conservation;
- R15 : Establish Environmental Damage Liability;
- R16 : Require Environmental Insurance Coverage; and
- R18 : Improve the Consultation and Community Engagement Process.

The following table shows estimated time frames for Priority 2 actions:

Table 6-2: Action Sequence – Priority 2

#	Recommendation	2011				2012				2013				2014				2015			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Priority 2																					
R6	Establish a Dedicated Spatial Information System																				
R7	Undertake Coordinated Spatial Planning																				
R10	Regional SEA Cooperation Program																				
R14	Establish a Trust Fund for Biodiversity Conservation																				
R15	Establish Environmental Damage Liability																				
R16	Require Environmental Insurance Coverage																				
R18	Improve the Consultation and Community Engagement Process																				

PRIORITY 3: MEDIUM TO LONG-TERM ACTION

- R9 : Involvement of the Private Sector;
- R17 : Improving Dialogue between Government, Civil Society and Industry; and
- R19: Wise Use of Water.

The following table shows estimated time frames for Priority 3 actions:

Table 6-3: Action Sequence – Priority 3

#	Recommendation	2011				2012				2013				2014				2015			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Priority 3																					
R9	Creation of a Mauritania Operators Group																				
R17	Transparent Revenue Collection and Distribution System in support of Development																				
R19	Wise Use of Water																				

6.2 PRIORITY STEPS FOR SESA IMPLEMENTATION

In order to proceed with the implementation of the recommendations in the proposed order, the steps that should be developed during the initial phases of the Action Plan are as follows:

The first step aims to create the foundation for SESA implementation through:

- Strengthening if the Comite de Suivi:
 - Expansion of the Comite de sSuivi to include representatives of other ministries;
 - Training and participation in sub-regional workshops;
 - Missions to countries which have implemented this type of strategy;
 - Creation of a database for updating the SESA; and
 - Implementation of an effective communication system.

The next steps should include:

- Preparation of Terms of Reference for the implementation of the recommendations;
- Creation of Draft Budgets; and
- Definition of a chronology of activities for implementation of the recommendations.

6.3 COST ESTIMATES

The following tables show the estimated costs involved in implementing the SESA.

Costs are established in consideration of the following elements:

- Human Resources;
- Materials and Equipment;
- Training;
- Administration;
- External Consultants; and
- Other.

These costs should be considered as preliminary estimates only and should be refined by the Comité de Suivi during initial implementation of the SESA.

Table 6-4: Cost Summary – Priority 1

Recommendation		Period	Budget Item	Cost
R1	Streamlining Environmental Responsibility	12 months 2011-2013	Human Resources	\$50,000
			Materials and Equipment	\$10,000
			Training	\$20,000
			Administration	\$10,000
			External Consultant	\$50,000
			Other	\$10,000
			Total	\$150,000
R2	Improved Management of EIA Process	12 months 2011-2013	Human Resources	\$40,000
			Materials and Equipment	\$40,000
			Training	\$75,000
			Administration	\$10,000
			External Consultant	\$25,000
			Other	\$10,000
			Total	\$200,000
R3	Establish National Environmental Agency	12 months 2011-2013	Human Resources	\$100,000
			Materials and Equipment	\$100,000
			Training	\$100,000
			Administration	\$20,000
			External Consultant	\$50,000
			Other	\$30,000
			Total	\$400,000
R4	Extend Role of the Comite de Suivi in SESA Implementation	36 months 2011-2013	Human Resources	\$210,000
			Materials and Equipment	\$0
			Training	\$150,000
			Administration	\$30,000
			External Consultant	\$0
			Other	\$0
			Total	\$390,000
R5	Implement Comprehensive Training	12 months 2011-2013	Human Resources	\$10,000
			Materials and Equipment	\$20,000
			Training	\$40,000
			Administration	\$20,000
			External Consultant	\$100,000
			Other	\$10,000
			Total	\$200,000
R8	Improve the Policy, Legal and Regulatory Framework	12 months 2011-2013	Human Resources	\$100,000
			Materials and Equipment	\$20,000
			Training	\$0
			Administration	\$20,000
			External Consultant	\$90,000
			Other	\$20,000
			Total	\$250,000
R11	Implement Oil Spill Prevention and Response	24 months 2012-2014	Human Resources	\$80,000
			Materials and Equipment	\$0
			Training	\$0
			Administration	\$10,000
			External Consultant	\$0
			Other	\$10,000
			Total	\$100,000
R12	Finalize Development of a National Oil Spill Contingency Plan	24 months 2012-2014	Human Resources	\$100,000
			Materials and Equipment	\$500,000
			Training	\$50,000
			Administration	\$40,000
			External Consultant	\$100,000
			Other	\$10,000
			Total	\$800,000
R13	Develop a Marine Strategy	12 months 2011-2013	Human Resources	\$40,000
			Materials and Equipment	\$20,000
			Training	\$0
			Administration	\$20,000
			External Consultant	\$50,000
			Other	\$20,000
			Total	\$150,000
R20	Linkages with National Poverty Reduction Plan (PSRP)	60 months 2011-2015	Human Resources	\$60,000
			Materials and Equipment	\$20,000
			Training	\$0
			Administration	\$30,000
			External Consultant	\$0
			Other	\$10,000
			Total	\$120,000
TOTAL COST				\$2,760,000

Table 6-5: Cost Summary – Priority 2

Recommendation		Period	Budget Item	Cost
R6	Establish a Dedicated Spatial Information System	24 months 2012-2014	Human Resources	\$50,000
			Materials and Equipment	\$100,000
			Training	\$0
			Administration	\$20,000
			External Consultant	\$50,000
			Other	\$30,000
			Total	\$250,000
R7	Undertake Coordinated Spatial Planning	24 months 2012-2014	Human Resources	\$50,000
			Materials and Equipment	\$10,000
			Training	\$0
			Administration	\$20,000
			External Consultant	\$0
			Other	\$20,000
			Total	\$100,000
R10	Regional SEA Cooperation Program	12 months 2012-2013	Human Resources	\$50,000
			Materials and Equipment	\$0
			Training	\$50,000
			Administration	\$0
			External Consultant	\$0
			Other	\$0
			Total	\$100,000
R14	Establish a Trust Fund for Biodiversity Conservation	48 months 2012-2015	Human Resources	\$30,000
			Materials and Equipment	\$0
			Training	\$0
			Administration	\$10,000
			External Consultant	\$30,000
			Other	\$10,000
			Total	\$80,000
R15	Establish Environmental Damage Liability	12 months 2012-2013	Human Resources	\$50,000
			Materials and Equipment	\$10,000
			Training	\$10,000
			Administration	\$20,000
			External Consultant	\$50,000
			Other	\$10,000
			Total	\$150,000
R16	Require Environmental Insurance Coverage	12 months 2012-2013	Human Resources	\$50,000
			Materials and Equipment	\$10,000
			Training	\$10,000
			Administration	\$20,000
			External Consultant	\$50,000
			Other	\$10,000
			Total	\$150,000
R18	Improve the Consultation and Community Engagement Process	12 months 2011-2013	Human Resources	\$20,000
			Materials and Equipment	\$10,000
			Training	\$0
			Administration	\$10,000
			External Consultant	\$0
			Other	\$10,000
			Total	\$50,000
			TOTAL COST	\$880,000

Table 6-6: Cost Summary – Priority 3

Recommendation	Period	Budget Item	Cost
R9 Creation of a Mauritania Operators Group	24 months 2011-2013	Human Resources	\$40,000
		Materials and Equipment	\$0
		Training	\$0
		Administration	\$10,000
		External Consultant	\$0
		Other	\$0
		Total	\$50,000
R17 Transparent Revenue Collection & Distribution System in support of Development	60 months 2011-2015	Human Resources	\$100,000
		Materials and Equipment	\$0
		Training	\$0
		Administration	\$20,000
		External Consultant	\$0
		Other	\$20,000
		Total	\$140,000
R19 Wise Use of Water	48 months 2012-2015	Human Resources	\$40,000
		Materials and Equipment	\$20,000
		Training	\$0
		Administration	\$20,000
		External Consultant	\$0
		Other	\$10,000
		Total	\$90,000
TOTAL COST			\$280,000

The total estimated cost for implementation of Priorities 1, 2 & 3 is:

- Total Cost of Priority 1: \$2,760,000
- Total Cost of Priority 2: \$880,000
- Total Cost of Priority 3: \$280,000
- **Total Cost** **\$3,920,000**

6.4 EFFECTIVE AND REALISTIC COST IMPLEMENTATION

Realistically, it will not be possible to implement all measures suggested in this Action Plan due to cost and resource limitations. Therefore, the SESA team recommends that the following three key Priority 1 measures be implemented immediately.

Recommendation	Amount in US\$
R4: Support for Comite de Suivi in SESA implementation	\$390,000
R1: Streamlining environmental responsibility	\$150,000
R3: Establish National Environmental Agency	\$400,000
TOTAL	\$940,000

The rationale for this decision is as follows:

- Without support for the Comite de Suivi, there will be no realistic implementation of the SESA. The Comite de Suivi should be charged with this responsibility including the

development of an Action Plan, budget and associated supervisory, monitoring and follow-up measures.

- There needs to be a realignment of responsibilities and priorities within MEDD and sectoral departments in other ministries to clearly delineate responsibilities for environmental approvals and licensing. This also includes creation of a National Environmental Agency.
- Creation of a National Environmental Agency was recommended as a means of establishing a monitoring and follow-up capacity for oil and gas activities. This NEA should be established as part of realignment of environmental responsibilities but given the current low level of oil and gas activity in Mauritania this should be done at a modest level, but fully coordinated with other ongoing responsibilities of MEDD.

6.5 CONCLUDING REMARKS

The SESA of the Mauritanian Oil and Gas Sector has provided a series of recommendations crucial to the future sustainable development of oil and gas resources while minimizing impacts on important environmental resources and local communities. These recommendations have been prioritized as to the immediacy of their implementation and initial cost estimates have been provided in the main body of the report. The success of these recommendations will depend now upon the commitment of the Government of RIM, through the Comité de Suivi, the MEDD and MPEM to develop an action plan for immediate and effective implementation.

As stressed at the onset, the SESA should be considered as an ongoing long-term process, rather than a stand-alone report. The SESA team and its project financial supporters, the Government of Norway and the World Bank, now await the implementation of an action plan by the Government of RIM and the development of a next phase of support for the sustainable long term development of oil and gas resources in Mauritania.

STRATEGIC ENVIRONMENTAL AND SOCIAL ASSESSMENT (SESA) OF THE OIL & GAS SECTOR IN MAURITANIA

PART B: DATA SOURCES

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GLOSSARY OF TERMS

Adaptive management	The implementation of new or modified mitigation measures in response to an unanticipated environmental effect.
Baseline	A description of the biophysical and socio-economic state of the environment at a given time, prior to development of a particular project.
Biodiversity	The variety of life on earth.
Biophysical	Pertaining to the natural environment.
Contamination	Pollution.
Conservation	The preservation of natural resources for use by future generations.
Consultation	A process of communication with those potentially affected by a project, policy, plan or program.
Cumulative effects	Changes to the environment that are caused by an action in combination with other past, present and future human actions.
Endangered species	An animal or plant in danger of extinction.
Environment	The combination of elements whose complex interrelationships make up the settings, surroundings and conditions of life of the individual and society as they are or are felt.
Ecosystem	An interconnected and symbiotic grouping of microorganisms, fungi, plants and animals.
Environmental audit	An environmental management tool consisting of a periodic and objective evaluation of an organization and installations to assess compliance with regulatory and other requirements, as defined by audit criteria.
Environmental impact assessment	A critical evaluation of the likely effects of a project on the environment, including the prescription of mitigation and management actions.
Environmental management plan	A comprehensive plan for the implementation of mitigation measures prescribed in the environmental impact assessment.
Fauna	The total animal population in a given area.
Flora	The total vegetation assemblage in a given area.
Global warming	The increase in average temperature of the surface of the earth.
Groundwater	Water found beneath the Earth's surface.
Habitat	The home of a plant or animal.

Impact	The consequence of an action or activity on the human or natural environment. Impacts may be positive, negative or neutral.
Issue	A question or concern regarding an environmental impact, consequence or effect.
Mitigation	Prescribed actions taken to prevent, avoid, reduce or minimize the impacts, or potential adverse effects, of a project.
Monitoring	A combination of observation and measurement to assess the environmental and social performance of a project and its compliance with the EIA/EMP, or other approval and regulatory conditions.
Proponent	The proposer, or applicant, of a project.
Protected Area	A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
Risk	The likelihood of occurrence of an adverse project effect.
Scoping	A tool to assess, evaluate and prioritize relevant issues or concerns arising from a project.
Screening	Process to assess which projects require an environmental impact assessment and to what extent.
Social impact assessment	A component of EIA that assesses the impacts of a project, policy, plan or program on people and society.
Stakeholder	Someone who has an interest in the outcome of a project, or a decision affecting them.
Strategic Environmental Assessment	A systematic process for evaluating the environmental consequences of proposed policy, plan or program initiatives in order to ensure they are fully included and appropriately addressed at the earliest appropriate stage of decision-making on par with economic and social considerations.
Water quality	A measurement of the purity of water, or drinking water.
Wetland	An area of land saturated with water that has high biodiversity importance.

1. INTRODUCTION

Part B of this report contains background and supporting information used in development of the SESA. The report is structured into the following sections:

- Description of methodology used in the SESA;
- Legal, regulatory and institutional framework;
- Development trends, onshore and offshore;
- Environmental setting – onshore and offshore;
- Social setting; and
- Cultural and archaeological heritage.

1.1 PROJECT EXECUTION AND WORK PLAN

Work on the SESA began in March 2008. Initial efforts of the SESA team were dedicated to establishing key contacts with Mauritanian counterparts and the project steering committee, the Comité de Suivi. A first mission to undertake this purpose was completed in March 16-20, 2008.

During this visit, a screening of the technical and institutional issues concerning the SESA project was conducted; in particular, great importance was dedicated to the examination of the main institutional aspects related to the development of oil and gas sector.

A second mission to Mauritania was held during May 17-24, 2008 and further definition of the institutional framework was discussed. This mission was considered part of the first mission held in March as all topics in the agenda for that mission were not accomplished. During the second mission, a final work plan for the SESA was presented to the Mauritanian counterparts and approved.

The third in-country mission was held from July 12-22, 2008 and focused on the completion of the environmental and social database necessary for the preparation of the SESA report. In particular, the work focused on deepening the knowledge on specific technical, scientific and social aspects that needed the support and the contribution of the Mauritanian sources. To this end, part of the SESA team visited the area of the National Park of Banc d'Arguin and had meetings in Nouhadibou. An SEA Workshop/Course was also held for the Mauritanian governmental, institutional, private sector and social organization persons involved in the SESA project.

On July 9 2008, a videoconference was held between the SESA team, the WB, IUCN and Mauritanian counterparts. The outcomes of the videoconference were to be discussed in the 3rd Team in country visit planned for September 2008. Unfortunately, a change of government in Mauritania in August 2008 resulted in the project being placed on indefinite hold.

In September 2009, discussions were reopened with Mauritanian authorities to resume work on the SESA project. A Reactivation Plan was completed in December and subsequently approved by the

Mauritanian Authorities and the World Bank. A new contract to proceed was subsequently signed in February 2010.

The first reactivation mission to Mauritania was held from April 11-19, 2010. The purpose of the mission was to present a draft SESA document for discussion in a workshop setting. Comments and suggestions from Mauritanian counterparts and workshop participants have been compiled in the final draft (this report) that were presented to the final mission to Mauritania in April 2011.

1.2 TERMS OF REFERENCE (TOR)

A term of reference (TOR) for a strategic environmental assessment of oil and gas activities in Mauritania was first proposed by GTZ and also suggested by NCEE ((Dutch Commission 2006; Goodland 2006)). A formal term of reference for the SESA project was subsequently developed in September 2007 by the Government of Mauritania (République Islamique de Mauritanie (RIM) 2007) (see Annex 1). This initial TOR formed the basis for the bidding and subsequent consultant selection to complete the SESA project. A revision to the terms of reference to include onshore oil and gas considerations was later made in December 2009, as part of the project reactivation plan.

1.3 WORK PLAN STRUCTURE

The approved SESA Work Plan consists of ten tasks grouped in four phases (modified from RIM 2007):

PHASE 1: WORK PLAN DEFINITION

TASK 1 – VALIDATION OF THE WORK PLAN WITH THE MONITORING AND COORDINATION COMMITTEE

The first task involves the preparation of the work plan for the development of the Strategic Environmental and Social Assessment.

The final Work Plan was approved during the second mission in Mauritania held in May 13-23 2008.

PHASE 2: DESCRIPTION OF THE LEGAL, SOCIAL AND ENVIRONMENTAL BACKGROUND OF THE OIL & GAS SECTOR (TASKS 2-5)

TASK 2: DESCRIPTION OF THE OIL & GAS COMPONENT OF THE PRISM2 AND OF THE ROLES OF THE DIFFERENT STAKEHOLDERS

The aim of this task was to carry out a sector review for both onshore and offshore oil and gas activities in Mauritania.

TASK 3: EVALUATION OF THE LEGAL AND INSTITUTIONAL FRAMEWORK

The goal of this task consists of analysis and evaluation of the contents, the relevance, and the effectiveness of the legal and institutional framework with particular reference to environmental protection, resource conservation and biodiversity.

TASK 4: DESCRIPTION OF THE STATE OF ENVIRONMENT IN MAURITANIA

The task involves the collection, analysis and presentation of existing data relevant to the natural environment of Mauritania. As indicated in the Bank's environmental assessment procedures described in Operational Policy (OP)/Bank Procedure (BP) 4.01, and Operational Policy for Natural Habitats (OP 4.04), the task focuses on the description of high value habitats and the ecosystems in order to promote and indicate precautionary approaches to manage highly valued natural resources in areas under consideration for oil and gas development.

The reference document for the description of the state of the environment in Mauritania has been the final report of June 2007 of the "Environmental Profile of Mauritania" carried out and financed by the European Commission.

TASK 5: DESCRIPTION OF THE SOCIAL ENVIRONMENT IN AREAS SUBJECT TO OIL & GAS DEVELOPMENT

The aim of this task is to describe the current assessment of social environment in areas subject to oil and gas development, as derived from existing information.

PHASE 3: IMPACT IDENTIFICATION, MITIGATION AND MONITORING (TASKS 6-8)

TASK 6: IDENTIFICATION OF THE POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS INDUCED BY REFORM IN THE OIL & GAS SECTOR

Key strategic environmental issues arising from current and future oil and gas development in Mauritania were identified and assessed.

In particular, this task describes the potential significant environmental and social effects due to implementation of a policy to implement sectoral reforms that will affect future development of the Mauritanian oil and gas sector.

TASK 7: DEVELOPMENT OF A MONITORING AND MANAGEMENT PLAN

Following the identification of key environmental and social issues arising from current and future oil and gas development in Mauritania, a strategic management framework to assess the effectiveness of proposed mitigation measures and establish a mechanism for regulatory compliance was presented.

This section considers the Framework for a National Oil Spill Contingency Plan (NOSCP) and the implementation of Environmental information systems.

TASK 8: SUPPORT FOR THE COORDINATION AMONG THE INVOLVED INSTITUTIONS, INCLUDING THE NON-GOVERNMENTAL SECTOR AND CITIZEN'S

According to the ToR, a strong emphasis on public consultation will be stressed during the preparation and completion of the SESA phases. Support will be provided to the various institutions of the Mauritanian government involved in SESA development to facilitate the public consultation process.

The result of the consultations process has contributed to the development of the draft and final report which has incorporated as much as possible the relevant viewpoints and expectations of stakeholders. A total of five stakeholder consultation workshops will be held.

PHASE 4: FINAL REPORT

TASK 9: ISSUE OF THE FINAL SESA REPORT

During the 4th D'Applonia-IEL Team mission of April 2010, a Draft of the SESA Report illustrating the study methodology, major findings and recommendations will be presented and discussed with the Comite de Suivi and the Comite Elargi.

TASK 10 – PRESENTATION OF FINAL SESA REPORT

This task will include presentation of a final report in a one-day workshop. The report will incorporate feedback from findings and comments arising from the fourth mission.

2. SEA INITIATIVES IN MAURITANIA'S OIL AND GAS SECTOR

2.1 SEA METHODOLOGY

Strategic environmental assessment aims to facilitate early and systematic consideration of environmental and social implications on the policy, planning, and program (PPP) level. There is an ever growing significance of SEA as a form of support in the strategic decision making process (Finnveden, Nilsson et al. 2003). In order for this process to be effective a number of criteria must be addressed. Certain steps may differ depending on a projects context and the country conducting the SEA; however the primary provisions for SEA tend to remain the same and can be grouped under three general approaches (Dalal-Clayton and Sadler 2005):

Recognizing that SEA is a distinct process which can be characterized as a extension of environmental impact assessment (EIA Commission) by:

- Applying SEA as a tiered planning process which begins with policies and then followed by plans and/or programs (sometimes this order may be reversed); and
- Integrating SEA into environmental policy appraisal and regional and land use planning.

Although countries may share or use one or more of these common three approaches, their SEA framework will differ in relation to national particularities in legal and institutional structures, and procedural arrangements ((Chaker, El-Fadl et al. 2006)

It is evident that SEA is an evolving concept in which no SEA process predominates over another. The underlying principles for good SEA's must be able to address a broad range of issues for a variety of specific uses along a continuum of material that may cover many different subject matters. There are some key principles worth mentioning which set SEA part from the rest of the family of environmental assessments (EA) (Kjorven and Lindhjem 2002). SEA aims to address key policy/program decisions and demands formal involvement of the decision makers, with proper timing and time-scale, rather than a project level focus as follows:

- Data needs tend to be targeted towards critical questions rather than comprehensive ones;
- A consultative process is typically conducted throughout the entire SEA process rather than consultation on specific documents; and
- It is flexible and iterative, including feedback (and review/monitoring where appropriate) as part of the process.

Table 2-1: Sequence of Actions & Assessments within a Tiered Planning Assessment System

Level of Government	Land-use plans (SEA)	Sectoral and Multisectoral Action			
		Policies (SEA)	Plans (SEA)	Programs (SEA)	Projects (EIA Commission)
International	Transboundary agreement on resource management → National Land-use plan	Multi country policy framework	Long-term sector (e.g. national roads) plan → Regional strategic plan	Multi-country investment program	Transboundary projects → Construction project (e.g. motorway section)
National Federal		National sector (e.g. transport) policy		5 year sector (e.g. road building) program	
Regional/State	Regional Land use plan	National economic policy			
Subregional	Subregional land-use plan			Subregional investment program	Local infrastructure project
Local	Local land-use plan				

(World Bank, 2002)

In general a SEA process should be directed by the following procedures (Dalal-Clayton and Sadler 2005):

- **Screening:** responsible organizations carry out an assessment of all the strategic decisions with significant environmental consequences;
- **Timing:** results attained from the assessment may be published sufficiently early enough for use in the strategic decision process;
- **Environmental scoping:** all relevant information is gathered and presented to determine whether an initiative should proceed and whether the objective can be attained in a more environmentally sound manner either through alternative initiative or different approaches;
- **Additional factors:** adequate information is reviewed surrounding additional factors such as socio-economic considerations;
- **Review:** the integrity of the process is maintained by an effective review method;

- *Participation*: sufficient information of the views of all stakeholders should be assessed and available for viewing early enough to ensure efficacy in the strategic decision process;
- *Documentation*: presentation of results are understandable and available to all parties for review;
- *Decision making and accountability*: it must be clear to all parties and stakeholders affected how the results from the assessment were taken into account during the decision making process; and
- *Post-decision*: ample information on the impacts of applying the decision is acquired to review whether the decision should be amended.

It is important to note that SEA's must be designed for the kind of decision at stake, and the nature of which the decision making process is based upon (Partidário 1998).

2.2 SEA INTERNATIONALLY

Current SEA practices differ greatly from nation to nation; as a practice SEA has been distributed throughout the world in industrialized countries, developing countries, and in countries in transition. The situations in which SEA's have been applied range from a number of different industries and topics which include social and economic concerns. Table 2-2: *SEA Use Internationally* lists those countries where SEA has been applied and the coverage (sectors) in which it has been used (Chaker, El-Fadl et al. 2006).

Based on international experience to date, the following can be stated:

- Considerable variability in SEA processes exist internationally. Some countries have adopted formal legal requirements for SEA (tied into EIA, other sectoral regulations or exclusively within SEA alone), while others have only adopted guidance documents.
- Currently there is no single favorable way to conduct an SEA; instead it is heavily based on the context of the country, factoring in its institutional framework, background on legal enforcement, and present governance approach (Chaker, El-Fadl et al. 2006).
- In the West Africa region, there is little experience in the implementation of strategic environmental assessment. An SEA has been done for the mining sector in Sierra Leone (The World Bank 2008) and the World Wildlife Fund (WWF) has been supporting a number of SEA training initiatives (P. Siegel, personal communication).
- In the majority of countries where SEA has been applied, the onus has been made for the proponent (private or public) to complete it, with various levels of involvement by the competent authority accountable for environmental issues. This is not ideal because SEA is directed more to government planning and policy levels, rather than at the project level. With this in mind, it is absolutely imperative that appropriate institutional framework is in place to supplement the SEA process.

Table 2-2: SEA Use Internationally

Country	Coverage (sectors)
Canada	Cabinet policies, oil and gas, power, forestry, foreign investment, atomic energy, land use planning, transport, aquaculture
Czech Republic	Energy, transport, agriculture, waste treatment, mining and processing of minerals, recreation, tourism, territorial planning, water management
Denmark	Sector environmental policy objectives (energy, transport and agriculture); action plans under Ministry of Energy and Environment
Hong Kong SAR	SEA applied to strategic policies and proposals of legislation. Environmental protection in areas of territorial development and land use, transport development, sewage disposal, waste to energy incineration, power generation
Netherlands	Waste management, electricity generation, water supply, land development, regional plans involving site selection of major housing, industrial and recreational areas
New Zealand	Plans and policies
Portugal	Land use and spatial planning
Sierra Leone	Mining sector
Slovenia	Land use planning
South Africa	Not specified, performed on a voluntary basis
Sweden	Expected to cover plans and programmes
UK	Local plans, unitary development plans, structure plans, mineral local plans, regional planning guidance, spatial development strategy for London, local development documents, and regional spatial strategies
USA	Proposals for legislation and other major Federal actions significantly affecting the quality of the human environment

2.3 RATIONALE FOR SEA

The basis for applying SEA to PPP's falls into three main categories; strengthening project level EIA, addressing cumulative effects, and advancing the principles of sustainability (Dalal-Clayton and Sadler 2005)). It has also been argued that a more strategic approach to SEA be taken (Partidário 1998).

STRENGTHENING PROJECT EIA

EIA's have structural weaknesses in the sense that they are applied too late in the decision making process. At this point, decisions on whether, where and what type of a project should occur have already been decided, often with little or no inclusion of environmental or social considerations. From a planning perspective, EIA is inefficient at addressing these higher hierarchical considerations, because decisions at the project level have largely been made. Incorporation of environmental and social concerns and alternatives at the PPP's level can help streamline the EIA process by examining issues at an earlier decision making phase, thus making them more consequential and reducing the time and effort needed to generate them. Another benefit of SEA is when applied at the policy level it can significantly reduce the amounts of project level EIA's and subsequently reduces the strain if institutional and/or expertise capacity is limited (Dalal-Clayton and Sadler 2005).

CUMULATIVE EFFECTS

Cumulative effects occur where ranges of influence from different activities overlap and consequently impact the same area (Dutch Commission 2006). These results of these effects must be greater than the sum of the individual effects.

SEA AND SUSTAINABILITY

SEA has a very important role in integrating environmental and social objectives in policy and planning development, and in turn has influences in implementing sustainable initiatives on the policy and planning levels.

EIA's are structurally weak in the sense that they are applied too late in the decision making process. At this point decisions on whether, type and where a project should occur have already been decided often with little or no environmental considerations.

CONSTRAINTS AND OPPORTUNITIES

The integration of social, economic, and environmental considerations in decision-making is an underlying aspect of SEA. The implementation of these strategies in developing countries shows their initiative to support good governance and should be conducted with transparency. In doing this governments visibly demonstrate their commitment to more strategic, proactive planning and decision-making towards environmental sustainability (Dalal-Clayton and Sadler 2005). A list of SEA constraints in developing and transition countries are outlined in Table 2-3: *Constraints and Opportunities in SEA*, along with corresponding opportunities (modified from Dalal-Clayton and Sadler, 2005).

The capacity of many developing countries to adopt and implement SEA’s can vary. In many instances the country will need assistance with policy, legal, and institutional reforms in order to create the fundamental preconditions (Dalal-Clayton and Sadler 2005). Even after SEA provisions are in place, it will take a substantial amount of effort to raise awareness and train future practitioners. This is one of the true challenges in implementing a lasting and effective SEA process.

Table 2-3: Constraints and Opportunities in SEA

Constraint	Opportunity
Little interest by many government agencies in subjecting policy and planning proposals to assessment, reinforced by fear of losing control, power and influence by opening up such processes	SEA is a transparent, participatory process that helps to realize good governance; it promotes inter-institutional relations in order to define priorities; and it supports informed, balanced decision-making, reinforces accountability and builds public trust and confidence
Limited appreciation of the potential utility of upstream assessment among senior staff (in both governments and donor agencies), and doubts about the robustness of results	The efforts of DAC and others to clarify the role and utility of SEA should improve understanding of how, when and where SEA can help senior staff achieve their responsibilities
Lack of resources for perceived ‘non-essential’ studies at early stages in the preparation of assistance programs	Investment up-front in an SEA can save time and the later expense of fixing the consequences of poor decisions
Perception that SEA will add significant costs and increase the work load of hard-pressed agencies.	It is likely that SEA costs will decrease over time as it is institutionalized (just as EIA costs reduced as it became routine)
Concern that SEA will increase the time frame for decision-making or delay development	When applied appropriately and early, the SEA process is integrated within the decision-making process
Absence of clear guidance and known, tried-and tested methods	SEA principles, methods and guidance are in use internationally and can be drawn upon
Unclear lines of accountability and responsibility for undertaking SEA	International legal instruments for SEA and practical experience with how to operate national systems can be built on
Lack of practitioners with expertise in SEA approaches in both donor agencies and in recipient countries	Investment in SEA awareness-raising and training can build skills and competencies
Need to train and take on additional staff for this purpose	Training can pay major dividends by improving decision-making, eliminating wasted time spent on fixing later problems and promoting more sustainable development

2.4 STRATEGIC VS. CONVENTIONAL IMPACT ASSESSMENT APPROACH

The development of SEA objectives is a recognized way in which environmental considerations can be described, analyzed, and compared in the SEA process. It is important to recognize that a Strategic Environmental Assessment (SEA) is a distinct and complementary process from an Environmental Impact Assessment process and under no circumstances can the EIA process replace or be replaced by SEA (EIA Commission). The key difference between the two is that the EIA process aims to assess the environmental and social impacts associated with a specific proposed project (seismic, drilling, development, etc.) of which location and design details are known and available. SEA it aimed at the policy, program and planning level whereby we have a logical idea of what we want (e.g. develop the onshore and offshore oil & gas sector), but we do not know precisely how it is going to be attained.

In other words, we can say that the EIA process should results in a good project design while the SEA should result in a good strategy definition. Fundamental differences between the two processes are shown in Table 2-4: *Fundamental Differences between SEA and EIA*.

The consequence is that we can fairly easily assess in detail the environmental and social impacts associated with the implementation of a certain project through the completion of a project level environmental assessment. However we can only forecast the general environmental and social components that will be affected by the implementation of a certain policy such as the development of the oil & gas sector in Mauritania. To aid in the assessment of the potential implications of the oil & gas development policy implementation, oil and gas development scenarios have been developed covering a credible range of activities.

Table 2-4: Fundamental Differences between SEA and EIA

Some Fundamental Differences between SEA and EIA	
SEA	EIA
The perspective is strategic and long-term	The perspective is of execution in the short and medium-term
The process is cyclical and continuous	The process is discrete, motivated by concrete intervention proposals
The purpose is to help build a desirable future, it is not an attempt to foresee the future	The intervention project has to be known with the suitable level of detail
The definition of what is intended is vague, there is a large amount of uncertainty and the data are always quite insufficient	The definition of what intends to be done is relatively precise and data are reasonably available or can be collected through fieldwork
Follow-up in SEA is performed through the preparation and development of policies, plans, programs and projects	EIA follow-up is performed through the construction and implementation of the project
The strategy may never be put into practice given that the actions established in plans and programs may never be implemented	Projects requiring an EIA are executed once their environmental feasibility is guaranteed

3. REVIEW OF THE LEGAL AND INSTITUTIONAL FRAMEWORK OF THE HYDROCARBON SECTOR

The following section describes the legal and institutional framework as it pertains to oil and gas development in Mauritania. It begins by describing the various institutions in place at the time of SESA preparation and key pertinent legislation is described. A gap analysis follows which is further elaborated in Section 3.3.

3.1 GOVERNMENT INSTITUTIONAL FRAMEWORK

The drafting, implementing and monitoring of environmental policy is at the core of the Ministry of Environment (MEDD) mandate. Nevertheless, there are a number of departments from other ministries which are directly or indirectly involved in the management of environmental issues. The following is a brief description of the relevant structure, powers and competences of these Ministries.

3.1.1 MINISTRY OF PETROLEUM ENERGY AND MINES (MPEM)¹⁸

Core mandate: MPEM is in charge of drafting and implementing government policies in the oil and energy sector. The Ministry is also responsible for collecting and disbursing the revenues obtained from these sectors. In particular, it promotes and regulates the production, import and export, transportation, storage and commercialization of hydrocarbons, while encouraging the exploration of new reserves. The Ministry also has a regulatory mandate in that it is responsible for issuing the required permits and monitoring the development of oil and energy sector. MPEM manages the offshore mineral resources with the Ministry of Fisheries and Maritime Economy (MFME) and other Ministries. (*Legal sources:* Decree number 177/2008, defining its powers and structure; and the law 2010/033 of Hydrocarbons Code).

Environment related structures and functions:

The MPEM is in charge of two divisions (directorates):

- **Directorate General of Electricity and Renewable Energy:** whose functions are detailed in Articles 20-32 of the new Decree 177/2008. It contributes to the development and implementation of policies and strategies in the electricity sector.
- **Directorate General of Refined Oil** (Articles 33-45): is responsible for procurement, distribution and technical standards in the downstream sector of oil & gas.
- **Directorate General of Crude Oil** (Articles 46-59): is responsible for developing, implementing and monitoring strategies related to the hydrocarbons sector. The General Directorate has 3 branches:

¹⁸ Current name as of this report preparation

- Directorate of Exploration - Production: responsible for managing operations of oil exploration and evaluation. This direction includes 3 services responsible for monitoring of exploration, development and production;
 - Directorate of Oil Wealth Management, Data and Promotion: deals with the collection, centralization, preservation, processing and dissemination of geologic information and petroleum. The Department of the Environment Petroleum, responsible for all matters relating to the oil market, belongs to this direction; and
 - The Audit Department and Economic Studies.
- **General Directorate of Administrative and Financial Affairs**

Public companies subject to technical review and policy of the Department are listed in articles 3 and 4 of the new order and include in particular the SMH, and SOMELEC SOMIR as well as organization or institution with public participation. This clause made the list open, unlike the exhaustive list set out in Decree 177/2008, and allows the department to widen its influence.

3.1.2 MINISTRY OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT (MEDD)

Core mandate: The MEDD has the mandate of protecting and managing the environment in Mauritania by preparing, coordinating, executing, monitoring and evaluating the government policy with respect to the environment. It is also responsible for the implementation of sustainable development objectives, including mainstreaming of objectives into public policies and in the management of natural resources.

Legal sources: Decree number 190/2008 defining its power and structure; the Environmental Code (Law number 45/2000) and the Decree for the Environmental Impact Assessment (EIA Commission) number 94/2007.

Historical Evolution: Environmental management was the responsibility shared among several ministries and focused mainly on the protection of flora and fauna and protected areas. The Ministry of Rural Development and Environment was established in 1995. However, departments from other ministries were still involved in managing the environment. In 2007, a secretariat in charge of the environment, under Prime Minister's Office was created. In 2008, the secretariat was re-structured to form the Ministry of the Environment and Sustainable Development (Decree number 190/2008).

Main functions:

- Propose strategies and policies to manage and protect the environment;
- Participate in the implementation of sectoral policies in areas that are subjected to environmental impacts such as urban planning, development planning, agriculture, fisheries, energy, infrastructure, transportation, extractive industries, tourism, education and health;
- Draft environmental legislations, regulations and norms and ensure their application after being approved by the government;

- Coordinate the ratification process of international environmental conventions and agreements;
- Monitoring the implementation of policies and programs related to the environment;
- Proceed through environmental police officials for investigations, controls and inspections necessary to verify the application of environmental norms and regulations;
- Monitor the quality of environmental management system, upgrade the level of protection and prevention, and mitigate the source of pollution/contamination and nuisance;
- Validate environmental feasibility studies in programs and projects subjected to Environmental Impact Assessment (EIA Commission). Moreover, following the 2007 Decree that instituted the EIA process, MEDD is mandated to issue directives and guidelines, validate TORs for the EIA studies and ensure public participation in the EIA process;
- Ensure a coordinated response from different government bodies to prevent technical errors;
- Support information exchange on the environmental aspects; create and maintain national database that has access to public;
- Educate citizens and civil society organizations about the environment and propose measures to improve quality of life;
- Conduct inventories, studies and research on the impact of human activities on the natural environment;
- Sponsor and validate studies related to environment; and
- Manage and coordinate activities of the Environment Intervention Fund (EIF).

Administrative structure: MEDD is divided into six directorates. Three of them are of particular interest in the context of the SESA project:

- *Directorate of Environment Control:* includes two services: (1) Environmental Assessment – the Directorate is in charge of publishing directives and guidelines required for the for EIA and validate TOR to carry out the EIA; and (2) Norms and Controls – the directorate is in charge of disseminating the existing environmental norms and ensuring environmental management (Article 23-25 Decree 190/08);
- *Directorate of Pollution Prevention and Environmental Crisis:* The mandate is to develop, coordinate and implement national strategies to prevent any form of pollution, including natural disaster. The directorate is also in charge of developing and implementing the Environmental Emergency Plan and Solid Waste Management Plan. An important service provided by the Directorate is the Marine Pollution Prevention Plan (MPP), with the sole aim of monitoring the compliance in regards to environmental regulations both onshore and off shore. It also collaborates with other departments to evaluate risks associated with offshore

oil exploration on the marine and coastal resources (Article Number 26-29 Decree number 190/08); and

- *Directorate of Protected Areas and Coastal Zone Management*: Its mandate is to improve the national policy on protected areas (PAs), develop and manage PAs and ensure protection of biodiversity (Article number 30-33 Decree number 190/08).

Related institutions: The MEDD is in charge of several projects implemented through specific coordination units and financed by different donors; some of these projects focus on the reinforcement of environmental capacity (training and piloting) such as the project Poverty-Environment funded by the UNDP-UNEP, the National Capacity Self-Assessment (NCSA) funded by the UNDP-EEG, and the environmental component of the “*Projet pour le Renforcement des Capacités du Secteur Public*” (PRECASP) funded by the World Bank (WB) which deals with public sector reforms.

3.1.3 MINISTRY OF TRANSPORT (MT)

Core mandate: MT is in charge of drafting and implementing government policies in the transport sector. The Ministry has regulatory power in its domain and has a say in decision making process. MT also controls and promotes the development of transport related infrastructure including harbour areas, and takes part in preserving the marine environment. Finally, it manages the weather network and climate studies in view of forecasting natural catastrophes.

Legal sources: Decree number 96/2007 defining its power and structure.

Environment related structure and functions: MT was categorised into five directorates until the Decree number 79/2009 assigned the Merchant Marine to MFME. As a result of this, only two of MT’s Directorates may be considered to be directly related to environmental issues:

- *Directorate for Studies, Planning and Cooperation*: The Directorate is responsible for drafting the procedure for assessment of the environmental and socio-economic impacts of transport related projects (Article number 18-20 Decree number 96/07); and
- *Directorate of Infrastructures and Transport*: Here the Directorate is in charge of preparing the EIA reports for transport related projects and takes part in environmental monitoring and implementation of environmental management plans (Article number 28-31 Decree number 96/07).

Main related institutions: The institutions under Ministry of Transport are:

- The National Office of Meteorology (ONM); and
- The Autonomous Port of Nouakchott (PANPA);

3.1.4 MINISTRY OF FISHERY AND MARINE ECONOMY (MFME)

Core mandate: MFME is in charge of the marine resources and has the authority to monitor the quality and health of the fishing industry. Its mandate includes sustainable exploitation of marine biological resources, conservation, stock maintenance and primary processing of these resources.

Legal sources: Decree number 95/2007 defining its powers and structure; the Fishery Code (Law number 25/2000); and Decree number 79/2009 on merchant marine.

Environment related structure and functions: The ministry is composed of several directorates that supervise public institutes and agencies on behalf of the government. Two of the directorates play an important role in the decision making process:

- *Directorate of Marine Resource Management and Oceanography:* The directorate in charge of developing and monitoring the national policy for the conservation of the marine ecosystems, coordinating the fight against marine pollution, developing and monitoring fishery management plans, and developing information systems and databases on the fishery industry.
- *Directorate of Merchant Marine:* As of May 2009, the Directorate was brought back under the supervision of the Ministry of the Fishery and Marine Economy (Decree number 79/2009). Mauritania's Merchant Marine is in charge of implementing policies and legislation related to the management of public maritime domain. It is composed of four policies including the policy for Conservation of the Marine Environment and Public Maritime Domain. This policy has several functions that are relevant to this report:
 - Organize the fight against marine pollution in consultation with government departments, implement POLMAR (action plan to fight marine pollution);
 - Collaborate with other government departments to implement POLMAR with respect to land-based pollution affecting the marine environment;
 - Update the POLMAR plan in consultation with government agencies and monitor the action plans developed by oil and gas operators and port authorities;
 - Participate in the harmonization of plans developed by oil companies, port authorities and transport vessels in regards to the International Convention for Prevention of Pollution from Ships (MARPOL) and the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPCR); and
 - Monitor the financial contribution to the International Oil Pollution Compensation Funds.

Main related institutions:

- The Mauritanian Institute of Oceanographic and Fishery Research (IMROP): Established in 1978 under the MFME, the institute is in charge of analyzing biological, physical, socio-economical and technical parameters associated with the fishery sector of Mauritania. In

addition to monitoring and evaluating the marine resources, IMROP works in collaboration with the National Park of Bank d'Arguin (PNBA) to monitor biodiversity.

- The Autonomous Port of Noudhibou (PAN); and
- The Centre for Coordination of Marine Research and Rescue (CCSM).

3.2 LEGAL AND REGULATORY FRAMEWORK OF THE HYDROCARBON SECTOR

3.2.1 KEY NATIONAL LEGISLATION AND POLICIES

The environmental regulatory and legal framework in Mauritania has recently been implemented. It includes the following sections:

3.2.1.1 ENVIRONMENTAL CODE (LAW NUMBER 45/2000)

The Environmental Code provides general principles and the legislative context to develop national policies for environmental management and protection (Article 1). The purpose of the Code is to conciliate the need for economic development focusing on environmental protection. Among the “fundamental principles”, the precautionary principle (Article 6) and the polluter-pays principle (Article 7) are emphasized. The Law further defines the main instruments of environmental management in Mauritania:

- The responsibilities of the Ministry of Environment and Sustainable Development (MEDD);
- The National Action Plan for the Environment (NAPE) comprising environmental management and protection;
- Environmental Impact Assessments (EIAs) as a requisite to obtain the authorization for any project or activity with potential negative impacts on the environment;
- An Intervention Fund for the Environment (IFE) to finance restoration initiatives to counteract environmental degradation (however, such a fund has never been created);
- An environmental police force; and
- The legal proceedings to identify and penalize environmental infractions.

3.2.1.2 NEW CODE ON ENVIRONMENT AND SUSTAINABLE DEVELOPMENT (DRAFT LAW)

In 2010 a new draft law to reform the Environmental Code approved in 2000 was released. The new text currently available introduces significant changes in Mauritania legislative framework for environmental protection, addressing many of the issues raised in the gap analysis of the current law.

The major changes proposed by the draft law are summarized below:

- New goals and guiding principles proposed. The most important is the “sustainable development”. This change is highly symbolic and marks a new awareness in striking the

balance between development and environmental protection. On the same direction goes the new reference to the fight against poverty (Article 4).

- Enforcement of international obligations currently undertaken. (Article 3). The implementation of important agreements officially signed by Mauritania such as FIPOLE and CLC conventions will allow the country to benefit from the related parachute systems in case of accidental pollutions at sea. On this matter, implementation would be expressly required by the new Articles 58 and 62. International cooperation is further encouraged requiring the MEDD to consult with its neighboring countries' counterparts while drafting the national action plan (Article 20).
- Reaching and maintaining a healthy environment constitutes legal (and thus actionable) rights (Article 6).
- Precautionary principle is defined more clearly with a new reference to the duty to prevent and mitigate environmental damage (and not just paying for the cleanup) by using the best available techniques (Articles 7-8).
- A priority list of required activities in relation to environmental damage is provided. First, prevention; second, mitigation and closing of the source of pollution; third, remediation and monitoring (Article 12).
- Transparency is improved by the express provision of the right for the public to access any information related to the environment and to take part to decision-making process (Article 10). Moreover, the national action plans must be adequately advertised among the population (Article 21) and public inquiries are provided for assessment plans on environmental related matters (Article 36).
- The issue of education and training is also directly addressed as the environment would enter in the school programs while research and innovation are encouraged in this field (Article 11).
- The MEDD passes from a mere role of advisor to be the co-author of related directives together with the other Ministries eventually involved (Article 13). MEDD coordinates the CNEDD (National Council for the Environment and Sustainable Development), with a broadened duty and mission. The CNEDD is supported by the newly created CTEDD (Technical Committee for the Environment and Sustainable Development) and regional Committees appointed by the MEDD itself (Articles 16, 17 and 19).
- The FIED, now FIEDD (Intervention Fund for the Environment and Sustainable Development) represents a more flexible tool for financing environment related projects (Article 22).
- The concept of Strategic Environmental Assessment is formally introduced (Article 31 and following).
- Standards of environmental quality are introduced based on listed factors and criteria (Article 38) together with fiscal incentives to encourage both private and public companies to improve their environmental performances (Article 42).

- Emergency plans in case of environmental accident are finally regulated and all facilities requiring environmental authorization must provide one (Articles 39-41).
- Protection of biodiversity (Articles 43- 47) in littoral zone (Articles 58-62) and national parks, (Articles 67-69) are also regulated. Air pollution issues are also addressed.
- New criteria for a balanced residential development are provided. (Articles 71-74).
- New regulations of hazardous substances (Articles 99-101) and liquid or gas spills (Articles 102-103), requiring to enact new laws and regulations.
- MEDD is in charge of supervising the implementation of the new Code, monitoring the respect of its dispositions and coordinating the authorities responsible for executing them (Articles 109-110).
- All the sanctions revised and more have been introduced to cover infringements of environmental laws. New closing provisions grant a penalty for all violations of Code not specifically regulated (Article 123) and double the charge in case of relapse into crime (Article 127).
- Any person or company affected by environmental damage can petition the authorities to investigate the potentially responsible party to ascertain eventual criminal violations (Article 129).
- MEDD is given the power to settle trials for environmental violations. In any case, the money collected from the responsible party goes to the FIED (Intervention Fund for the Environment and the Sustainable Development) (Article 131).

3.2.1.3 ENVIRONMENTAL IMPACT ASSESSMENT LAW (DECREE NUMBER 94/2004, LAST AMENDED BY DECREE NUMBER 105/2007)

The decree mandated by the Environmental Code (Article 15), streamlines the activities and requirements to carry out EIAs. The Decree identifies two main activities that may have significant direct or indirect impacts on the environment (Article 4): (A) activities requiring an EIA; (B) activities that require an environmental impact assessment notice. In particular, activities related to the oil and gas sector such as seismic exploration, drilling, transportation and storage of hydrocarbons and gas, offshore implantation, and oil and gas refinery facility are considered as category A requiring an EIA. Article 7 details the content of an EIA, including an environmental management plan proposing mitigation measures. Article 17 comments on the need for public consultation as part of the EIA process. (See Appendix A for a list of clauses that explains the approval process.)

3.2.1.4 OIL AND GAS LEGISLATION AND MARPOL CONVENTION

Mauritanian legislation does not include yet a single and comprehensive framework to regulate the exploration and exploitation of oil and gas activities. As a result, oil operators refer to International Standards and certificates (e.g., ISO 14001) on a “best practice” approach.

Mauritania’s current legislation on hydrocarbons is summed up below.

Law 2010/33 of the Hydrocarbon Code: The New Code approved in 2010 aims to prepare the legislative, fiscal and institutional framework regulating the "Petroleum Operations", is defined as any activity involving the exploration, exploitation, storage, transportation and marketing of hydrocarbons (see Chapter 3.2.6).

Law number 29/2004: The law includes a simplified fiscal process for foreign contractors and sub-contractors providing services for oil and gas companies in Mauritania.

Law Number 20/2008 (replacing Law number 8/2006): Creation of National Hydrocarbon Revenue Funds (Fonds National des Revenus des Hydrocarbures - FNRH) with the aim of collecting revenues generated from exploitation of hydrocarbons in Mauritania. The Fund is managed by the Ministry of Finance assisted by Consultative Committee on Investments. According to the convention signed in 2006, the management may be delegated to the Central Bank of Mauritania.

In order to provide a quick look of the issues related to the implementation in Mauritania of The International Convention for the Prevention of Pollution from Ships (MARPOL) Convention, a summary of the convention provisions and their applicability to the Mauritania situation is provided below.

MARPOL has a new draft for Code of Hydrocarbons as part of the transportation process.

The MARPOL Convention, adopted by the IMO on 2nd November 1973, is the main international instrument covering prevention of marine environment pollution by ships from operational or accidental causes.

At the onset, the Convention was restricted to the regulation and prevention of oil pollution by oil tankers through its Annex 1. However, the Convention has been subjected to successive amendments and widened to include different pollutants. Mauritania has ratified the MARPOL Convention and its first five annexes (out of 6 annexes), but their implementation will be completed only with the final approval of the draft Law concerning on marine pollution analyzed below.

MARPOL, as well as traditional legislation concerning hydrocarbons pollution, used to regulate mobile vessels such as ships and tankers separately from fixed ones such as drilling platforms. This fact prompted a decade long debate at the IMO as to what regulation should apply to hybrid facilities such as Floating Production Storage and Offloading (FPSOs) vessels, used in the production and storage of crude oil located in deep water fields offshore, or Floating Storage Units (FSUs), used for the offshore storage of produced oil. FPSOs in particular are now being used in a number of deepwater projects all over the world including Mauritania at the Chinguetti field.

The MARPOL Convention contains many provisions, which are not relevant to FPSOs and FSUs because Annex 1 was formulated principally for the prevention of pollution by oil tankers trading from port to port.

The IMO's Marine Environment Protection Committee (MEPC), realising the complex issues which would arise if the convention were applied in its totality to FPSOs and FSUs, assigned the subcommittee on Bulk, Liquids and Gases (BLG) with the task of revising the applicability of Annex 1

to FPSOs/FSUs. The BLG recommended specific rules to guide the operation of FPSOs/FSUs known as the “Guidelines for the Application of the Revised MARPOL Annex 1 to FPSOs and FSUs”.

Some important aspects of the Guidelines include:

Approval date and entry into force: The Guidelines were approved by the MEPC in July 2003 and member states were recommended to adopt them not later than 2 years after that date. However, timing and degree of implementation can be negotiated. Guidelines are not retroactive, so they apply only to contracts for the construction or conversion of FPSOs entered on or after the approval date.

Scope of application: The Guidelines apply to both self-propelled FPSOs/FSUs units and units without propulsion arrangements, whether registered in a national shipping register or unregistered. They apply when the units are located at their operating station, either during abnormal and rare circumstance of voyages made by the FPSO for dry-docking, repair or maintenance work or destruction of the platform in extreme environmental or emergency conditions.

FPSOs/FSUs should be subject to Enhanced Survey programme scheme with the only waiver for underwater bottom survey instead of a dry-docking at the scheduled time.

Hulls in newly built FPSOs/FSUs must have double sides/collision risks as a collision avoidance measure, while appropriate measures are to be taken to address collision risks for converted tankers. No upgrade is required for existing FPSOs/FSUs.

In 1992, Annex 1 of the convention was amended and made it mandatory for new oil tankers to have double hulls. This requirement is however not applicable to FPSOs and FSUs under the convention, unless opted for by the coastal state.

Application of MARPOL damage stability requirements may cause restrictions on allowable topsides or hulls of smaller size FPSOs.

Limitation of oil outflow is set to a maximum 30,000 m³. This requirement is applicable only to VLCC (Very Large Crude Carrier) size FPSOs and FSUs and it may place a restriction on the allocation of ballast tanks on the FPSO/FSU.

Discharge requirements are made more explicit for contaminated seawater. Discharge options include sending it ashore, incinerating, separating/discharging or adding it to the production stream.

FPSOs/FSUs are not allowed to transport oil to ports or terminals except with the specific agreement of the flag and relevant coastal states, which should be obtained on a voyage basis. When undertaking any voyage away from their normal operating station for whatever purpose, FPSOs/FSUs are required to comply with the discharge provisions of MARPOL Annex 1 for oil tankers.

3.2.1.5 CODE OF CRUDE OIL (LAW N.2011/33)

The Law n. 2010/33 of 20 July 2010 on Crude Oil Code replaces Ordinance No. 151/1988 and provides a legal framework and improved significantly with respect to the following aspects:

- It establishes the division between the two new branches introduced by the decree which has reformed the responsibilities of the new DG of MPEM and the Refined and Crude Oils;
- It introduces the possibility to assert multiple permissions (authorization of recognition, exploration-production contract and mining license) in the same area by assigning them to different subjects (Art. 10), based on the legislative model of Tunisia;
- It modifies the duration and physical extent of the authorization of recognition which shall be raised to 12 months and renewable at a depth of 300 m (Art. 13);
- It defines the principles that regulate the sharing of revenues from new fields between the state and private operators (the share for the repayment of private oil operations is set at a maximum of 60 and 65%), and refers to the Standard Contract Exploration and Production, contextually renovated, for details (see below) (Articles 16 and 38);
- It defines the procedure for awarding areas subject to permission and provides that the MPEM can waive with the consent of the Council of Ministers (Art. 18);
- It maintains the contract exploration- production in two distinct phases: the research period (maximum 10 years), divided in into three phases, and the exploitation period (maximum 25 years for oil deposits and 30 years for gas deposits, up to 10 years renewable in both cases) (Art. 20);
- Each of these phases and sub-phases will provide minimum business plans to be executed within the terms provided and projected annual budget, which must be subject to approval by the MPEM, the contract can be terminated in case of non-accomplishment (Articles 24-26);
- The private operator will be responsible for preparing all equipment and tools necessary to execute the for exploration-production contract and be responsible for any damages arising from such activities (Articles 30-32);
- It also provides the option for the MPEM to demand a compensation for the residents of coastal areas affected by exploration (Art. 36);
- The rehabilitation plan that the operator must submit before the exhaustion of the deposit will be financed through guaranteed annual payment of a lump sum from the operator as provided in the contract (Art. 43);
- All Exploration-Production Contract shall provide an option that allows the state to become a shareholder of a private operator to share a percentage of costs and profits of not less than 10% (Art. 44); and
- The settlement of controversies between the state and the private operator will necessarily pass through an international arbitration clause to include in the contract, while the applicable law remains the Mauritanian law (Articles 49-51).

The new Code does not apply retroactively to contracts stipulated prior to its entry into effect (Art. 110).

3.2.1.6 PRODUCTION SHARING CONTRACT MODEL / CONTRAT TYPE DE PARTAGE DE PRODUCTION (PSC / CPP)

The new law on Exploration-Production Contract replaces the provisions in the Law n. 29/2004 of exploration and exploitation of hydrocarbons in Mauritania. The new CEP aims to regulate and share the production between the operator and the Government of Mauritania.

The new text prepared pursuant to Article 18 of the new Code Crude Oil n. 2010/33 sets out the main novelties introduced by the Code itself (see Section 3.2.5.) and provides some additional details.

For the rest, the new CEP is virtually identical to that of 2007 and maintains the same count of items.

3.2.1.7 MINING CODE (LAW N. 13/1999, AND DECREE N. 54/2004)

The old Code establishes a legal framework for the Mining sector which will be integrated with the Environment Code (Law number. 45/2000). The New Mining Code established in 2008 is waiting for its approval. Appendix C lists the activities and features required to obtain a Mining Code.

3.2.1.8 PREVENTION AND COMBAT OF DIFFERENT TYPES OF MARINE POLLUTIONS (DRAT LAW 2006)

A draft Code of the Marine Environment was created in 2004 and validated in 2006 with the support of the IMO. This project was adopted by parliament and is being adopted by the Mauritanian parliament in 2011.

The main elements of the current bill are summarized below:

- Definition of “*navire*”. It expressly includes not only boats but “every facility of any kind operating in the marine environment, including submarine and floating crafts as well as fixed or floating platforms of all kind” (Article 2). This would affect the applicability of MARPOL and other conventions to FPSOs and FSUs;
- Regulation of spill, dumping or discharge of hydrocarbons, ballast water, noxious liquids in bulk, wastewater, ship garbage and bunker oil from any vessel under Mauritania’s jurisdiction as defined by the scope of application clause (Article 4);
- Presumption of responsibility in case of unlawful discharge (Articles 36-37);
- Oil tankers of 150 tons and every other ship with a gross capacity of 400 certification (Articles 38-50);
- Marine accidents involving hazardous substances reporting (Articles 55-62) and investigations (Articles 63-67);
- MFME and MEDD responsible for Port State control on foreign vessels (Articles 68-69) and managing the National Emergency Plan to respond to hydrocarbon spills in the marine environment (Articles 70-71);

- Penal sanctions framework introduced to prevent and punish infringements relating to discharge of pollutants or waste at the sea, violations of MARPOL 73/78 and of INTERVENTION 1969, waste incineration, and pollution from drilling platforms or port facilities (Articles 72-142);
- Civil liability in case of environmental damage caused by hydrocarbons' spill introduced. Obligation for specific insurance policy in case of accidental pollution also provided (Articles 143-169);
- Oil operators in Mauritania called for International Fund for Compensation for Oil Pollution Damage contribution (Articles 170-176);
- Fines and seizures contribute to the Intervention Fund for the environment according to Article 22 of the current Environmental Code (Articles 192-203);
- A Consultative Committee to Protect the Marine Environment (CCPME) established for the coordination of government actions to protect the marine ecosystem (Articles 204-206); and
- A special POLMAR Fund for Prevention of Marine Pollution and Intervention in case of accident (FIPOL) established to develop resources necessary to prevent, mitigate and stop marine pollution regulated under the draft Law.

3.2.1.9 ORDINANCE N. 37/2007 FOR THE PROTECTION, DEVELOPMENT AND MANAGEMENT OF THE COASTAL ZONE

The Ordinance defines the coastal zones along the coast of Mauritania, including the urban community of Nouakchott, the two national parks, delimited territorial sea (12 marine miles) and the communities along the coast (Nouadhibou and others). See Appendix C for a list of reforms defined by the Ordinance number 37/2007.

3.2.1.10 FISHERY CODE (LAW NUMBER 25/2000)

The Code defines the fishing rules under Mauritanian jurisdiction (water bodies and Sea). The Fishery Code aims at sustainable exploitation of fishery resources while preserving existing ecosystems and aquatic habitats. The requirements of the Fishery code include:

- The Ministry in charge of fishery has to establish management plans for the sector;
- Create a National Consultative Committee for the Development of Fisheries with a responsibility of commenting on the strategies for the development of the fisheries and on the management plans;
- The fishing boats from other countries must be authorized to fish in Mauritanian waters;
- Draft a list of protected species; and
- Establish a monitoring system for fishing activities and corresponding penalties for infractions.

3.2.1.11 HUNTING CODE AND PROTECTION OF FAUNA (LAW NUMBER 6/1997)

Hunting Code and Protection of Fauna establishes a framework to protect biodiversity in the national parks and natural reserves of Mauritania. The framework defines the measures required to protect fauna (from hunting) and manage protected areas.

3.2.1.12 KEY INTERNATIONAL CONVENTIONS AND TREATIES

Table 3-1: *Conventions and Policies Relevant to the Hydrocarbon Sector* below presents multilateral conventions that Mauritania has ratified to protect marine and coastal biodiversity. The conventions and policies are relevant to the hydrocarbon sector.

It is important to note that Mauritania has ratified many of these conventions, indicating both government interest and commitment to their implementation. As in many developing nations, putting these conventions into effect is a difficult process.

Table 3-1: Conventions and Policies Relevant to the Hydrocarbon Sector

Convention	Year of Adoption	Object	Year Ratified/ Signed
Natural Resources			
UNCBD	1992	Biological diversity	1992 / 1996
CITES Convention	1975	International trade of endangered flora and fauna	1998
Agenda 21	1992	Sustainable development	n/a
RAMSAR Convention	1971	Management and conservation of Wetlands of International Importance (WII)	1983
Protocol amending de Wetlands Convention		WII with a particular reference to migratory bird habitats	1989
IUCN Convention	reviewed in 1996	International Union for the Conservation of Nature and Natural Resources	1998
Bonn Convention	1978	Trade of Migratory Species and Wild Animals	1981
Algiers Convention	1968	African Convention for the Conservation of Nature and Natural resources	Signed but not yet into force
Protocol of Agreement	1999	Specific measures for the conservation of sea turtles in the Atlantic coast of Africa	1999
UNCCD	1994	United Nation Convention to Combat Desertification	1996

Convention	Year of Adoption	Object	Year Ratified/ Signed
Atmosphere			
Vienna Convention	1985	Protection of the ozone layer	
Montreal Protocol	1987	Substances threatening the ozone layer	1994/ 2005
UNFCCC	1994	United Nations Framework Convention on Climate Change	1996
Kyoto Protocol		Climate change	2005
Stockholm Convention		Persistent Organic Pollutants	2001 / 2005
Navigation			
UNCLOS Convention Montego Bay	1982	United Nations Convention on the Law of the Sea	1996
London International Convention	1978	International Convention on Standards of Training, Certification and Watch keeping for Seafarers.	1995
OMI Convention		International Marine Organization	1996
London Convention	1972	Convention on the Prevention of Marine Pollution by Dumping Wastes	
MARPOL Convention 73/78 Annex V		International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978: Garbage	1998
MARPOL Convention 73/78 Annex IV		International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978: Sewage	1997 Acceptation approval
MARPOL Convention 73/78 Annex III		International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978: Harmful Substances	1998
OPRC 90 Convention	1990	International Convention on Oil Pollution Preparedness, Response and Cooperation	2000
London SOLAS Convention		International Convention for the Safety of Life at Sea	1998
Brussels CLC Convention	1969	International Convention on Civil Liability for Oil Pollution Damage	Signed in 1996, not ratified yet

Convention	Year of Adoption	Object	Year Ratified/ Signed
Amendment to the Brussels CLC Convention	1992	Amendment on the calculation method for liability limitation	Adhere
Basel Convention	1989	Control of Transboundary Movements of Hazardous Wastes and their disposal	1996
Abidjan Convention	1981	Marine environment, coastal zones and related inland waters falling within the jurisdiction of the States of the Western African Region, from Mauritania to South Africa.	Signed but not yet ratified
Bamako Convention		Ban of the Import of Hazardous Wastes into Africa and on the Control of their Transboundary Movements within Africa	1991
FIPOL 92 Convention & FIPOL 92 Protocol	1971& 1992	Creation of an International Fund of compensation for the damage due to pollution by hydrocarbons OPRC 90, CLC 92, et FIPOL 82	Signed in 1996, not ratified yet
London Convention	1972	Convention on the International Regulations for Preventing Collisions at Sea	1995

3.2.2 RELATIONSHIP WITH KEY NATIONAL RELEVANT PLANS AND PROGRAMS

The following sections describe national plans and programs that are helpful in making effective decisions in relation to SEA in Mauritania.

POVERTY REDUCTION STRATEGIC PROGRAM (PRSP)

Mauritania has embarked on a broad package of reforms and programs related to the fight against poverty. The Poverty Reduction Strategy Program (PRSP) is a key component of the country's future economic progress and is closely linked to the UNDP-UNEP Poverty and Environment Initiative (PEI), which aims to contribute to poverty reduction by mainstreaming environmental sustainability into the national development processes. The following is a brief chronological overview of some of the other plans and programs recently involved in the issue:

- 2002, the first PRSP was developed and provided the basis for the development of the regional Plans for Poverty Reduction implemented at the district level;
- 2004-2005, the National Environmental Action Plan (NEAP) was developed (adopted in 2006);
- 2006 NEAP was approved and entered into force, while the second generation of PRSP was developed adding more consideration for the impact of environmental issues into the fight against poverty;
- 2008, publication of the country's first State of the Environment Report with the support of PEI; and

- 2010 the second generation PRSP is due to expire and be replaced by a third generation PRSP for the period 2011-2015.

A reassessment of all PRSP programs is anticipated in 2011 in order to align it with the long term strategy of the Millennium Development Goals (MDGs). Besides this main structure, there are other programs, such as the Special Intervention Program (SIP) to combat the food crisis or other specific actions, which are forming a matrix of policies in need for synthesis and coordination.

The initial achievements of the PSRP (2001-2004) were recently reviewed by the International Monetary Fund (IMF) and an action plan was established for 2006-2010. The PRSP focuses on four national priorities – education, health, water and infrastructure and two priority zones – dry rural areas and underprivileged neighbourhoods.

The PSRP Action Plan (2006-2010) places a high reliance on revenues from oil and gas development stating that annual production will rise 27 million barrels (75,000 bpd) providing \$163.6 million in revenue to the Mauritanian government.

The Plan refers to the following basic criteria for optimal management of petroleum income:

- Transparency of information about production, composition of petroleum industry associated revenues , criteria used to allocate government revenues, and the effective utilization of those revenues;
- Definition and implementation of an appropriate strategy for allocating petroleum revenues; and
- Monitoring and analysis of the petroleum industry's economic and financial impact.

NATIONAL STRATEGY FOR SUSTAINABLE DEVELOPMENT (NSSD / SNDD)

The NSSD was approved in 2006. The strategy is to establish a common understanding and vision for the sustainable development of Mauritania. It states that economic growth, good governance and reduction in poverty can be established through good governance. The program extends to a period of ten years (2005-2015) and is associated with the other programs - Poverty Reduction Strategy Program (PRSP) and the Millennium Development Goals (MDGs). The objectives of the program are:

- Reinforce institutions and policies to manage environment and natural resources;
- Promote sustainable access to basic services to reduce poverty;
- Efficient use of natural resources through integrated and participative management methods;
- Compliance to International agreements; and
- Develop financing mechanism to support National Environmental Action Plan.

ACTION PLAN FOR THE ENVIRONMENT AND SUSTAINABLE DEVELOPMENT (NAPE)

An environmental profile of Mauritania was completed in 2007. Based on this review, NAPE aims to formulate and to plan all actions necessary for implementing an environmental policy aligned with the concept of sustainable development. NAPE complements the strategies mentioned in the National Strategy for Sustainable Development. This is a five year plan that was initiated in 2007 (2007-2011). With its 92 operations objectives, NAPE would be instrumental in defining policies that support the environmental management programs in Mauritania.

PAN-LCD - NATIONAL ACTION PLAN FOR THE FIGHT AGAINST DESERTIFICATION

The ratification of UNCCD in 1996 requires Mauritania to implement a National Action Plan (NAP / PAN) to combat desertification within the larger frame of NAPE (PANE in French) and the even larger context of fight against poverty through economic development (CSLP).

The National Action Plan to Combat Desertification (NAP-LCD) aims in particular to alleviate the adverse effects of drought, and is based on the experiences of other countries and the recommendations formulated in the CCD to implement its agreed strategy with the objective of enabling local communities, NGOs, grass-root community organizations, and local civil structures to improve their methods of management of natural resources. This strategy is based on the following guidelines:

- improving the living conditions of communities by combining the issues of management of natural resources and the struggle against poverty;
- Integrating objectives and strategies from the other major conventions (such as the convention on biological diversity and the convention on climate change) into the NAP objectives and strategies;
- Capitalizing on previous experiences in the fight against desertification and mitigating the effects of drought; and
- Drafting the NAP in terms as clear, concise, and efficient as possible to enable it to adapt to change.

The NAP focuses on seven priority areas: protection of natural resources, production in rural areas, research, funding, institutional and legal.

Besides their participatory methodology based on the capitalization of previous experiences, the NAP and the NEAP action plans also have in common their quest for sustainable development through a balance between resources from ecosystems and the needs of local communities. In this context, both plans work towards improving methods of managing natural resources.

The priority options and adaptation measures put forward by NEAP integrate the strategy guidelines of the NAP, particularly those related to the protection of natural resources and production in rural areas.

NATIONAL STRATEGY AND NATIONAL MONOGRAPH ON BIODIVERSITY

The National Strategy on Biological Diversity (NSBD) aims to achieve all the objectives of the International Convention on Biological Diversity, as follows:

- Emphasis upon biodiversity conservation;
- Sustainable use of biodiversity components; and
- Equitable division of benefits resulting from the exploitation of genetic resources.

At the same time, as attempting to contribute to solving the priority environmental problems in Mauritania, this strategy establishes the links between environmental problems and socioeconomic development of the various sectors of society in order to achieve sustainable development. This strategy advocates the conservation of biological diversity, the regulation of sustainable management of natural resources, the management of environmental risks, and integrated development of the land.

NSBD shares with NEAP/PANE its main objective, summed up as sustainable development through the improvement of the management of the environment and the same participatory methodology.

PDALM – PLAN DIRECTOR OF MANAGEMENT OF MAURITANIAN LITTORAL ZONE

This management plan was prepared in 2004-05 with the support of the IUCN and the AFD. The plan is published by the MEDD and has been validated by a technical committee on the development of the coastal zone. Even though the Government has not yet adopted the PDALM, its implementation has started.

The plan covers the entire coastal zone of Mauritania that is divided into three zones:

1. The *Northern Coastal Zone* with a contrast between the city of Nouadhibou and its industrial activities on one hand, and the national park of Banc d'Arguin of global importance on the other hand;
2. The *Central Zone* with a coast that is generally a flat coastal stretch area protected from the sea by only a thin strip of dunes; it includes the coast near Nouakchott; and
3. The *Southern Zone* characterized by wetlands influenced by the agricultural activities in the Senegal River delta.

The PDALM is coherent with the PANE and the Poverty Reduction Strategy Program (PRSP). It sets strategic orientations for the coastal zone that are development principles for these three fragile zones such as preserving ecological functions of the natural coastal ecosystems; strengthening activities that are specific to the coastal zone such as fishery, tourism and offshore oil production; developing the capacity for managing the littoral spatially; and informing the public and improving the decision-making process. The plan then details the different sub-zones in each of the three zones presented above with their respective characteristics and proposed development.

The MEDD (Directorate of Protected Areas) is responsible for the implementation of this plan and will report to the National Coastal Zone Consultative Council (CCNL). The implementation will be based on a set of directives and guidelines, “*Directives d’Aménagement du Littoral (DAL)*” that will be submitted to the CCNL for approval.

The plan also includes the creation of a National Coastal Zone Observatory (*Observatoire du Littoral*). The Observatory would be in charge of coordinating the implementation of the PDALM, as well as collecting and disseminating key information on the coastal zone.

NAPA – NATIONAL ADAPTION PROGRAM OF ACTION AGAINST CLIMATE CHANGE

NAPA is a mechanism within the United Nations Convention on Climate Change, which is specifically designed to help least developed countries (LDCs); including Mauritania, to identify and divulgate their priority adaptation options to climate change. NAPA does not impose any obligations, but instead offers opportunities. It is a stage in the process designed to meet a country’s urgent and immediate needs regarding adaptation to climate change.

Mauritania went through all the NAPA stages as described in the LDC’s Expert Group (LEG) guidelines becoming a pioneer and a reference for subsequent exercises at regional and even continental level.

The drafting of the NAPA document is based in particular on the following principles:

- A participatory approach involving all key stakeholders at regional (Wilaya) and central levels including the whole local community, both males and females, the private sector, NGOs, and institutions in order to provide vital information on the adaptation strategies effectiveness by the people most affected by climate change;
- A multi-disciplinary approach that does not exclude any field work sensitive to climate variation;
- A complementary approach based on existing plans and programs, among which the NAP-LCD, biodiversity strategies and national actions plans or other national sectoral policies;
- Sustainable development as the major instrument to fight against poverty in the long term;
- Equality between men and women. As the adverse effects of climate change disproportionately affect women (for instance the increasing frequency of drought requires women to walk longer distances to collect water and firewood) they need to be recognized as key stakeholders in the consultation and decision-making processes;
- Rational management of the environment so to avoid “Easter Island” syndrome (natural resources depletion with catastrophic demographic consequences);
- Cost-effectiveness to select the best adaptation options proposed by the stakeholders;
- Flexible procedures to be tailored on specific national situations; and
- The presentation of the Mauritania NAPA document includes a list of priority activities.

POLMAR 3 – POLLUTION PREVENTION PLAN FOR HYDROCARBONS AND DANGEROUS CHEMICAL SUBSTANCES

The draft Contingency Plan for the Spill of Hydrocarbon and Hazardous Chemical Substances (POLMAR Plan) originated from a French government initiative instituted in 1978 following the “Amoco Cadiz” catastrophe on the Brittany littoral. It is a response mechanism to combat marine pollution due to sea accidents. In particular, it defines the mobilization and coordination of measures to prevent and respond to pollution caused by accidental spills of hydrocarbon and hazardous chemicals into the marine environment.

It includes two parts: (i) a Sea POLMAR Plan when intervention at sea is needed; and (ii) a Land POLMAR Plan when intervention on the littoral is needed. POLMAR Plan further defines measures for monitoring marine navigation and responsible organizations, emergency measures, including risk assessment and intervention measures. The main authority responsible is the MFME (Directorate of Merchant Marine) for the Sea Plan and the MEDD for the Land plan. However, the plan is still a draft not yet approved by the Government.

PRCM REGIONAL PROGRAM OF CONSERVATION OF THE COASTAL AND MARITIME AREAS IN WEST AFRICA

PRCM is a coalition of agencies set up on the initiative of the World Conservation Union (IUCN), the WWF, Wetlands International and the International Foundation for the Banc d’Arguin (FIBA), in partnership with the Sub-regional Fisheries Commission (CSRFP). PRCM now represents a coalition of nearly 50 partner institutions with the aim of coordinating conservation action directed at the coastal zone of the sub-region’s seaboard countries – Mauritania, Senegal, the Gambia, Guinea Bissau, Guinea, Sierra Leone and Cape Verde.

The purpose of this coordination is to improve the overall relevance and coherence of conservation actions, to pool available resources, foster sharing of experiences and expertise, develop research, training, communications and advocacy actions with a view to promoting sustainable coastal zone development. Priorities of the program revolve around:

- The support for the establishment and strengthening of Marine Protected Areas (MPAs);
- The conservation and management of habitats and species;
- Fisheries management;
- MPA’s contribution to the development of Ecotourism;
- Hydrocarbons and conservation;
- Research; and
- Communications.

The PRCM is part of IUCN’s activities in Mauritania. IUCN’s engagement in the Mauritanian littoral is done under the inter-sectoral program ARC (*Aménagement, Remédiation, Conservation*), which also

includes activities to strengthen coastal planning in Mauritania with the support for the development of the PDALM; the necessary legislation for the protection of the littoral and the establishment of an “*Observatoire du Littoral*”.

Among other activities, IUCN has also been supporting the independent *Panel Pétrole* to review the mining and hydrocarbon activities in Mauritania and, in collaboration with the PRCM initiative and UNEP/WCMC, produced a map “biodiversity and hydrocarbons” with the objectives of evaluating potential impacts of the oil and gas activities on biodiversity, and contributing to the strategic environmental assessment of the marine and coastal economic activities.

PANEL PETROLE

The *Panel Pétrole* is an initiative supported by IUCN-Mauritania which has the following objectives:

- Improve the response capacity of the public and private sectors to technological and environmental risks due to the offshore and onshore oil and gas activities;
- Improve the environmental legislation for the development of this sector;
- Strengthen management and coordination capacity of the main governmental bodies in charge of negotiating oil and gas activities and monitor the implementation of these activities; and
- Stimulate national development through better allocation of public investments funded by the oil and gas revenue.

The report published by the panel in April 2009 indicates the weak capacity of the government to regulate, control and coordinate the oil and gas activities.

Appendix A-D presents other plans, programs and strategies that are relevant to the oil and gas sector in Mauritania.

3.3 MAIN GAPS OF THE PRESENT INSTITUTIONAL, LEGAL AND POLICY FRAMEWORK

In this section, the major gaps inherent in the present institutional, legal and policy framework are pointed out.

3.3.1 GOVERNANCE FRAMEWORKS

The existing policies, laws and regulations related to the development of the oil and gas sector do not provide an adequate enabling environment to ensure pollution prevention, and to protect and conserve biodiversity. The main gaps of the governance framework are described below.

3.3.2 LEGISLATIVE FRAMEWORK

The legislation in place to prevent and reduce risks of pollution by hydrocarbons present the following gaps:

- The "Polluter Pays" Principle was recently introduced into the new law of the exploration-production contract type. However, it is important to emphasize that this principle cannot operate without appropriate mechanisms and rapid attribution of responsibility.
- Integration of the ratified international norms into the legal framework of Mauritania is weak, as well as the capacity to interpret and implement this type of legislation due also to a lack of specialized expertise within the Government.
- The updated and comprehensive plan to revise the legislative framework for the oil sector, including the elaboration of a Hydrocarbons Code and a Law on the management of the oil revenues is not completed yet.
- As a result, the current legislative framework is dated and inadequate to protect and conserve marine and coastal biodiversity. The main existing law (n. 6/1997 on Hunting) to protect biodiversity is focused on protecting the fauna within the context of hunting, while the Ordinance currently regulating the hydrocarbons sector (n. 151/1988) does not includes environmental protection provisions. As a consequence, oil and gas corporate players in Mauritania are relying on industry standards for biodiversity protection.

3.3.3 POLICY FRAMEWORK

Strategic elements for the development of this sector are stated in the Poverty Reduction Strategy Program (PRSP) and a consultative group exists within the MPEM to implement these strategic elements. This group is also delegated with the development of a sectoral oil policy. Still, biodiversity concerns will not be included (or mainstreamed) into this policy framework unless specifically targeted. There is currently no effort in this direction.

The main policy gaps to be addressed are as follows:

Oil spill contingency planning: The government is attempting to develop an oil spill contingency plan called the POLMAR plan. This will be used as a means to implement the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) and other key governance

instruments for protecting its coast and the EEZ. The latest version of the plan focuses only on marine pollution leaving older versions to deal with oil spills. None of these versions has been approved by the Government, leaving the Country's preparedness to face an oil spill emergency virtually unchanged. Furthermore, the oil and gas industry has been left out of any coordinated response planning in case of accidental spills. Mauritania has a weak compensation regime with respect to damage caused by the industry, thus leaving operators with no positive incentives (e.g. tax breaks or less frequent inspections for over average HSE performances) to cooperate and weak negative incentives (i.e. sanctions) to prevent violations;

EIA's review and consequent decision making: The Government's capacity to manage EIA processes is biased by the limited experience matured (first EIA Study was submitted by Woodside in 2003). The government resorted to foreign expertise and opened its doors to the international community, NGOs, CSOs and others in order to deal with this issue. The EIA process failed to eliminate seismic surveys which were carried out in the Diawling National Park without due diligence being followed. In addition, issues concerning biodiversity are only marginally integrated into EIA frameworks. In this light, the limitations of the current EIA process can be grouped into three areas:

- *Legislative gaps:* Necessary regulations for the implementation of the EIA process need to be elaborated;
- *Lack of Government capacity to apply the EIA process:* The capacity to coordinate the public consultation process and the capacity to enforce the existing legislation to ensure that private companies are conducting EIA's according to Mauritanian requirements; and
- *Lack of coherence among the various pieces of legislation.*

3.3.4 FINANCING MECHANISMS

In addition to global and national importance, the marine and coastal biodiversity in Mauritania is essential for a large part of the population who depend on it for their livelihoods. Protecting and conserving this marine and coastal biodiversity necessitates an effective management of biological resource.

These main financial instruments currently available are:

- Development partners and donors provide funding through specific projects; This source is not continuous, homogeneous or sustainable in the long run.
- Corporate social responsibility activities by the oil and gas industry in Mauritania can be so far considered negligible. Currently there are no mechanisms compelling companies to invest revenues into Health, Safety and Environment (HSE), resulting in efforts going only to safety measures. Improvement on the industry's side will occur only when directed by a system made up of both positive and negative incentives.
- The new "Banc d'Arguin and Coastal and Marine Biodiversity Trust Fund Limited" is expected to increase investments in conservation for the protected area system. It is not clear if and how other conservation measures in other protected areas of Mauritania (existing and to be created) will ever be eligible to benefit from this Trust Fund.

- The Intervention Fund for the Environment (IFE) was established by the Environmental Code with the sole purpose of contrasting environmental degradation through the funding of restoration activities. So far, this fund has not been used.
- The National Hydrocarbon Revenue Fund (FNRH) was created by the Law n. 20/2008 to collect all revenues from hydrocarbons exploitation in Mauritania. Yet, there are no provisions that specifically target biodiversity.

3.4 INSTITUTIONAL OVERLAPS

Despite the existence of MEDD with its special status of reporting directly to the Prime Minister, sectoral environmental issues are also dealt with by other ministries such as energy and petroleum, rural development, mining, transport, fishery and industry and hydraulic. Additionally, MEDD has the cross-cutting mandate to be the custodian of environmental management from a Government point of view but it also has other responsibilities that are similar to responsibilities given to these other above-mentioned ministries. As a result, contradictions in interpreting the mandate of each institution hamper the performance of these institutions.

In term of inter-ministerial coordination, the government made some efforts to improve this situation, particularly regarding environmental matters, nevertheless problems still exist.

3.5 ENFORCEMENT MECHANISMS

In addition to policy and legislative gaps, control mechanisms to monitor activities from the oil industry, its impact on the environment, and enforcement of the legislated guidelines currently in place are lacking. The Government has limited capacity to manage the oil and gas industry, as to ensure its development path is compatible with biodiversity management needs. Both the MEDD and the environmental office of the new MPEM would require significant additional human and technical resources to be effective. In addition, their respective mandates and modes of cooperation are not yet clear and transparent.

3.5.1 MONITORING BIODIVERSITY

Mauritania suffers from a scarcity of information on existing biophysical resources in the coastal and marine ecosystems where most oil and gas development is scheduled to take place, including the understanding of potential impacts which may occur to ecosystem functionality and biodiversity.

This lack of information constrains effective decision-making at the policy level, and also limits the ability of technical personnel and local stakeholders to advocate for specific guidelines and restrictions on oil and gas development, including guidelines and restrictions that help protect biodiversity.

Despite the existence of some limited environmental information (including the publication of a State of the Environment (SOE) in 2008), the function of environmental monitoring and reporting is not developed adequately to provide crucial information on the state of the environment; particularly biodiversity in marine and coastal areas.

The Environmental Code is not explicit when it comes to environmental monitoring and reporting. Indeed, the Ordinance for the protection, development and management of the Coastal Zone (n. 37/2007) provides the legal framework for the creation of a Coastal Zone Observatory. However, the PDALM plan is not fully approved yet.

The lack of a centralized data-base on the marine environment prevents the government from capitalizing on relevant knowledge. This is obstructing sound ecologically decision making. Monitoring activities conducted in the national parks Banc d'Arguin and Diawling are carried out by various foreign research institutes.

The Banc d'Arguin has recently set up a centralized data base, allowing for more accessible data. Research on fisheries to establish catch quota and other management measures is carried out by IMROP in collaboration with various partner institutes and organizations, mainly fishery institutes from Europe (e.g. IFREMER - France, IMARES - the Netherlands and Spain). However, there is little cross-fertilization between scientists studying the protected areas and those doing fishery research.

In addition to these somewhat scattered research efforts, the oil and gas industry is now gathering data on the marine environment. The data is sometimes published in scientific reviews, but most of the time this information remains in the hands of the oil companies. Exploration activities carried out by Woodside have revealed deep-sea coral reef systems in the Chinguetti oil field area. In spite of the importance of this ecosystem for marine biodiversity, the coral reef systems seem to be left out by policy makers as no Mauritanian policy document mentions them.

3.5.2 CAPACITY TO ASSESS ECONOMIC VALUE OF BIODIVERSITY

The marine and coastal resources have a value which is an observation of their ecological, social, cultural and economic functions. The economic value is composed of three complementary values; direct values, indirect values, and the value of existence (advantages of having these natural resources).

The direct and indirect economic values indicate their role in the local and national economies. It could also indicate the contribution of these resources in poverty reduction, including the development of activities that could generate revenues for the local population. Overall, knowing the value of natural resources contributes to justify the need to preserve and develop these renewable resources; including the need for more financial contributions to preserve natural resources.

A poor Government capacity to value these natural resources affects its ability to evaluate the risks linked to environmental damage and the possible costs of remediation and compensation (particularly in terms of interim losses, meaning the loss of natural resource enjoyment in the time between the damage outburst and remediation completion). This misevaluation also hampers decision maker's assessment of the financial benefits to enhance the network of marine protected areas, reducing incentives for investing on biodiversity protection and conservation.

Unfortunately, capacity to correctly evaluate trade-offs and to explore alternative options currently remains a challenge. The Government still lacks the information instruments to strategically plan,

regulate, and monitor the oil and gas developments in the country and to undertake other sources of threat to coastal and marine biodiversity in an integrated manner.

4. DEVELOPMENT TRENDS OF THE O&G SECTOR IN MAURITANIA (ONSHORE AND OFFSHORE)

In order to provide a rough assessment of environmental impacts caused by development of the oil sector, it is necessary to establish a framework of Mauritania hydrocarbon potential and to estimate the activities of exploration and production which, presumably, will be undertaken to exploit this potential.

This section of the report provides a speculative estimate of potential reserves of hydrocarbons which, based on data and information available, should constitute Mauritanian reserve. The estimated hydrocarbon potential is realized on the basis of information and data published in the scientific literature or provided by the MPEM.

In addition, this chapter contains a general description of current and anticipated E & P which is defined in the current exploration and exploitation concessions permits, and a forecast of future speculative activities of E & P.

4.1 MAURITANIA HYDROCARBON POTENTIAL

In 1980, the French international Oil & Gas consulting company BEICIP conducted a regional evaluation of the hydrocarbon potential of the Taoudeni Basin and the Coastal Basin; the largest sedimentary basins in Mauritania with a high hydrocarbon potential. A second evaluation of the coastal basin was carried out in 1985. The two studies were performed for the MPEM with World Bank financing.

Up to year 2000, these studies represented the only existing assessments of the hydrocarbon potential of Mauritania.

This section highlights the main petroleum geology aspects for the two main sedimentary basins of Mauritania and provides some indications on possible future development scenarios generated from the present day anticipated E&P work programs.

From a geological stand point, the two sedimentary basins have different characteristics:

- The intracratonic Taoudeni Basin covering half of the inner part of the country and extending eastward into Mali and further north into Algeria is one of the largest African intracratonic basins; and
- The Coastal Basin straddling the coastline and extending southward over Senegal, developed on the Atlantic passive margin.

Mauritania also includes marginal portions of other sedimentary basins extending in the adjacent areas. These are:

- The infracambrian-paleozoic Tindouf Basin (almost entirely extending in Algeria) in northernmost part of the country; Some parts of the Tindouf Basin intercept small sectors in Mauritania near the north-eastern borders of the Western Sahara or Algeria. The Mauritania

side of the basin covers the Reguibat Shield, and consists of dolomite of the Upper Proterozoic and sandstone, shale, and limestone of the Ordovician-Devonian (BRGM 1975).

- The infracambrian-paleozoic Zemmour Basin (mostly extending in Western Sahara) in the north-western part of the country; Although named differently, this Basin represents the south-western extension of the Tindouf Basin.
- The Nara Trough (across the Malian border) in the south-eastern part of the country; Of Cretaceous age, the Nara Trough superimposes over the pre-existing Taoudeni Basin. Information on this unexplored basin is limited; its presence has been observed on gravity data (MPEM).

Other large geological units within Mauritania include:

- The Reguibat Shield located in the north of Mauritania; This unit represents the Precambrian and crystalline basement outcrops. It is composed of the Archean and Lower Proterozoic metamorphic rocks and granites, which forms the north-western margin of the West Africa craton (Cahen, Snelling et al. 1984). No hydrocarbon potential is associated to this unit.
- The Mauritanides Range which is eroded separates the Taoudeni and the Coastal basins; The so-called “Greenstone Belt”, is characterized by folds and thrust faults formed by Palaeozoic Hercynian orogeny, located at the western margin of the West Africa craton. It stretches for more than 2,500km, from Senegal through Mauritania to Morocco. It shows a NNW- SSE strike directed to Mauritania and reaches 150km in width. It is constituted by sedimentary rocks, igneous and metamorphic rocks of the Precambrian to Palaeozoic era (BRGM 1975). No hydrocarbon potential is associated to this unit.

In the next sections a description of the main hydrocarbon geology elements of the Taoudeni Basin and the Coastal Basin are given.



Map 4-1: Main Geological Domains of Mauritania

4.2 TAOUDENI BASIN

The Taoudeni Basin extends over Mauritania, Mali and Algeria, covering some 1.3 million Km². The Mauritanian component of the basin covers an area greater than 500,000 Km² in the Eastern and Southern part of the country. It is bounded by the Mauritanidi belt to the West, by the Reguibat Shield to the North, and Léo Ridge to the South. Its western part constitutes more than half of Mauritania.

The Taoudeni basin, which contains over 6,000 meters of Neoproterozoic to Paleozoic sections, constitutes a thin Jurassic and Holocene sediment cover, developed between the Infracambrian and Carboniferous age (Faxia and Veiga 2007).

The Palaeozoic succession was caused by a weak tectonic movement, and has a flat structure with a few faults, revealing a simple structure. However, there are some ENE-WSW directed faults in the southern region, with accompanying dolerite intrusions of Permian-Triassic age (BRGM 1975).

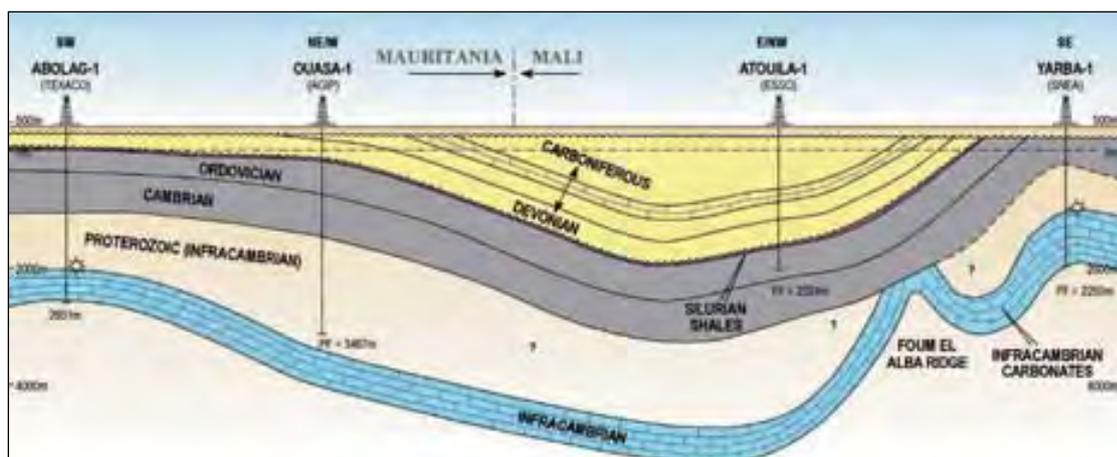


Figure 4-1: Schematic section showing the location of wells Abolag-1, Ouas-1, and Yarba Atoula-1-1

A regional similarity with active producing basins in Africa makes the Taoudeni Basin very attractive for its unexplored potential. On the other hand, it has been observed that the Palaeozoic intracratonic basins of North Africa (Murzuk, Ghadames, Mouydir-Oued Mya, Ahnet-Timimoun) have similar regional geology, however hydrocarbon richness varies widely across them depending on the influence of factors such as reservoir facies/diagenetic transformation, tectonic erosion effect on the source rocks distribution and their communication with reservoirs, thermal maturity evolution, and timing of oil generation compared to Hercynian, Austrian and Pyrenean inversion (Echikh 2003).

Recent studies have indicated that Precambrian successions in northern and western Africa, the Middle East, and the Indian Subcontinent are now emerging as important hydrocarbon exploration targets, with proven petroleum systems in several areas. Recent fieldwork in the Taoudeni Basin has added substantially to the understanding of Precambrian reservoir, source, and seal relationships (Craig et al 2009).

PAST EXPLORATION ACTIVITIES

In spite of its vast surface extension, past oil exploration is very limited. The Taoudeni Basin is virtually unexplored. In fact, a total of only six wells have been drilled in the basin, two of which are situated in the Mauritanian sector of the basin. In 1974, Texaco's Abolag 1 well tested 0.48 MMcf/d (13.600 m³/d i.e. 83 boe/d) with condensate and salt water from the Infracambrian limestones.

The same year, Agip's Ouasa 1 well was plugged & abandoned. No further exploration was conducted in the basin after 1974 until recent times. As a result of the recognized potential of the Precambrian intracratonic basins some 30 years later, major oil companies are revisiting the Taoudeni Basin and wildcats are scheduled for early 2010.

4.2.1 HYDROCARBON SYSTEM

Two main petroleum systems are recognized in the Taoudeni Basin (AU.RE.P 2006).

- Palaeozoic shallow oil play:
 - Silurian and Devonian source rocks;

- Good quality Ordovician sandstones reservoirs; and
- Intra-formational shale beds provide an effective seal.

The Taoudeni Basin has the same Ordovician reservoirs which are very productive in the Murzuk and Illizi Basins (Lybia) and Ahnet Basin, (Algeria) where at present are sandy glacial and periglacial sediments deposited in erosional palaeovalleys.

Hydrocarbon charging occurs through cross-fault juxtaposition of the lower Silurian source rocks and the Ordovician reservoirs (Echikh 2003).

- Infracambrian deep gas play:
 - Infracambrian stromatolitic source rocks;
 - Infracambrian fractured reservoirs; and
 - Intra-formational shale beds provide an effective seal.

The Late Ordovician-Early Silurian petroleum system in North Africa may be a good analogue for Precambrian glaciogenic reservoir and post-glacial source rock depositional systems (Craig et al 2009).

Structural entrapment mainly relates to the emplacement of the large horsts (like the El Mrayer structure in the Makteir Depression) potentially capable of containing high volumes of hydrocarbon, and, less importantly, on the subtle closures within channelled reservoirs on the Abolag-Ouassa basin flank (MPEM).

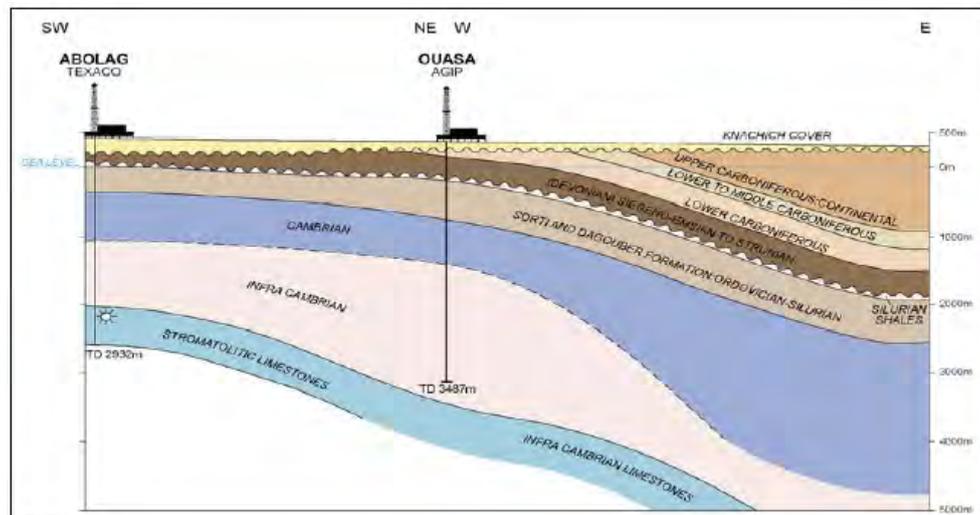


Figure 4-2: Cross-section through the Abolag-1 and Ousas-1 wells, Mauritanian side of Taoudeni Basin

4.2.2 HYDROCARBON POTENTIAL

Very little data on the hydrocarbon potential of the Taoudeni Basin exists in the literature. The lack of data makes it difficult to produce reliable basin potential reserve estimates, however some

tentative assessments have been conducted on the basis of the general analogies existing between the Taoudeni Basin and the other oil and gas proven Infracambrian-Paleozoic basins abroad.

It has been observed that the hydrocarbon accumulations tested in Abolag-1 well are sourced from time equivalent black shale's section, a worldwide recognized Palaeozoic source rock. Outcrop samples from this black shale indicate the high hydrocarbon potential and early mature conditions of the Mauritanian source rock, equivalent in age and facies of prolific source rock worldwide (i.e. Oman, Siberia) (Faxia and Veiga 2007).

The most recent basin reserves analysis in the literature¹⁹ gives the following recoverable reserves figures for the entire Taoudeni Basin:

- Oil: 9.2 - 14.8 MMbbls oil in place. Corresponding to approx. 1.85 – 3.0 MMbbls recoverable reserves²⁰; and
- Natural Gas: 1200 - 2900 MMm³ gas in place – corresponding to approximately 480 - 1160 MMm³ recoverable reserves²¹.

Considering the Mauritania share of oil reserve corresponds to approximately 40% of entire Basin surface extension, the recoverable reserves for Mauritania are:

- Oil: 3.7 - 5.9 MMbbls oil in place. Corresponding to approx. 0.74 - 1.2 MMbbls recoverable reserves²²; and
- Natural Gas: 480 - 1200 MMm³ gas in place. Corresponding to approximately 190 - 460 MMm³ recoverable reserves²³.

The wide range of reserves potential reflects the great uncertainty analysts have encountered while defining the most appropriate parameters to be used in the basin reserves calculations process. After 35 years with no activities, oil companies nowadays are largely committed to exploring the Taoudeni Basin. Therefore, any future development scenario is strictly dependent upon the results of the wells oil companies will be drilling in the basin during the forthcoming exploration cycle.

Encouraging early results will accelerate the development trend scenario, while disappointing drilling campaigns will likely lead to reduced assurance of oil companies.

4.2.3 CURRENT E&P ACTIVITIES IN TAOUDENI BASIN

The up to date list of international oil companies currently operating exploration licences under the terms of public Production Sharing Agreements²⁴ (PDA) in the Taoudeni basin are:

¹⁹ Gang Wenzhe Pet.Sci. (2009) Vol.6 pages 29-37

²⁰ Assuming 20% Recovery Factor

²¹ Assuming 40% Recovery Factor

²² Assuming 20% Recovery Factor

²³ Assuming 40% Recovery Factor

- Total (France);
- Repsol (Spain);
- Wintershall (Germany); and
- SIPEX/SMH (Algeria-Mauritania).

The list of active operators includes the Mauritanian national oil company, namely “Société Mauritanienne des Hydrocarbures” (SMH).

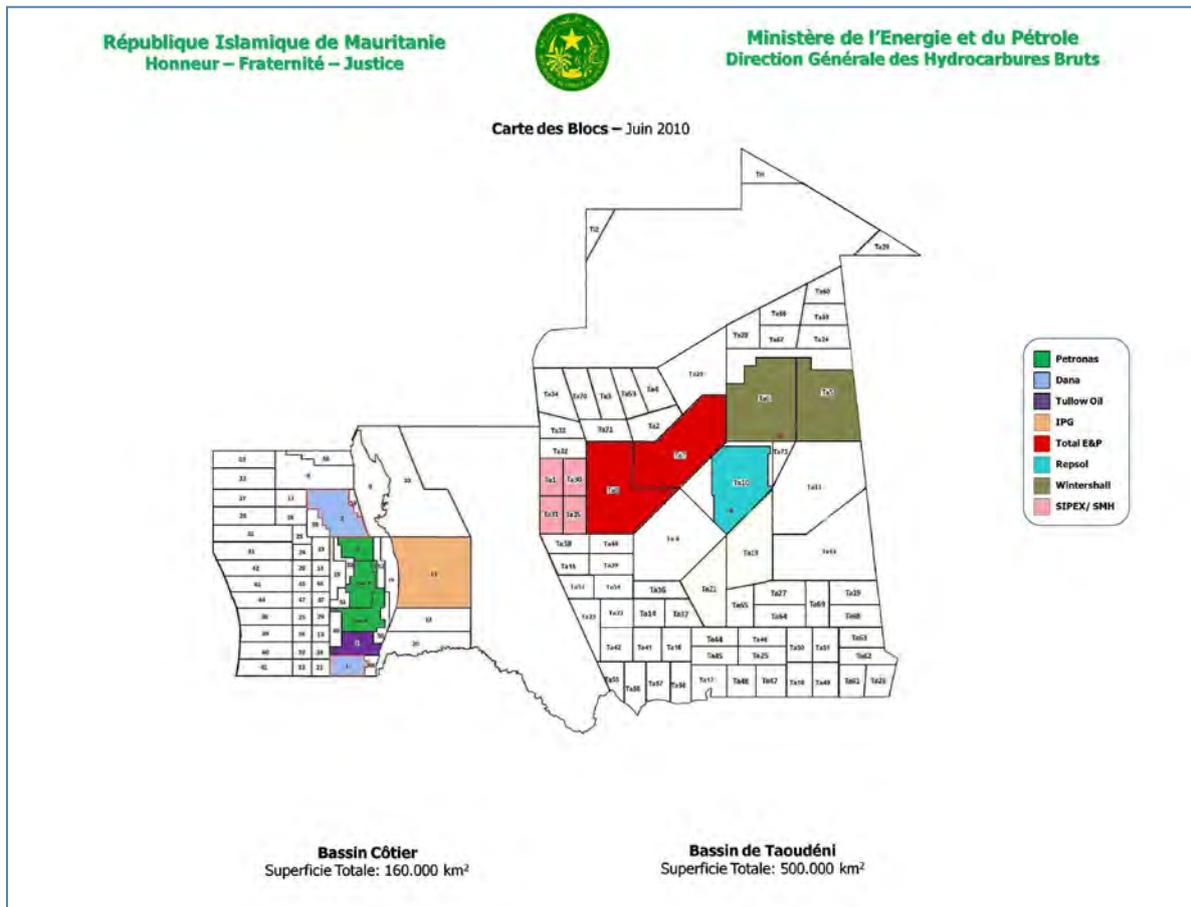


Figure 4-3: Acreage Situation Map

²⁴ <http://www.petrole.gov.mr/MinesIndustrie/Documents/Contrats/listedescontrats.htm>

Year 2010 exploration activities include:

- Total is presently drilling their first exploration wells (3rd Quarter 2010);
- Wintershall has acquired 2D seismic data in TA05 and TA06 blocks; and
- Repsol has acquired 2D seismic data in TA10 block.

Exploration activities planned for 2011 in the Basin Taoudéni include:

- Continued drilling of Atil-1 on Block TA8 by Total;
- Exploration (data interpretation and areomag areograv) on the block TA1, TA30, TA31, TA35 by Sipex; and
- Preparation of 2D seismic on the block by Total TA7.

The MPEM provided no further information on work programs that oil companies plan to conduct in the context of mining permits granted. The lack of such data does not facilitate an accurate estimation of seismic acquisition and perforation of wells planned for the coming years.

4.3 OFFSHORE

The Coastal Mauritanian-Senegalese Basin extends for 1400 km from Cap Blanc to the North, to Guinea Bissau to the South. This is the westernmost and one of the largest West Africa coastal basins (Ritz and Bellion 1990). In Mauritania, the Coastal Mauritanian-Senegalese Basin extends from the northern to southern borders of the Mauritanian coastline, over a distance of approximately 500 kilometres, and is over 300 kilometres wide from east to west. The Coastal Basin covers more than 160,000 km², with 100,000 km² of the basin being offshore (MPEM). The Coastal Mauritanian-Senegalese Basin formed at the culmination of a Permian to Triassic rift system that developed over an extensive Paleozoic basin during the breakup of North America, Africa, and South America (Brownfield and Charpentier 2003).

Its structural setting corresponds to a typical Atlantic passive margin basin, gently dipping toward the ocean and filled in by superimposed prograding accretion wedges. Basin sedimentation is continuous from Triassic-Liassic age to Quaternary, resulting in an overall thickness of almost 10,000 meters. This relatively simple structural setting is complicated by the effects of a saline tectonic with the presence of diapirs cutting across the sedimentary sequence along the Mauritanian offshore continental slope (Ritz and Bellion 1990).



Figure 4-4: Coastal Basin General Cross-section

During the Miocene, a major delta system deposited channel sands, which form the main prospective play. Most discoveries to date have been in these sands (ROC Oil Company 2010).

Exploration began in the Coastal Basin in 1960. Since then to 2007, only 55 wells have been drilled. Exploration has been steady, albeit slow, since 1966, with a brief period of non-exploration between 1992 and 1997. Most exploration has been focused on the outer shelf, with one near shore well, and three deepwater wells (MPEM).

4.3.1 HYDROCARBON SYSTEM

The coastal basin of Mauritania is emerging as a potential major petroleum province from the results of renewed exploration activity over the past years. Two significant discoveries of oil and gas have been made at Chinguetti and Banda, proving that an effective petroleum system exists in this passive margin basin.

The successful play type comprises:

- Miocene Play:
 - Miocene turbidite channel reservoirs; and
 - Fine-grained channel abandonment facies or a hemipelagic shale drape act as effective seal,

The most prospective structures are associated with diapiric salt, although a variety of other structural styles including compression toe thrusts and rotated extensional fault blocks are also present (Vear 2005).

- Cretaceous Play

Older Cretaceous reservoirs potential has been confirmed by discoveries at Pelican-1 (PSC Block 7), Faucon-1 (PSC Block 1) and the deeper section of Tevet-2 (PSC B) (ROC Oil Company 2010).

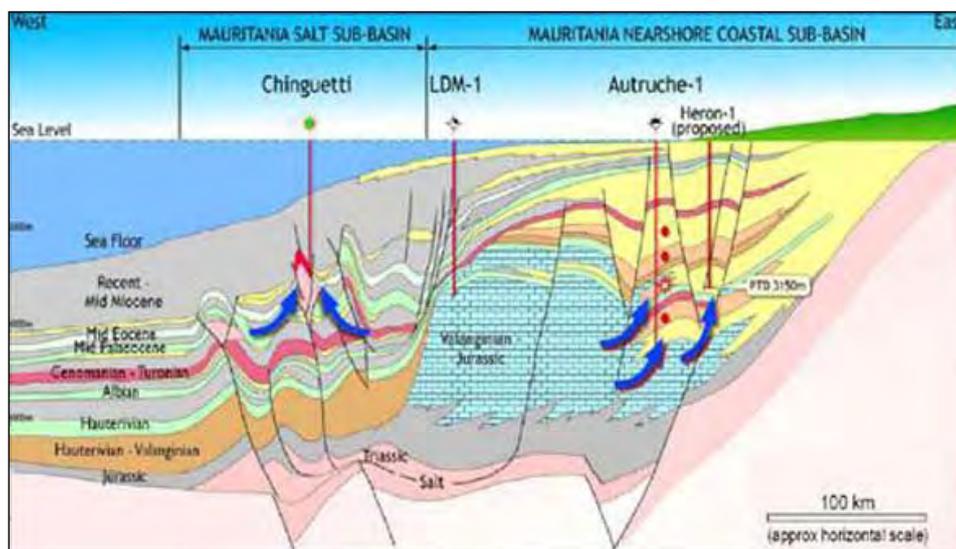


Figure 4-5: Cross-section of Coastal Basin showing the location of some drillings

Exploration drilling off NW Africa since 2000 has confirmed the existence, in addition to the presence of biogenic gas, two working thermogenic hydrocarbon source systems, and the existence of other potential source intervals developed at a number of stratigraphic levels. Recent Dana Petroleum wells offshore Mauritania demonstrates the presence of the two thermogenic source systems. However, there is insufficient data at present to allow an understanding of the spatial distribution of these proven source rock intervals. Predicting their thermal maturity also presents a number of challenges, particularly in light of fluid inclusion data that indicates that the history of basin evolution is far from straightforward (A brief look at potential hydrocarbon source rocks and their maturity, offshore Mauritania (Downey 2007)).

The presence of an effective petroleum system is also confirmed by the recent analysis of multi-temporal Synthetic Aperture Radar imagery over the offshore region of the Mauritanian Coastal Basin, which has revealed a number of well defined clusters of what could possibly be natural hydrocarbon slicks emanating from seafloor seeps. Reasonable correlation between sites of possible natural seepage and the positions of natural geological structural features of the seafloor provides confidence that many of the slicks result from natural hydrocarbon seepage (Woodside 2005).

4.3.2 HYDROCARBON POTENTIAL

Recent, country specific hydrocarbon potential assessments of the Coastal Basin are not available in the literature. Some figures are included in the USGS "Assessment of undiscovered oil and gas of the Senegal province, Mauritania, Senegal, The Gambia and Guinea-Bissau, Northwest Africa", (USGS 2003), but these were not considered suitable for the purpose of this study because of study limitations (e.g. only one, out of at least three existing total petroleum systems were considered, basin evaluation was limited to water depths less than 2000 m, and the reserves provided in the study reflected the whole basin extension, not just Mauritania).

On the basis of the exploration activities carried out so far by international oil companies in the basin (exploration activity in the Coastal Basin started in 1960) Table 4-1: *Oil and Gas fields*

discovered in the Coastal Basin gives a quick overview of the exploration results achieved over this period.

In 2003, the Oudsay well also successfully tested the coastal basin potential.

To date there have been five oil and/or gas discoveries classified either as commercial or potentially commercial (SMH data).

Table 4-1: Oil and Gas fields discovered in the Coastal Basin

OIL /GAS FIELD NAME	PROVEN + PROBABLE RESERVES	
	Oil: Million Barrels – (MMbbls)	Gas: Trillion Cubic Feet – (TCF)
Chinguetti Oil/Gas Field in PSC B.	53	
Banda Gas Field in PSCs A&B (with some oil).	70	Around 1 TCF
Tiof/Tiof West Oil/Gas Field in PSC B.	280 (*)	
Pelican oil/Gas discovery in PSC Block 7.	-	around 0.9 TCF (*)
Tevet & Aabedna e Oil/Gas discovery and Cretaceous Oil discovery in PSC B.	40(*) + 40(*)	Assessment underway
Faucon Gas discovery in Bloc C1		Around 0.2 TCF (*)

(*) To be confirmed

The figure below provides a summary of seismic surveys recorded and then punched in the Coastal Basin until 2007.



Figure 4-6: Seismic campaigns acquired and exploration wells drilled in the Coastal basin (2007)

World Energy Council data indicates for Mauritania proved recoverable reserves at end - 2007 of 14 Million tons of crude oil and natural gas liquids. This data is associated with the Chinguetti commercial reserves.

4.3.3 CHINGUETTI OIL FIELD

The most important oil discovery, and so far representing the only offshore oil field under exploitation, is the Chinguetti field. The Australian oil company Woodside discovered this field in 2001. It is located in Block 4, within the PSC B which includes other exploration blocks, extending approximately 80 km due west of the Mauritanian coastline, and approximately 90 km from Nouakchott.

The Chinguetti field is a faulted anticlinal structure of ~12 km² and is approximately 5 km wide. It is dominated by a major east-west trending normal fault with a maximum throw in excess of 250m at the crest. The reservoir is located ~1,300 - 2,700m below the seafloor. Estimated recoverable proven oil reserves are in the order of 53 million barrels (Woodside 2005). The oil production in Chinguetti started in February of 2006 with an expected flow of 75,000 barrel per day, which presently has never been achieved.

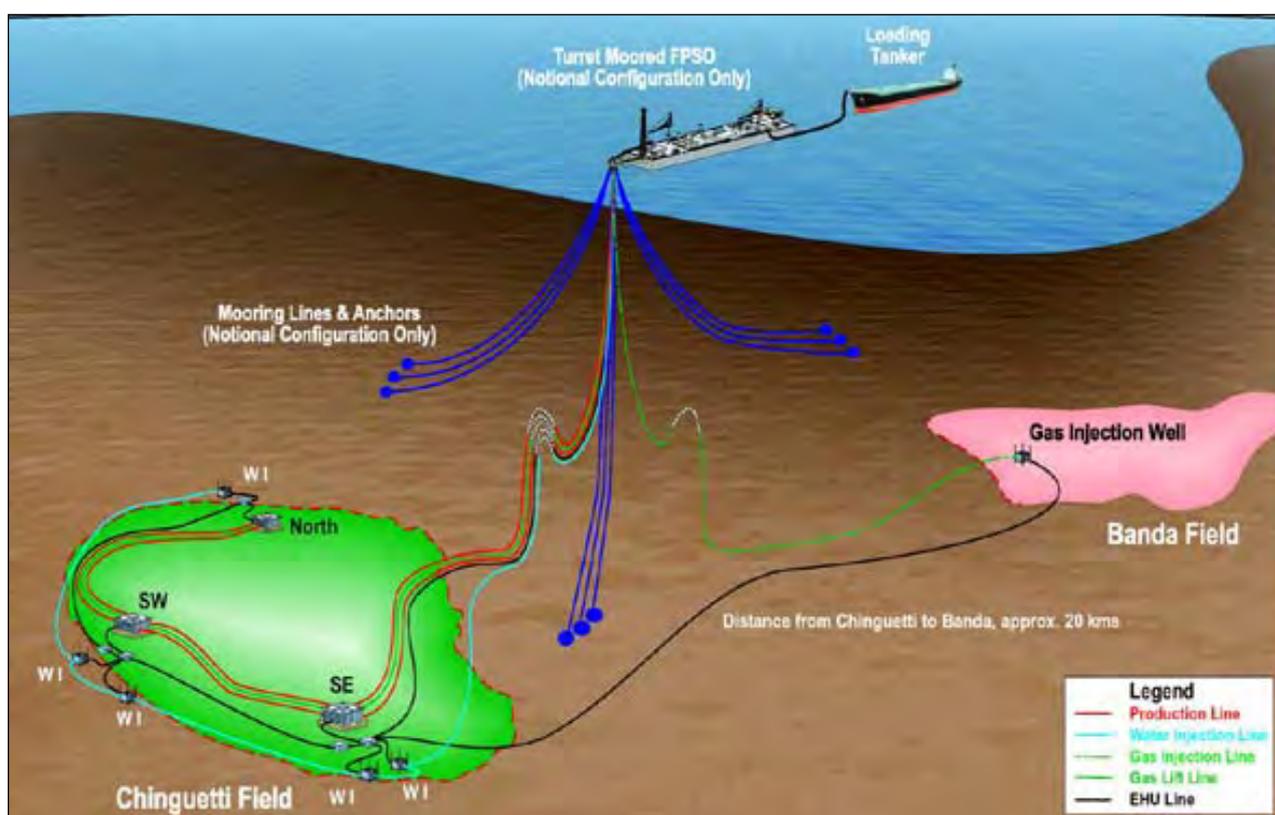


Figure 4-7: Chinguetti Field Production Facility

The field development included:

- Six oil production wells. In May 2008 a drilling program commenced consisting of three interventions and two new Chinguetti development wells. The interventions were completed by the end of June and the first of the new development wells commenced production in the second half of 2008 (Premier Oil);

- Four vertical water injection wells;
- One gas injection well, located approximately 15 kilometers outside the field and connected to the FPSO by a gas injection line; and
- A single FPSO vessel receiving reservoir fluids from the production wells, and returning gas from the oil reservoir to the gas injection well.

Oil from the production wells is carried from the manifold via flexible flowlines and risers to the FPSO. The gas injection well is used to dispose of gas from the oil reservoir. Produced formation water (PFW), separated from the oil, is treated to the standard specified for safe, environmentally responsible discharge from the FPSO. The FPSO is permanently moored at the field.

4.3.4 CURRENT E&P ACTIVITIES IN THE COASTAL BASIN

The international oil companies currently operating exploration licences under the terms of public available Production Sharing Agreements in the Coastal Basin are (Figure 4-3):

Offshore

- Petronas (Malaysia), formerly Woodside operated blocks;
- Dana Petroleum, (UK); and
- Tullow Oil (UK);

Onshore

- IPG onshore (Anglo-Mauritanian-Russian);

The MPEM authorized the following activities in order to delineate and appraise the hydrocarbon discoveries:

- Tiof discovery has been appraised with five wells;
- One appraisal well has been drilled on the Tevet discovery;
- Two appraisal wells were drilled on the Banda Oil and Gas Field in 2008; and
- Two production wells drilled by Petronas in the Chinguetti field.

Exploration activities carried out in the coastal basin in 2010 include:

- Drilling of Cormoran-1 well in Block 7 by Dana Petroleum;
- Appraisal of Gharabi-1 in Block 6 par Petronas;
- Preparation for a seismic survey on Block C-2 by Tullow Oil.

Regarding the activities planned for the coming years, the MPEM has made this announcement: based on current contracts (2010), approximately 15 wells will be drilled over the next 5 years in the Coastal Basin.

5. ENVIRONMENTAL SETTING - OFFSHORE

The next three sections describe the environmental and social setting in the offshore and onshore oil and gas regions of Mauritania. It is based on a review of existing information, which is very sparse for the onshore region. Information for the offshore is somewhat better due to the completion of some environmental assessments (e.g. Woodside) and ongoing fisheries research.

5.1 MARINE AND COASTAL ENVIRONMENT

The Mauritanian coastal marine environment is a part of a larger ecosystem on the west coast of Africa. It is an area of very high biodiversity and biological productivity.

5.1.1 PHYSICAL GEOGRAPHY

The Mauritanian coastline is 754 km long. The area of the continental shelf off the coast of Mauritania is 28,370 km². The width of the shelf area is 74 km at the latitude of Cap Blanc and reaches 148 km at its widest, at the level of the Banc d'Arguin. The territorial sea (up to 12 nautical miles) has an area of 19,455 km². The claimed Exclusive Economic Zone is 141,334 km² (Republique Islamique de Mauritanie 2009).

The coastline bordering Mauritania offers a variety of habitats, from rocky cliffs and broad sandy beaches to extensive sea grass beds in the north, and dense mangrove forests and well-developed estuaries in the south.

5.1.2 PHYSICAL OCEANOGRAPHY

Mauritania's coastal marine waters are part of the Canary Current Large Marine Ecosystem (LME). This LME is a major upwelling region off the coast of northwest Africa, bordered by the Canary Islands (Spain), Morocco, the Western Sahara, Mauritania, Senegal, Gambia, Guinea-Bissau and as far west as Cape Verde. The region's total surface area is approximately 1,125,327 km².

The Canary Current LME is a highly productive ecosystem. The upwellings are primarily the result of the year-round trade winds that push surface waters away from the coast and draw in deep cold, nutrient-rich waters to the ocean surface. Upwellings are year round, but south of Cape Blanc, this phenomenon is only observed from December to March. During summer months (August to November), the southern part of the country is also influenced by the warmer Guinea current.

Average surface water temperatures range from 19.0°C in north to 22.6°C in the south. The continental shelf's average annual temperature is 21.0°C. These temperatures vary seasonally, and are dependent on the activity of upwellings. Between August and September, when the upwelling migrates north, water temperature rises to 22.0°C. For the remainder of the year, water temperatures are approximately 18.0°C. Over a 30 year period, there is a general rise in surface temperatures in both north and south zones at certain intervals: low temperatures during 1970 (lower than 21.5°C) and higher than 21.8°C from 1994 to present (Khaless and Myre 2005).

5.1.3 MARINE WATER QUALITY

Water quality pollution off the west coast of Africa is of industrial (fishing, refineries, ports, power plants, etc.), agricultural (insecticides, manure) and urban (sewers) origin. Other contributing factors include hydrocarbon sources such as tanker ballast water discharges and accidental spills (Khaless and Myre 2005).

To date, the amount of marine pollution has not been quantified; however, it is believed that fisheries have not been directly impacted. It is expected that the risks to marine pollution will only escalate over the next few years with the continued oil exploitation activities and the development of urban cities. Pollution can be classified as:

- Pollution by discharges of chemicals (heavy metals, hydrocarbons, pesticides, detergents etc.);
- Pollution by solid waste discharge (ore dust, plastics, fishing gear, etc);
- Domestic discharges (waste water, biological pollution);
- Pollution by drilling or dredge spoils; and
- Thermal pollution (cooling water and sewage discharges).

Pollutants within the marine environment occur through the following vectors:

- Urban and industrial effluents;
- Currently, larger cities and villages located on the littoral zones discharge effluents into the sea very often without primary treatment. A chronic source of pollution, the increase in population and developments within the shoreline will likely continue to harm waters such as Bay of l'Étoile and more so, the Bay of Lévrier (Khaless and Myre 2005);
- Accidental discharges (ships transporting chemical products or hydrocarbons):
 - Since 2006, there has been a steady increase in sea traffic within the oil extraction sectors.
- Degasification operations at sea.
 - All ships practice degasification at sea. Some ship Captains relate this generalized behavior to the absence of structured gas treatment in Mauritania, especially in ports.
- Surface runoff, transport by the rivers and the winds, after rain events:
 - The control of this vector can be done upstream, planning to treat discharge products and waste. During the last thirty years, prevailing winds carry iron ore dust from the ore tanker port of the National Industrial and Mining Company (SNIM) to adjacent waters.

CHEMICAL POLLUTION

HEAVY METALS

Heavy metals include arsenic, mercury, lead, cadmium, cobalt, manganese, phosphorus, iron, titanium, selenium, vanadium, zinc, nickel, aluminum, hydrogenated fluoride, beryllium, acids and hydrogen sulphide; the most toxic are lead, cadmium and mercury.

Measured concentration levels by some authors indicate that Mauritania is in a state of minimal, but growing pollution. However, heavy metal pollution will require special attention as the exploitation of oil continues. In Mauritania, enormous risks are faced by the natural resources and marine activities are at risk from the absence of rigorous regulations and a lack of follow-up on the application of the existing rules, a lack of installations of recovery and treatment of the spent oils in the ports, particularly with the movement of large volumes of hydrocarbons along the coasts with the oil exploitation since 2006 (Khaless and Myre 2005).

PESTICIDES

The behaviour of the pesticides within Mauritania's marine environment is quite variable. Some pesticides undergo degradation, while others remain intact and toxic. In Mauritania, pesticide pollution is small, apart from river estuaries and coastal areas, which experience high rates of discharge of pesticides from agricultural runoff, discard/loss of industrial fishing gear, effluent treatment discharge units, and domestic discharges, etc.

SOLID WASTE DISCHARGES

Over the long term, solid wastes affect the characteristics of the ground. In Mauritania, solid waste from boats (remains of fishing gear), steel cables, ropes, papers, rags, plastics, glass, metal, etc) and the dust from the ore tanker port of Nouadhibou, installed for more than forty years, comprise important sources of this type of industrial pollution (Khaless and Myre 2005).

POLLUTION BY DRILLING WASTE OR DREDGE SPOILS

With the development of offshore oil extraction, there is the potential for discharge of oil drilling mud and cuttings and material associated with dredging activities.

THERMAL POLLUTION

Stenothermal species, species which are adapted to a limited thermal interval, are directly impacted by temperature modifications. In the zones exposed to pollution, there is a change of the settlements by substitution of species more tolerant. The primary sources of this type of pollution are discharges of cooling water from machines, in particular, at the power plant in Nouadhibou. Sampling of average temperatures adjacent to this power station illustrate temperatures of 24°C and 28°C, compared to 19.5°C to the Cape Blanc and 20°C - 21°C in Bay of Lévrier (Dubrovin, Mahfoud et al. 1991).

5.1.4 LIVING MARINE RESOURCES

Intense tropical sun, together with an almost constant input of nutrients provides a perfect environment for massive growth of plankton – the foundation of an extremely productive food chain that supports high levels of biodiversity. Mauritania’s EEZ has an abundant fish population thanks to the Cape Blanc upwelling stream. This phenomenon supports a healthy phytoplanktonic population, which constitute the basis of an important food chain (MPEM 2004).

The waters off the coast of Mauritania are among the richest fishing grounds in the world. According to WWF, over 1,000 species of fish have been identified, as well as several species of cetaceans including dolphins and whales, five species of endangered marine turtles²⁵, and a colony of 100 monk seals in Cape Blanc, Northern Mauritania. The Cap Blanc monk seal colony is the largest surviving population of Mediterranean monk seals left on Earth. Recent satellite tracking has confirmed that green turtles lay eggs along the remote beaches of Guinea Bissau and travel northwards through Senegalese and Gambian waters to graze in the rich sea grasses off Mauritania.

In terms of fisheries, the Canary Current LME is rich and diverse in resources. Marine fishery resources in Mauritania fall into two basic groups: (i) demersal species – species which are associated with the bottom of the sea, including octopus, lobster, shrimp, hake, and bream; and (ii) pelagic species - which are associated with the ocean surface, consisting of mackerel, sardine, sardinella, and tuna. Literature indicates that Mauritania has 239 commercial fishery species (195 fish species, 18 species of crustaceans, and 26 species of mollusks) (UNDP 2009).

The most valued species are certain types of sharks, rays, croakers and grey mullets. The latter are especially valued for their eggs (caviar), particularly in Spain, France and Italy.

PELAGIC SPECIES

Small pelagic fishes include sardine (*Sardina pilchardus*), sardinella (*Sardinella aurita*, *S. maderensis*), anchovy (*Engraulis encrasicolus*), chub mackerel (*Scomber japonicus*) and horse mackerel (*Trachurus spp.*) which constitute more than 60% of the catch in the LME.

Other species caught in the LME include coastal migratory pelagic finfish including tuna (e.g. *Katsuwonus pelamis*), *Pagellus bellotti*, *Pseudotolithus sp.*, *Dentex canariensis*, *Galeoides decadactylus*, and *Brachydeuterus auritus*. Most of these species occupy transboundary habitats or are migratory, with the distribution of tunas often extending beyond the bordering countries’ EEZs into international waters.

DEMERSAL SPECIES

Total catches of demersal stocks on the Mauritania continental shelf have decreased from 36,000 mt (1984) to 12,800 mt (1992), which could reflect a change in fishing strategy (e.g. replacement of

²⁵ Green turtles (*Chelonia mydas*); hawksbill turtles (*Eretmochelys imbricata*) loggerhead turtles (*Caretta caretta*); leatherback turtles (*Dermochelys coriacea*) and olive ridley turtles (*Lepidochelys olivacea*).

target species, increase of discarded fishes, incomplete statistics, etc.). Hakes have been considered moderately exploited while other demersal fish species are more intensively exploited. Quantitative evaluation of many demersal resources has not been undertaken due to the unavailability of required data. The Maximum Sustainable Yield (MSY) for these resources is estimated to be around 130 000 t (1994).

Two stocks of common octopus (*Octopus vulgaris*) are recognized off the Northwest African coast. The southern stock off Cape Blanc, is considered overexploited, with an estimated MSY of 50,000 mt. Catches from the southern stock in 1992 (a total of 44,000 t landed in Mauritania) have returned to the high levels observed in 1986-87. This recovery is not due to fisheries management, but rather to a drop in catch rates resulting in a 40% reduction in fishing activity of the trawler fleet and a decrease in the proportion of juveniles in the catches during 1987-92. Exploitation patterns have improved as a result of use of selective gears by the artisanal fishery.

The level of exploitation of other species of cephalopods, such as cuttlefish and squids (*Sepia spp.*, and *Loligo vulgaris*), is lower than that of octopus: their catches account for 15% of the cephalopods landed.

In Mauritania area, pink spiny lobster stocks continue to be heavily exploited. Northern and southern stocks of green lobsters are probably over-exploited.

There are two different species of Venus shellfish in Mauritanian waters: *Venus verrucosa*, more commonly known as the warty Venus shell; and *V. rosalina*, also known as the African Venus shell. Both species live burrowed in the sand, and are still unexploited. Dredging is the only commercially-viable means of fishing for them.

The warty Venus shell presence in Mauritania is limited to sandy and muddy sediments in waters between 3 and 10 metres deep in the Bay of Levrier. The total biomass in the region of this species has been estimated at 173,000 tonnes (Diop 1988a).

In contrast, the African Venus shell forms a vast bank of approximately 350 square kilometres, south of Cap Blanc and west of the Banc d'Arguin National Park. Its biomass has been estimated at between 1.3 and 2.8 million mt, with an average density of 50 shellfish per m² (Diop 1988a). It lives burrowed in fine to large sand grains at a water depth between 10 and 30 m. Much like coral reefs, shellfish banks provide wave-resistant shelter for myriad organisms. Many juvenile fish find refuge from larger predators in them, and as a result shellfish banks form nurseries for many species. Samples that have been taken in the Mauritanian *V. Rosalina* banks suggest a very high level of biodiversity.

Stocks of deep-sea crab (*Chaceon maritae*) seem to be reasonably exploited. The present level of catch of deep-sea shrimp (*Parapenaeopsis atlantica*) is around 1,200 to 2,400 mt, and the state of stocks seems to allow a possible controlled increase of shrimp fishing activities (FAO Marine Resources Service 1997). Other shrimp species include *Parapenaeus longirostris* and *Penaeus notialis*.

OTHER MARINE RESOURCES

Maerl banks. Among the species to be found in the Mauritanian shellfish banks are maerl, (collective name for two or three species of red calcareous (Corallinaceae) algae), which form three-dimensional, coral-like structures. It accumulates as unattached particles and forms extensive beds in suitable sublittoral sites. Maerl beds have been described as being essentially analogous to kelp forests or seagrass beds, in that they are complex habitats, formed by algae, which support a very rich biodiversity. They grow extremely slowly, so much so that it may take centuries for maerl deposits to develop. As a result, noted one researcher, maerl beds “are considered to be a non-renewable resource.” That same researcher described maerl beds as “fragile habitats that support many rare, unusual and scientifically interesting species and as such are of particular international conservation interest” (Barbera, Bordehore et al. 2003). According to IMARES, the Dutch research institute advising Mauritania on the proposed test fishery, a large part of the shellfish bank is covered by maerl. Ironically, maerl beds are protected by law under the EU Habitats Directive. However the protection does not extend to areas outside the European Union, even if EU fishing fleets operate in these waters.

Carbonate mud mounds and deep-water coral reefs. In 2002 extensive carbonate mud mounds were discovered in Mauritania’s EEZ, 80km off the coastline. Carbonate mounds are seabed features resulting from growth of carbonate producing organisms and current controlled sedimentation. The Mauritanian mounds occur in waters of approximately 500 m depth and extend parallel to the coast for at least 85 km. They are approximately 100 m high and with a 500 m basal diameter. The mounds are arranged in a series of rows. Water currents close to the seabed are believed to play an important role in determining the shape of the mounds. Deep-water corals including reef-building species cover parts of the mounds. The mud mounds off Mauritania are associated with at least four species of reef-forming cold-water corals: *Lophelia pertusa*, *Madrepora oculata*, *Solenosmilia variabilis* and *Desmophyllum*. These coral frameworks provide an important habitat for invertebrates and fish and form real hotspots for marine biodiversity. Like shellfish beds deepsea coral also take up CO₂, which is converted into calcium carbonate of the reef structure (UNDP 2009).

Pelagic Areas of High Biodiversity. Areas of high biodiversity can be found in the pelagic area as well. These areas are often situated at front zones where warm and cold water masses converge around geological features such as seamounts and “shelf breaks” at the edge of the continental shelf. Seabirds flocking together indicate high fish concentrations composed of schools of pelagic fish followed by predatory species such as tuna, swordfish, and sharks. Mauritania’s most important year-round upwelling area, situated around the Cape Blanc, could qualify as a pelagic hotspot for marine biodiversity. The entire continental shelf and the shelf breaks are also important for marine biodiversity. Besides dense concentrations of fish species, fish eggs and larvae, relatively high concentrations of seabirds commonly encountered within this area, Grey Phalaropes, Sabine's Gulls, Long-tailed Skuas and storm-petrels are dominant species. Pelagic marine biodiversity varies between the seasons. By-catch rates of the pelagic fleet of (Subramanian and Meranger) tropical species (manta, hammerhead sharks, bill fish) is minimal during winters and springs (December to June) and high during the summer months (July to September). These large predators seem to accompany the migration of *Sardinella*, an important species for the large distance pelagic trawler fleet (UNDP 2009)

5.1.5 LITTORAL ECOSYSTEMS

The richness of halieutic resources in Mauritania's waters is heavily influenced by the biophysical nature off the coast of the Banc d'Arguin, Diawling National Park, and 3 other marine/littoral protected areas (Republique Islamique de Mauritanie 2009). These provide marine fauna with favorable conditions for reproduction and development during early phases of their life cycles, which are critical for maintaining fish stocks and marine mammals throughout western Africa.

The Banc d'Arguin also is a globally important nesting and breeding area for millions of birds, hosting the world's largest concentration of palaeartic migratory birds every winter, and also providing habitat for large numbers of breeding waterfowl species. About one third of the Mauritanian coastline is included in the Banc d'Arguin National Park (with 1,207,500 ha), which includes a marine area of 624,500 ha. Located in a gulf, the Park contains a variety of habitats, including islands, sea grass beds, mudflats, mangroves and natural pasture on the terrestrial side. An abundance of food resources and a protective environment attracts approximately two million palaeartic migratory birds to the Banc d'Arguin during the winter months, which follow the path from Siberia to South Africa. The Park is not only the country's largest and most important protected areas, but also among the most important marine protected areas of the West African Marine Ecoregion (WAMER) (UNDP 2009).

Many areas of the Mauritanian coast, including the Banc d'Arguin ecosystem, cover large areas of shallow water and many small islands, which support sea-grass beds (one species), mangroves (three species). All of these ecosystem components are supported by seasonal upwelling of nutrient-rich cold waters. Other areas are not specifically protected, such as the Venus clam banks, deep-sea corals, carbonate mounds and certain fish nursery and spawning areas within Mauritania's EEZ. They are also very important for maintaining the marine trophic chain. Historically, these rich littoral ecosystems have supported a high abundance of invertebrates, fish, coastal birds, and marine mammals. There continues to be a need, however, for a better understanding of the role of biodiversity in sustaining fisheries in the region.

6. ENVIRONMENTAL SETTING – ONSHORE

6.1 TOPOGRAPHY

Mauritania is generally flat, covering an area of 1,030,700 Sq Km forming vast and arid plains broken by occasional ridges and cliff like outcroppings.

Mauritania is located in West Africa at latitude of about 15 to 28⁰ N, lying almost entirely within the arid zone of the Sahara desert (McSweeny, New et al. 2008). Mauritania has four ecological zones: the Saharan Zone, the Sahelian Zone, the Senegal River Valley, and the Coastal Zone. Although the zones are markedly different from one another, no natural features clearly delineate the boundaries between them. Sand, varying in color and composition, covers 40 percent of the surface of the country, forming dunes that appear in all zones except the Senegal River Valley. Fixed sand dunes are composed of coarse, fawn-colored sand; while shifting ("mobile") dunes consist of fine, dust like, reddish-colored sands that can be carried by the wind. Plateaus generally are covered with heavier blue, gray, and black sands that form a crusty surface over layers of soft, loose sand (Mauritania Geography 2009).

The high point, Mount Ijill at about 915 m (3,002 ft), is near Fdérik. The country is generally flat. Three-quarters of the country is covered by Saharan desert, and the remaining one quarter is a Sahelian Zone. Mauritania is, therefore, a country extremely vulnerable to the effects of desertification (NAPA-RIM 2004)

More than half of the country is part of the African Plain. The remaining land is a combination of vast plains sporadically scattered with the plateaux of Adrar, Tagant and Affolé, which have heights that vary from 200 to 800 metres; the highest point being 917 metres at Kédia d'Idjil. The lowest altitudes are along the Atlantic Coast at under 50 metres. To the east of the littoral are continental dunes which range between 50 and 100 metres. Between the dunes and the Plateaux of Assaba, Tagant and Adrar there are ergs with scattered stony buttes, usually under 100 metres. In general, topographic variation affects neither the temperature nor the vegetation (Soule 2003).

6.2 CLIMATE

Mauritania's climate is characterized by extremes in temperature and by meagre and irregular rainfall. Annual temperature variations are small, although diurnal variations can be extreme. The Harmattan, a hot dry wind, blows from the Sahara throughout most of the year and is the prevailing wind, except along the narrow coastal strip, which is influenced by oceanic trade winds (Mauritania Geography 2009).

The climate of Mauritania is governed by three centres of activity (Diagana 1998):

- The Azores anticyclone, sited at the south-west of the Azores archipelago, the sea wind from this anticyclone blows north-north-west permanently on the Mauritanian littoral.
- The St. Helena anticyclone or monsoon: centered in the south Atlantic, blows south or south-west and is responsible for the summer rains.

- The anticyclones which form in the Sahara in winter, moving northwards and create the Saharan depression. The Harmattan coming from these anticyclones is cool and dry in winter and hot and dry in summer.

6.2.1 TEMPERATURE

Trade winds moderate the temperature in the coastal region, which is arid. The mean temperature of the coldest month at Nouakchott is 21°C and that of the warmest month is 30°C. Farther north, but still on the coast at Nouadhibou, the corresponding figures are 20°C and 26°C. Here the lower temperature for the warmest month reflects the influence of the cold Canary current which flows close to the shore at Nouadhibou, but swings away westwards to the south (Ramsar Wetlands 2009).

6.2.2 RAINFALL

Mauritania is characterized by sparse and sporadic rainfall. Southern Mauritania has a Sahelian climate and the rainy season lasts from July to October. Annual precipitation is even lower further north at Nouadhibou, at ~30 mm. It rains for approximately one to two days per month (~17 days per year) in Nouakchott. At Nouadhibou, rainfall greater than 1mm falls for approximately 10 days per year. Highest rainfall generally occurs from August to October. The total annual rainfall for coastal Mauritania is approximately 680 mm. Wetter conditions are experienced in the south, with rainfall recorded for approximately 42 days per year at Dakar, Senegal (Woodside 2005).

6.2.3 WIND

With the exception of the coastal area overlooking the Atlantic, the inland of Mauritania is hot and relatively dry for most of the year. Radiation and sunshine too being of substantial amounts lead to excessive evaporation. From the coast, the evaporation increases in a uniform pattern towards the inland (Shahin 2002). The seasonal variation in wind speed and direction are related to the north-south seasonal variations in the positions of the Azores anticyclone and of the equatorial low-pressure systems (Woodside 2005).

6.3 GEOLOGY AND SOILS

6.3.1 BEDROCK GEOLOGY

Geologically, Mauritania can be divided into four major domains:

- The Archean Reguibat Shield in the north of the country, which strikes into Western Sahara and Algeria;
- The north-south striking Mauritanide Belt, folded and thrustured during the Variscan orogeny;
- The Taoudenni Basin with predominantly continental sediments of Neoproterozoic to Phanerozoic age, covering most of central and southern Mauritania; and
- The Senegal Basin with mainly marine sediments of Jurassic to Tertiary age. Sand dunes cover almost 50% of Mauritania's surface, which forms a vast peneplain studded with inselbergs over the folded belts (Schluter 2006).

6.4 STRATIGRAPHY AND TECTONICS

West Africa is underlain by Archean and early to middle Proterozoic crystalline rocks of the West-African craton. This craton is exposed in the Reguibat and Leo Shields, and a central part underlies the late Paleozoic to Mesozoic Taoudeni Basin (Watanabe, Murakami et al. 2006).

The vast Taoudeni basin is centered on the West African Craton, serving as Neoproterozoic to Early Paleozoic foreland to the encircling Pan-African mobile belts to the west and to the east. Apart from Mauritania, it underlies large areas of Mali, southern Algeria, Burkina Faso and continues into Guinea, Guinea-Bissau and Senegal, where it is known as the Bove Basin. Stratigraphically, the Taoudeni Basin consists of fine-grained clastics carbonates, 2,000 – 3,000 m thick.

Mauritania comprises a wide part of the Senegal basin, which is the largest onshore embayment in northwest Africa. Stratigraphically, its onshore succession starts with Late Jurassic marine dolomite sandstones. A pronounced regression occurred at the end of the Maastrichtian before a widespread Early Tertiary transgression (Schluter 2006).

6.4.1 ECONOMIC GEOLOGY

Major mineral sources of Mauritania are iron, phosphate, gypsum, titanium, copper and gold (Watanabe et al. 2006). The iron ore production is still the dominant mineral production in Mauritania. In the 1970s the reserves of Iron were estimated at 200 Mt, grading of 64% Fe as hematite lenses and developed over Proterozoic banded iron formations at F'Deriksegazou, Rouessa and Tazadit Hills, all close to the border with the Western Sahara. The Akjoujt copper deposit is located about 250Km northeast of Nouakchott at the northern tip of the Mauritanides Orogenic belt. It consists of a 1,000m long and up to 250m wide lens-shaped copper bearing carbonate body occurring on top of two hills, the west and east Moghrein Guelbs.

The production of gypsum was derived from the N'Drahamcha quarry, 50Km northeast of Nouakchott. The phosphate resources identified in southern Mauritania were estimated at 120 150 Mmt of phosphate rock averaging 20% of P₂O₂ (Schluter 2006).

6.4.2 SOILS

Mauritania is an arid country in West Africa with 750 km of Atlantic coastline. Vast areas to the north of the Senegal River are occupied by extensive sand dune plains of the Sahara Desert. Mountainous areas occur in the northeastern part of the country. Most of the country receives less than 200 mm of precipitation per year. The only agricultural area with productive soils lies along the Senegal River valley at the border with Senegal. Mauritania's harsh physical and climatic conditions constrain its agricultural potential. Only a few areas are suitable for crop production and these are mainly located in the narrow strip along the Senegal River and scattered oases. Crops produced are rice, sorghum and millet.

The soils of Mauritania are divided into climatic regions:

Soil Region A: In the extreme south of the country is the best watered zone and receives over 500 mm. It is the northern limit of the dry savannah. This zone has the best potential for rain fed cropping and pastures.

Soil Region B: Considers those zones with rainfalls between 225 and 500 mm. The land forms include: sand dunes, rocky lands, pediments, coastal dunes, sebkhas (inland areas deposited with salt by repeated flooding from the sea). Grazing and agriculture are the main activities in this zone.

Soil Region C: The soil type is prevalent in the rest of the country where rainfall is in the range of 200 to 225 mm. Land forms include: sand dunes, rocky lands and pediments (Soule 2003).

6.5 WATER (SURFACE AND GROUND WATER)

6.5.1 HYDROLOGY

The Senegal River is the second largest river in West Africa, originating in the Fouta Djallon Mountains of Guinea where its three main tributaries, the Bafing, Bakoye, and Faleme contribute about 80% of the river flow (Map 6-2). The Senegal River flows 1,800 km from Guinea, crossing Mali, Mauritania and Senegal on its way to the Atlantic Ocean (Newton 2009). The Bafing alone contributes half of the river's flow at Bakel.



Source: Prepared for the World Water Assessment Program (WWAP) by AFDEC, 2002.

Map 6-1: Senegal River Basin

The total capacity of the Manantali dam, built on the Bafing River, is 115 Bm³. It is the largest dam in the river basin. The purpose of the dam is to attenuate extreme floods, generate electricity and store water in the wet season to support irrigation. The Diama dam, located 23 Km from Saint Louis by the mouth of the Senegal River in the delta, sits aside the territories of Mauritania and Senegal (Senegal River Basin 2009).

AQUASTAT, a global database of water statistics maintained by the Food and Agriculture organization of the United Nations (FAO) presents internal renewable water resources (in km³) data for Mauritania and Sub-Saharan Africa (Table 6-1: Internal Renewable Water Resources). The data indicates that Mauritania's internal renewable water resources have been depleted.

Table 6-1: Internal Renewable Water Resources

Internal Renewable Water Resources (IRWR),1977-2001, in Km ³	Mauritania	Sub-Saharan Africa
Surface water produced internally	0	3812
Groundwater Recharge	0	1549
Overlap (shared by groundwater and Surface water)	0	1468
Total Internal Renewable Water Resources (surface water + groundwater - overlap)	0	3901
Per capita IRWR, 2001 (cubic meters)	141	5705

Source: *Earth Trends – Water Resources and Fresh Water Ecosystems*.

6.5.2 HYDROGEOLOGY

The ground water flow system in Mauritania can be best described as two interconnected regional systems: the porous Continental Terminal coastal system and the interior fractured sedimentary Taoudeni Basin system. In these systems, ground-water flow occurs in fill deposits and carbonate, clastic, metasedimentary, and metavolcanic rocks. Based on an evaluation of the potentiometric surface, there are three areas of ground-water recharge in the Taoudeni Basin system. One region occurs in the northwest at the edge of the Shield, one occurs to the south overlying the Tillites, and one is centered at the city of Tidjikdja. In addition to these recharge and discharge areas, ground water flows across the country's borders. Specifically, ground water from the Atlantic Ocean flows into Mauritania, transporting dissolved sodium from the west as salt water intrusion, whereas fresh ground water discharges from the east into Mali.(Friedel and Finn 2008) .

The region suffered a continuous drop in rainfall(Ranga 2010)(Ranga 2010) from 1960-1980, resulting in droughts and disruption of economies in the basin states. Lack of rainfall and depletion of water resources in the region resulted in erosion, saltwater intrusion, drop in groundwater and freshwater levels, loss of vegetation, etc. (Newton 2009). Data on water quality and water resources do exist, but are dispersed in various research institutes, or in cooperation institutions (e.g, FAO). Aquastat - FAO's global information on water and agriculture developed by the Land and Water Division has maintained database on water resources for Mauritania region since 1988. The following table (Table 6-2: *Surface and Groundwater Data for the Mauritanian Region*) presents the surface and groundwater data for the Mauritania region (Aquastat 2010).

Table 6-2: Surface and Groundwater Data for the Mauritanian Region

Mauritania	1988-1992	1993-1997	1998-2002	2003-2007
Average precipitation in depth (mm/yr)	92	92	92	92
Average precipitation in volume (10 ⁹ m ³ /yr)	94.82	94.82	94.82	94.82
Surface water: produced internally (10 ⁹ m ³ /yr)	0.1	0.1	0.1	0.1
Groundwater: produced internally (10 ⁹ m ³ /yr)	0.3	0.3	0.3	0.3
Water resources: total internal renewable (10 ⁹ m ³ /yr)	0.4	0.4	0.4	0.4
Surface water: entering the country (natural) (10 ⁹ m ³ /yr)	0	0	0	0
Surface water: leaving the country (natural) (10 ⁹ m ³ /yr)	0	0	0	0
Surface water: total external renewable (actual) (10 ⁹ m ³ /yr)	11	11	11	11
Groundwater: entering the country (natural) (10 ⁹ m ³ /yr)	0	0	0	0
Groundwater: entering the country (actual) (10 ⁹ m ³ /yr)	0	0	0	0
Groundwater: leaving the country (natural) (10 ⁹ m ³ /yr)	0	0	0	0
Groundwater: leaving the country (actual) (10 ⁹ m ³ /yr)				
Water resources: total external renewable (natural) (10 ⁹ m ³ /yr)	11	11	11	11
Water resources: total external renewable (actual) (10 ⁹ m ³ /yr)	11	11	11	11
Surface water: total renewable (natural) (10 ⁹ m ³ /yr)	11.1	11.1	11.1	11.1
Surface water: total renewable (actual) (10 ⁹ m ³ /yr)	11.1	11.1	11.1	11.1
Groundwater: total renewable (natural) (10 ⁹ m ³ /yr)	0.3	0.3	0.3	0.3
Groundwater: total renewable (actual) (10 ⁹ m ³ /yr)	0.3	0.3	0.3	0.3
Water resources: total renewable (natural) (10 ⁹ m ³ /yr)	11.4	11.4	11.4	11.4
Water resources: total renewable (actual) (10 ⁹ m ³ /yr)	11.4	11.4	11.4	11.4
Water resources: total renewable per capita (actual) (m ³ /inhab/yr)	5442	4756	4141	3632
Dependency ratio (%)	96.49	96.49	96.49	96.49
Water resources: total exploitable (10 ⁹ m ³ /yr)				
Total dam capacity (km ³)		0.89		

F - FAO estimate

(c) 2010 FAO of the UN

6.6 FLORA, FAUNA AND VEGETATION

The characteristics and distribution of the flora and fauna of Mauritania reflect the subdivision of the country into four eco-climatic zones (see Map 6-2: *Eco-climatic Zones*).

The Arid (or Saharan) Zone covers most of the country, encompassing a surface of 810.000 km², (75% of Mauritania). The zone corresponds to a wide desert region where annual precipitations are lower than 150 mm and extends mostly north of the parallel passing through of Nouackchott, excluding the coastal belt of Mauritania, which is classified differently. The Arid zone includes the regions of Tiris Zemmour, Adrar and Tagant, Oualata, Magta, Lahjar, Boumdeid, and Boutilimitt.

The Sahelian Zone is located south of the Arid Zone north of the 400 mm isohyet, and covers around 18% of the country surface, corresponding to 175,000 km². It includes the Region of Assaba, and a part of Trarza, Brakna, Gorgol, Guidimakha and the two Hodhs. This area is typically devoted to agropastoralism and rainfed agriculture depending on precipitations.

The Coastal Zone extends along the coast for 800 km from Nouadhibou to Keur Macéne, and for 50 km onshore to the west. The coast has scarce precipitation and hosts the majority of the biodiversity of the country, mainly concentrated in the Banc d'Arguin Natural Park.

The River Valley Zone extends along the right shore of the Senegal River and is administratively included in the southern portions of Wilayas of Brakna, Gorgol, Trarza and Guidimagha, covering 22,000 km² and 2% of the Country. This zone is the most intensively cultivated area of Mauritania and is located north of the 600 mm isohyet.



(Source: FAO, 2005)

Map 6-2: Eco-climatic Zones

FLORA

SAHARA ZONE

The arid zone of Mauritania is the most poorly vegetated due to climatic constraints and scarce precipitations (less than 150 mm annually). Vegetation is very little, typically herbaceous and sparse with rare shrubs and bushes usually concentrated in ground depressions and between dunes where the water table approach's closer to the surface or humidity condensate. Acacias, soapberry trees, capers, and swallowwort can be found here.

In sebkhas or other saline areas, alophytic vegetation is typically present, including the specialized chenopods. Cultivations are limited to palms and small herbaceous crops in oases.

SAHELIAN ZONE

With the transition from the arid to the sahelian zone, vegetation increases in density and variety, although still sparse and concentrated in areas where water is scarce. The sahelian zone is typically devoted to agro-pastoralism, with increasing presence of rain fed agriculture in the western portions, and transboundary exchanges of cattle in the east.

In the northern Sahel, the landscape is typically covered by spiny acacia trees and scrub grasses. As you move to the south, rainfall increases and vegetation becomes denser. Areas of palm plantations are present (*Phoenix dactylifera*), as well as grassland, brushwood, balsam, and spurge covering fixed dunes. Occasionally baobab trees can be found in the grasslands of the southern Sahel. Forests of gum-bearing acacia grow in the Trarza and Brakna regions.

The most common species found in the Sahelian zone are *Acacia sieberiana*, *Acacia Senegal*, *Acacia seyal*, *Crateva religiosa*, *Acacia tortilis*, *Balanites aegyptia*, *Combretum spp*, *Adansonia digitata*, *Piliostigma reticulatum*, *Borassus flabelifer*, *Mitragyna inermis*, *Raphia soudanica*, *Tamarinus indica*, *Grewia bicolor*, *Pterocarpus luscens* and *Commifora africana*.

In the transition belt to the river valley, rainfall is abundant enough to support forms of sedentary agriculture.

COASTAL ZONE

The Coastal Zone extends for almost 800 km along the Atlantic coast of Mauritania. This zone includes two national parks; the Banc d'Arguin, situated in the North and the Diawling in the South. The most relevant vegetation is found in the Banc d'Arguin Park and in the lower Senegal River delta where mangroves are still residually present.

Vegetation native to mangrove areas include *Rhizophora racimosa* and *Avicennia nituda*. Additional relevant vegetation cover is found close to the Senegal River valley, mainly made of Acacia and grasslands, however these areas are facing increasing degradation due to climatic constraints and anthropological influence. On coastal dunes vegetation is rare. At the foot of ridges, large tamarisk bushes, dwarf acacias, and swallow worts may be found. In the north, some high grass, mixed with

balsam, spurge, and spiny shrubs, grows in the central region of the coastal zone. The north of the coastal zone has very little vegetation.

In 1997, Mauritania adopted a law for the protection of forests and the regulation of hunting activities, which includes a list of protected flora, and specifically *Adansonia digitata*, *Acacia senegal*, *Acacia albia*, *Acacia nilotica*, *Borassus flabellifer*, *Boscia senegalensis*, *Ceiba pentandra*, *Commiphora africana*, *Dalbergia milanoxylon*, *Grewia bicolor*, *Grewia tenax*, *Hyphaene tabaica*, *Khaya senegalensis*, *Combretum micrantum*, *Pterocarpus ericaceus*, *Raphia soudanica*, *Tamarindus*.

RIVER VALLEY ZONE

Rainfall in the Senegal River Valley is higher than in the other ecoclimatic zones of Mauritania. Precipitation ranges from 400 millimetres up to 600 millimetres annually and are usually concentrated between May and September. Rainfall, combined with annual fluctuations of the river water level and floods, provide suitable conditions for traditional agricultural and pastoral activities. This zone contains a majority of the forest formations in Mauritania.

Floods can cover the entire valley with a width of twenty-five to thirty-five kilometres from the river. Recharge of lakes and sloughs (marigots) occurs which eventually drain back into the river during the dry season. After the water recedes from the basins, planting can begin. The periodical flooding of the valley makes the soil rich in clay and comparatively abundant in flora.

Rainfall combined with a network of relatively dense irrigation creates the basis for the development of near-tropical vegetation. In addition to abundant grasses are baobab, gonakie and palm trees. The Senegal River Valley hosts most of the countries forest resources; some closed stands are also found in the Sudanian zone along the edge of the Senegal valley. Formerly the home of varied closed forests, this zone is now dominated by *Acacia nilotica* in areas that are regularly flooded each year. The coasts of the River valley zone, and that of the Coastal zone, have an abundance of halophytic vegetation dominated by bushy shrubs. Residual mangroves are found in the Trarza region of the Senegal River delta.

The intensive agricultural exploitation of the river valley has reduced most of the areas original forest and vegetation, which are, however, still found in the region. The most common species, beside *Acacia nilotica*, include *Balanites aegyptiana*, *Acacia albida*, *Ziziphus mauritania* and *Bauhinia rufescens*. Some gallery forest are still existing along the river and are made mainly of *Bauhinia rufescens*, *Combretum* spp, *Ziziphus mauritania* *Tamarinus indica* et *Anogeissus* spp.

The following is a list of forests, most of them located in the River Valley and their extension (FAO 2005).

Table 6-3: Classified Forests in the River Valley

Administrative area (Willaya)	N°	Name	Surface Area (ha)
Trarza	1	Forêt de bou Hevra	320
	2	Keur Mour	450
	3	Gani	2.200
	4	M'barwadji	486
	5	Dioldi	627
	6	Koundi	4.470
Brakna	7	Tessem	453
	8	Mboyo	2 940
	9	Da el Barka	328
	10	Olo Ologo	217
	11	Silbe	2.736
	12	Afina + Toueidieri	507
	13	Lopel	582
	14	Ganki	600
Gorgol	15	Diorbivol	754
	16	Dinde	395
	17	Dao	958
	18	Yame N'diaye	530
	19	N'Goye	1.825
Guidimaka	20	Melgué	606
	21	Seydou	320
	22	Bouli	600
	23	Kalimioro	610
	24	Oued jrid	115
Assaba	25	Neham	1340
	26	Marais seder	3.065
Tagant	27	El Mechrae	540
	28	Legdam	550
	29	Tintane	4.495

6.6.1 FAUNA

The fauna of Mauritania is very rich and diversified, particularly amongst bird species. In the wetlands of the Coastal zone and of the Senegal River delta millions of migratory, overwintering, and breeding birds can be found all year round. A total of 541 bird species have been recorded. Out of these, 196 are resident, 294 show regular seasonal movements but do not breed, including 185 Palearctic migrants.

There are neither endemic nor near-endemic bird species in Mauritania. However, there are endemic subspecies of Grey Heron (*Ardea cinerea monicae*) and Eurasian Spoonbill (*Platalea leucorodia balsaci*), both found at the Banc d'Arguin. Four bird species are recorded as "vulnerable", notably the Lappet-faced Vulture (*Torgos tracheliotus*), Lesser Kestrel (*Falco Naumanni*), Corncrake (*Crex Crex*), and the Aquatic Warbler (*Acrocephalus Paludicola*).

As far as terrestrial mammals are concerned, 103 species have been recorded in Mauritania (considering also marine mammals). The most relevant are the African Elephant (*Loxodonta africana*), Cheetah (*Acinonyx jubatus*), Caracal (*Caracal caracal*), Sand Cat (*Felis margarita*), Wildcat (*Felis silvestris*), Leopard (*Panthera pardus*), Lion (*Panthera leo*), Striped Hyena *Hyaena hyaena*, Hippopotamus (*Hippopotamus amphibius*), Giraffe (*Giraffa camelopardalis*), Gazelles, Roan Antelope, (*Hippotragus equinus*), Scimitar Oryx (*Oryx dammah*).

Three mammal species are reported to be critically endangered (IUCN 2001): Mediterranean Monk Seal *Monachus monachus*, Dama Gazelle (*Gazella dama*), and Addax (*Addax nasomaculatus*). Nine species are considered vulnerable (including the elephant, cheetah, lion, hippopotamus and two gazelles) (IUCN 2001). One species is near-threatened (Sand Cat) (IUCN 2001). One of the species (Scimitar Oryx) although recorded in the recent past is currently considered extinct in the wild (IUCN 2001).

The River Senegal hosts around 100 species of fresh-water fishes, mammals, and reptiles, including manatees, crocodiles and hippopotami. However, manatees and hippos are almost non-existent in the river area.

In 1997 Mauritania adopted a law for the protection of natural resources, which includes in Annex 2 lists with totally and partially protected species. The former list contains species for which any hunting activity is strictly forbidden, whereas for the latter group hunting is permitted under the restrictions described in Articles 10 and 11. Protected species as per the law and its amendments are reported below in Table 6-4.

Table 6-4: Protected Species in Mauritania (IUCN 2001)

Strictly Protected Species		Partially Protected Species	
Scientific Name	English Name	Scientific Name	English Name
<i>Loxodonta africana</i>	Elephant	<i>Phacochoerus aethiopicus</i>	Warthog
<i>Addax Nasomaculatus</i>	Addax	<i>Anas querquedula</i>	Garganey
<i>Oryx gazella</i>	Oryx	<i>Anas clypeata</i>	Northern Shoveler
<i>Gazella Dama</i>	Dama Gazelle	<i>Anas acuta</i>	Pintail
<i>Gazella dorcas</i>	Dorcas Gazelle	<i>Anas penelope</i>	Wigeon
<i>Gazella rufifrons</i>	Red-fronted Gazelle	<i>Anas platyrhynchos</i>	Mallard
<i>Ammotragus Lervia</i>	Barbary Sheep	<i>Sarkidiornis melanotos</i>	Knob-billed Duck
<i>Orycteropus afer</i>	Aardvark	<i>Numida meleagris</i>	Helmeted Guineafowl
<i>Bubalis bubalis</i>	Water Buffalo	<i>Pterocles exustus</i>	Chestnut-bellied Sandgrouse
<i>Damalius</i>	Damasliq	<i>Francolinus sp</i>	Francolins
<i>Hippotragus sp</i>	Hippotragus	<i>Plectropterus gambensis</i>	Spur-winged Goose
<i>Giraffa camelopardalis</i>	Giraffe	<i>Alopochen aegyptiaca</i>	Egyptian Goose
<i>Otis arabs</i>	Arabian Bustard	<i>Lepus sp</i>	Hare
<i>Neotis Nuba</i>	Nubian Bustard	<i>Tringa sp</i>	Sandpipers, shanks, tattlers.
<i>Neotis denhami</i>	Stanley's Bustard	<i>Streptopelia sp</i>	Dove
<i>Eupodotis ruficrista</i>	Rested Bustard	<i>Eupodotis senegalensis</i>	Senegal Bustard
<i>Struthio camelus</i>	Ostrich	<i>Coturnix coturnix</i>	Quail
<i>Trichechus senegalensis</i>	African Manatee	<i>Columba livia</i>	Rock Pigeon
<i>Monachus monachus</i>	Mediterranean monk seal	<i>Dendrocygna bicolor</i>	Fulvous Whistling Duck,
<i>Testudo graeca graeca</i>	Spur-thighed Tortoise	<i>Dendrocygna viduata</i>	White-faced Whistling Duck
		<i>Ptilopachus petrosus</i>	Stone Partridge
		<i>Fulica sp</i>	Coot

6.7 PROTECTED AREAS

Mauritania has two National Parks, four Ramsar sites and a small number of wildlife reserves.

BANC D'ARGUIN NATIONAL PARK

The National Park “Banc d’Arguin” is by far the most important and environmentally relevant protected area in Mauritania. It was established in 1976 by a specific decree and has been further enforced and regulated by Law number 24 issued in 2000 and two following executive decrees issued in 2006, which have confirmed its boundaries and specified the criteria and legal mechanisms for its management and conservation.

alophytic vegetation is predominant (*Salsola baryosma*, *Salicornia senegalensis*, *Sesuvium portulacastrum*, *Arthrocnemon* spp, *Suaeda fruticosa*). Salt marshes are populated by *Ipomea pes-caprae* and *Sporobolus virginicus*. Residual and relevant mangrovia swamps of *Avicennia africana* are still found on the Ile de Tidra and (1,700 ha) in the mainland near Cap Timiris.

The onshore desert portion of the park is dominated by typical Sahara vegetation with Mediterranean influence. Herbaceous and shrub species like *Panicum turgidum*, *Cassia italica*, *Pergularia tomentosa* *Heliotropium bacciferum* *Stipagrostis pungens*, *Cornulaca monacantha*, *Euphorbia balsamifera* and *Calligonum comosum* are found on the sand dunes. Tree species include *Acacia raddiana*, *Balanites aegyptiaca*, *Maerua crassifolia* and *Capparis decidua*.

The bank has a very high productivity of pelagic phytoplankton offshore and of benthic forms near the shore which provide the energy base for the countless numbers of birds and fish (UNEP 2005). There are thousands of fiddler crabs (*Uca tangeri*) on the upper beaches, and cockles (*Cardium edule*) and the detritivorous gastropods (*Cymbium* and *Cornus* spp.) on the mudflats. Park waters have a very high productivity of Phytoplankton, which support the large amount of birds and fishes found in the area. The wintering bird population in the Park accounts for one third of the total amount of wintering birds of Western Africa (UNEP 2005). In addition, the Park has numerous populations and variety of nesting birds. In total, 249 bird species have been recorded, from both Palaearctic and Afrotropical realms. For many of them the Park represents, respectively, the Southern or Northern limit of distribution.

Most relevant wintering shorebirds include species such as black tern (*Chlidonias nigra*), flamingos (*Phoenicopterus ruber*), plovers (*Charadrius hiaticula* and *Pluvialis squatarola*), knot (*Calidris canutus*), redshank (*Tringa tetanus*), and bar-tailed godwit (*Limosa lapponica*) among many other species. The area is one of the most important wintering grounds for hundreds of thousands of European spoonbill (*Platalea leucorodia*) and gull-billed terns (*Gelochelidon nilotica*). Over 40,000 pairs of breeding birds include white pelicans (*Pelecanus onocrotalus*), three subspecies of cormorant (*Phalacrocorax africanus*), and a range of terns such as the Caspian (*Hydroprogne caspia*), the royal (*Sterna maxima*), in addition to *Sterna hirundo*, *S. albifrons*, and *S. anaethetus*. Additional relevant species are gulls (*Larus cirrocephalus* and *L. genei*). There are several species or subspecies with an African distribution, such as the endemic grey heron (*Ardea cinerea monicae*), spoonbill (*Platalea leucorodia balsaci*), and the western reef heron (*Egretta gularis*).

Mammals include relevant terrestrial and marine species. Approximately one hundred Monk seals breed on the Cote des Phoques at Cap Blanc. Marine mammals recorded at the Park include dolphins (*Sousa teuszii*, *Delphinus delphis*, *Steno bredanensis*, *Tursiops truncatus*, *Grampus griseus*) and whales (*Orcinus orca*, *Balaenoptera physalus*, *Phocoena phocoena*). Terrestrial mammal species include gazelles (*Gazella dorcas*), jackals (*Canis aureus*), foxes (*Fennecus zerda*, *Vulpes rueppelli*), wild cats (*Felis margarita*, *Felis lybica*), and other. The high productivity of the gulf seagrass and the numerous existing marine biotopes, make the Park a major fish breeding ground, including shallow water fish and pelagic migrants like tunnies, sawfishes, guitarfish and sharks (UNEP 2005). The Park's sandy coast and shallow waters of Lévrier Bay is a major habitat for some turtle species: *Chelonia mydas*, *Eretmochelys imbricate*, loggerhead (*Caretta caretta*), leatherback (*Dermochelys coriacea*) and olive ridley (*Lepidochelys olivacea*).

DIAWLING NATIONAL PARK

Diawling National Park was established in 1990 and extends over a surface of 13,500 ha. The Park is mostly corresponding to a saline floodplain in the lower delta of the Senegal River. The Park (also a Ramsar Site) is disseminated with marsh-pools and sand dunes and includes three coastal lagoons and an estuarine zone of mangroves providing feeding grounds for fish, shrimp, and prawns.

Numerous bird species have been recorded: cormorants, storks, spoonbills, egrets, *Ardeidae* (herons, bitterns, etc.), and African and European *Anatidae* (ducks, geese, swans, etc.) and waders. Mammals include warthogs, jackals and monkeys. The last gazelles have disappeared recently. Human activities include controlled traditional exploitation (gathering, harvesting, fishing, and grazing).

RAMSAR SITES (RAMSAR WETLANDS)

In addition to the Banc d'Aguin and the Diawling National Parks, Mauritania includes two more Ramsar sites. **Chat Tboul** extends over a surface of 155 km² and lies onshore near the Atlantic coast, north of the National Park of Diawling Ramsar site, around a former branch and meanders of the Senegal River.

The site is split by the coast by a strip of dunes with a cover of Sahelian-type vegetation, and includes a series of wetlands with different characteristics. Permanent or temporary, brackish or saline they wetlands occur as lakes, pools, estuarine waters, intertidal mud/sand flats, forested wetlands, sandy shores, and intertidal marshes. The site's environmental variety is reflected by the numerous rare bird species breeding or wintering in the area, like *Pelecanus onocrotalus*, *Phoenicopterus ruber*, *Larus genei*, *Recurvirostra avosetta*, *Podiceps nigricollis*, *Chlidonias niger*, and *Sterna sandvicensis* (Ramsar Wetlands 2009).

Lake Gabou and the hydrographic network of Tagant Plateau lie at the boundary between the Sahelian and the Arid Zones. It is composed of a network of wadis that flow forming Lac Gabou, as well as by several temporary lagoons, ponds, freshwater springs and oases.

This hydrographic network supports a diverse range of flora and fauna. *Phoenix dactylifera* and *Hyphaene thebaica* are two palm species of great economic value (Ramsar Wetlands 2009). Two baobabs species are also found here and are typical of sahelian environments, namely *Adansonia digitata* and *Adenium obesum* (Ramsar Wetlands 2009). Most notable species of the local fauna are *Crocodylus niloticus suchus* and storks (*Ciconia ciconia* and *Ciconia nigra*) together with other water birds which use the site as a stopover location during migration across North Africa (Ramsar Wetlands 2009).

7. SOCIAL ENVIRONMENT

7.1 ECONOMIC OVERVIEW

In 2009, the GDP of Mauritania dropped for the first time in a dozen years (Trading Economics 2009). This was due to political uncertainty and the world economic recession, which impacted demand for the country's raw materials.

Table 7-1: GDP in billions (National Currency – Ouguiya)

Year	Billions (National Currency)	Billions (GDP at current prices in US dollars)
2009	352.102	3.029
2008	355.892	3.54
2007	343.306	2.822
2006	339.829	2.699
2005	304.931	1.857
2004	289.185	1.495
2003	274.947	1.285
2002	260.381	1.15
2001	257.555	1.122
2000	250.315	1.081
1999	245.768	1.195
1998	230.399	1.219
1997	224.172	1.402
1996	233.621	1.443

Source: (Trading Economics 2009)

In terms of exports, the official national statistics show that iron, followed by petroleum and fish products were the top three exports in 2008. From 2006 to 2010 there is a steady increase in the export of iron, gold and copper. The export of fish products has been more consistent since 2006, while the exportation of petroleum has fallen by more than 50% in three years.

Table 7-2: Mauritanian Export by Millions of Ouguiya per Product

Product	2006	2007	2008
Iron	122,209	144.403	186,473.7
Gold	430	9783.4	29,118.8
Copper	1490.9	44,028.6	30,881.8
Petroleum	170,504	87,551.8	78,690
Fish Products	45,992.8	64,031.5	66,624

(Source: (EPCV - Annuaire Statistique 2008 2009)

7.2 AGRICULTURE

A large percentage of the population is still dependent on agriculture despite the fact there is a higher percentage of population living in an urban setting in 2008 compared to 2004. In addition, although the labour force involved in the agriculture industry is high, this sector's contribution to the GDP is relatively low at 12.5% in 2007. In 2008 there was an estimated 691,000 of the population economically active in agriculture (The World Bank 2008a).

Agricultural and livestock production varies greatly from year to year despite significantly improved methods (especially for growing rice) and a small degree of diversification into products with more added economic value. The two largest grain crops are sorghum and rice while wheat, barley, corn and dates are also produced. The agricultural industry is very volatile due to desertification and recurring drought (African Development Bank 2008).

Irrigated farming gets most of the sector's investment but does not produce the hoped-for results. Irrigated land fell from 14 000 hectares in 2006/07 to 7 000 hectares in 2008/09 (18% of all arable land). Annual investment in rural development rose 7.9% to MRO 19.2 billion in 2009 (9.7% of all investment) (Africa Economic Outlook Mauritania 2009).

The total amount of agricultural land in Mauritania has fallen slightly each year since 2005 (397,500 km²) to 2007 (397,120 km²), which represents approximately 38.5% of the total land area in the country (The World Bank 2008a).

Analysis of the trend for agricultural production of rainfed crops over the 2000-2004 period alongside the poverty index shows a negative correlation between the two: an increase in production is accompanied by a decrease in poverty. The wilayas where poverty decreased had pronounced increases in terms of agricultural output (Mauritania 2007).

The agro-pastoral sector, despite dependence on the weather, accounted for 13.6% of GDP in 2009 and grew at 6% a year (up from 4.5% in 2008) (The World Bank 2008a).

Poverty largely coincides with agriculture and livestock farming and is characterized by:

- problems gaining access to land ownership, in particular on the part of women;
- the limited arable land areas that have been improved;
- poor yields and limited production capacities;
- difficult access to appropriate forms of credit;
- inadequate infrastructures and services available (transportation, education, healthcare, etc.);
- the inadequate conservation and marketing of food production;
- the limited impact of the ownership of livestock (sometimes in large numbers) on living conditions; and
- organizational capacities which remain insufficient.(Mauritania 2007).

7.3 INDUSTRY

7.3.1 MINING

Mining accounted for an estimated 36.5% of GDP in 2009, up from 34.2% in 2008. The state-owned mining firm SNIM produces 10-11 million tonnes of iron ore a year and its subsidiary SAMIA almost 30 000 tonnes of gypsum. The country's biggest gold mine went into operation in mid-2007 with an investment of USD 80 million and an annual production target of 120 000 ounces (about four tonnes). This will rise to 275 000 ounces under a USD 50 million investment agreement in April 2009 between the government and the Swedish multinational Lundin after new discoveries around El Ghaicha.(Africa Economic Outlook Mauritania 2009).

The Akjoujt copper mine reopened in early 2007 after investment of more than USD 104 million by the copper-mining consortium MCM (*Mines de cuivre de Mauritanie*) – led by Canada's First Quantum Minerals and including the Gulf company Wadi El Rawda Industrial Investments and the Australian General Gold International – with a target of extracting 120 000 tonnes of 25% copper concentrate and gold at 12 grammes/tonne a year. MCM also began producing gold in March 2009 with an annual target of 60 000 ounces (about two tonnes). (Africa Economic Outlook Mauritania 2009).

In 2009, iron, gold and copper accounted for almost 11,000,000 tonnes of export and nearly 250,000,000,000 ouguiya in value. (EPCV - Annuaire Statistique 2008 2009).

7.3.2 FISH

Fisheries are a key industry for Mauritania, which has a 720 km coastline with a very suitable environment. Catchable stocks are considerable and include seabed varieties (cephalopods, fish and crustaceans), small pelagic fish and molluscs.

About 800 000 tonnes were caught in 2009, mainly for export, and the sector provides a quarter of government revenue and a fifth of the country's export earnings. When other activity related to fishing is included, the sector's GDP contribution is about 6%.

In 2008, exportation of fish products equalled approximately 171,929.2 tonnes. This is up significantly from 2004's 88,243.7 tonnes. (EPCV - Annuaire Statistique 2008 2009)

For Mauritania, the alternative to selling access to its waters is to develop companies to catch, package and export fish on a larger scale.

The government's sectoral strategy for fisheries set forth in the PRSP is based on three pillars:

- i. rational management of fishery resources;
- ii. the development of local processing of fisheries products; and
- iii. the development of small-scale (artisanal) and coastal fishing. (Mauritania 2007).

7.3.3 PORTS

The country's two main Country ports are located in Nouadhibou and Nouakchott. These two urban centres represent both industrial and artisanal fishery fleets. As ports, they have operated since 1919 and 1986, respectively, with Nouadhibou handling approximately 56% and Nouakchott handling approximately 26% of all fish resource landings. Approximately 23% of the catch is landed at sites for artisanal vessels along the coast.

Nouadhibou has four separate ports: normal commercial traffic, an artisanal fishing port, a bulk iron ore loading terminal and a terminal for tankers (Environmental Resources Management 2006). Nouadhibou's main port presents logistical problems for vessels looking to dock due to the high number of wrecks sunk in port (Miller 2007).

7.3.4 PROCESSING

Nouakchott and Nouadhibou have 24 and 20 fish processing plants respectively, with capacity ranging from industrial factories to micro-enterprises. The fishing industry and spin-off industries play a major role at these port cities.

However, due to the influx of industrial foreign vessels in Mauritanian waters able to process or freeze fish, 95% of the Mauritanian catch is immediately taken out of national waters with little processing or value-added onshore in country (USGS 2003).

7.4 ETHNIC COMPOSITION AND LANGUAGES

Moors are the main ethnic group in Mauritania, constituting between 60 to 80 percent of the population. This is compared to the latter half of the 1990s, when 40% of the population was a Moor/black mixture, 30% was Moor and 30% was all black (Encyclopedia of the Nations 1990).

The official language of Mauritania is Arabic, while the variant predominantly used in the country is Hassaniya. Mauritania, a one-time French colony also recognized French as an official language until 1991. French is still used in Mauritania, especially in business. Currently, Wolof is an official language, and along with Peular and Soninke, is recognized as a national language (Encyclopedia of the Nations 1990).

7.5 DEMOGRAPHIC DATA

The population growth rate has declined steadily over the past 6 years. In 2009 the rate stood at 2.3% versus 2.7% in 2004. In 2009 the population stood at 3,290,630. 42% of the population is living in poverty, with the rural rate (59.4%) more predominant than the urban (20.8%). (EPCV - Annuaire Statistique 2008 2009).

Key demographic data for Mauritania included in the table (Table 7-3: *Development and Demographic Indicators from the World Bank* below).

Table 7-3: Development and Demographic Indicators from the World Bank

Indicators	2004	2008
Life Expectancy; total	56.39	56.73
Population	2.99 million (2005)	3.22 million
Population Urban %	40.32	41
Population Rural %	59.68	59
Population ages 15-64 % of Total	56.42%	57.59%
Age dependency ratio (% of working-age population)	77.25%	73.65%
Literacy Rate	N/A	56.8%
Labour participation rate; female	23.2	22.3
Labour participation rate; male	24.8	24.1
Labour participation rate, total	69.3	69.9
Labour Force	1190677	1353737
Mortality Rate Infant per 1000	75.5 (2005)	74.6
Mortality Rate Male per 1000	310.89	308.23
Mortality Rate Female per 1000	243.81	240.78
Improved Water Source	43% (2005)	47%
Improved Sanitation Facilities	24% (2005)	26%

Source: (The World Bank 2008a)

7.6 EDUCATION

Some progress has been made in education. Net primary school enrolment was around 82% in 2008, according to the education ministry. This was helped by the PNDSE national education development system, which is in line with the aims of the poverty reduction strategy framework (PRSF) and the Millenium Development Goals (MDG) and has set a target of universal basic education enrolment and gender equality. The retention rate has risen significantly, to 49.3%, but still falls well short of expectations (Africa Economic Outlook Mauritania 2009).

There has been a substantial increase in the number of primary education teachers from 2004 (10,652) to 2008 (12,724). This has helped decrease the pupil-to-teacher ratio from 40.7 to 37.2. This trend is consistent with secondary education as the pupil-to-teacher ratio has fallen from 28.4 in 2004 to 26.6 in 2007. (The World Bank 2008a).

Education is compulsory from ages 6 to 14. Primary school begins at age 6 and continues for 6 years. The total enrolment of students age-appropriate for primary schooling was at 76.9% in 2008. This is down slightly from the 77% in 2004, but up significantly from the 69.4% in 2003. The total net enrolment ratio for females is at 79.7% in 2008, while males is less, at 74.3%. (The World Bank 2008a)

The University of Nouakchott, the principal post-secondary institution in Mauritania, had more than 12,000 students in 2007-08. This is a significant increase from the 2003-04 enrolment of 8,567. The great majority of these students are registered in the faculties of Technical Science (1,162), Social Science (3,370), and Sciences Juridiques (7065) et Economiques (EPCV - Annuaire Statistique 2008 2009).

7.7 HUMAN RESOURCES

The latest unemployment rate on record at the World Bank is 33% from 2004(The World Bank 2008a). However, a report cited in Agence de Presse Africaine states the 2009 rate is close to this number at 32% (2010).

Because of the rising population and the slow economic growth, employment has been sluggish. Two-thirds of jobless people are under 25 and 80% of them are looking for their first job. Most of the unemployed are illiterate, unqualified and without professional experience. The formal sector is not very diverse and provides few jobs while the informal economy employs nearly 80% of the active population (Africa Economic Outlook Mauritania 2009).

The predominance of the informal sector, which includes most SMEs, also delays private sector growth. Informal activity is the biggest source of jobs and provides for most of the population. It is part of the shift from a traditional agricultural and livestock-based economy operating on well-established but narrowly-based mutual trust, to a more diverse and market-oriented activity

Around 600 higher education graduates find work annually. However, the University and institutions of higher education produce about 1,100 qualified graduates per year. Jobs go unfilled because of the poor fit between skills and knowledge attained and job requirements (Environmental Resources Management 2006).

The World Bank indicators show Mauritania as having a labor participation rate of 69.9% in 2008 and 69.7% in 2007 (The World Bank 2008a).

7.8 TELECOMMUNICATIONS AND INTERNET

Telecommunications must be managed between issues related to network problems and continuing high prices (Mauritania 2007). Mobile cellular subscriptions have increased dramatically since 2004 when there were a total of 524,043. In 2008 there were a total of just over 2,000,000 subscriptions (EPCV - Annuaire Statistique 2008 2009)). If these numbers were attributed to on subscription per person it would relate to approximately 65% of the population.

Comparatively, internet is not nearly as widespread as mobile phones. As of 2008, only 1.9 % of the population, approximately 60,000 people, used the internet. However, this is more than a 300% increase in the 14,000 users in 2004 (The World Bank 2008a).

7.9 TRANSPORTATION

7.9.1 AIRPORTS

As of 2009, there are a total of 27 airports in Mauritania. This is up from 24 airports in 2008. Of these 27, nine have paved runways (2009).

In total there was 116,000 tonnes of air transport freight hauled in 2008, as compared to the 90,000 tonnes hauled in 2004 (The World Bank 2008a).

7.9.2 ROADS

In 2006, there was a total of 11,066 km of roads in Mauritania, equalling approximately 1.1 km for every 100 km² of land. Of these roads, only 2,966 km were paved (The World Bank 2008a).

Housing and Living Conditions

Urbanization in Mauritania has occurred to a minor extent from 2004 to 2008 as the urban population grew from 40 to 41% of the population. The 2009 urban growth rate is at 2.8% and thus urban centres can expect a significant increase in people in the coming years (The World Bank 2008a).

One third of all housing is substandard, consisting of shacks, tents and huts. The Construction and Real Estate Management Company (SOCOGIM) is the government entity tasked with the responsibility of building houses. It however does not have the financial resources to significantly improve the poor housing situation (Mauritania 2007).

Over three quarters of households own the housing units they inhabit, a situation that remained stable over the 2000-2004 period. This said, despite efforts to improve neighbourhoods, particularly in Nouakchott, a third of all Mauritanian households continue to live in substandard housing(tents, shacks, or huts), which is amplified in the rural areas where almost 47% live in these conditions (Mauritania 2007).

7.9.3 SANITATION

Access to improved sanitation facilities has increased significantly in urban areas where 50% of the population now enjoys this access. However, in rural areas this access to improved sanitation facilities has actually decreased from 11% of the population in 2000 to 9% of the population in 2008. Of the total population, in 2008, 26% enjoyed access to improved sanitation facilities.

7.9.4 WATER

There was a moderate improvement in rural areas in terms of access to improved water source. In 2008, 47% of the rural population had access, an increase from 43% in 2005. In urban areas access went from 49% to 52% in these same years (The World Bank 2008a). Water is supplied by Société Nationale de l'eau (SNDE) a state company (Mauritania 2007). In attempts to improve access to water the government plans to buy 2 desalination plants for the capital. In addition, the government is building a pipeline to bring water to the capital and other cities from the Senegal-Mauritania River. Work is expected to be finished in 2011 (Mauritania 2007)(Mauritania 2007)(Mauritania 2007).

7.9.5 ELECTRICITY

The proportion of households connected to the electricity grid increased from 18 percent in 2000 to nearly 24 percent in 2004, largely the result of the positive trend in urban areas, up more than 8 percentage points over the period. The use of gas as a cooking fuel also became more widespread, increasing from 28 percent in 2000 to 35 percent in 2004 (Mauritania 2007).

7.9.6 HEALTH

The government of Mauritania committed budget to improvement of the health sector from 2008 to 2010. This improvement would include the building of 13 new clinics and the rehabilitation of an additional three. Also, additional equipment for major hospitals and four regional centres were considered. Further, Mauritanian doctors abroad were urged to return home to strengthen the health system, with a promise that they would enjoy the same conditions as they had outside the country. (Africa Economic Outlook Mauritania 2009)

The health situation in Mauritania has improved over the past 5 years, but the country still ranks amongst the lowest in the world according to the United Nation Human Development Index(Africa Economic Outlook Mauritania 2009). The health expenditure per capita has steadily increased from 2005 when it was \$17 to 2007 when it was \$22. (The World Bank 2008a).

Key aspects of the Mauritania health situation follow:

LOW LIFE EXPECTANCY

In 2008, Life expectancy at birth is 56.73 years in Mauritania, with a breakdown of 58.73 years for females and 54.82 for males.(Trading Economics 2009)

HIGH MORTALITY RATES (2008 DATA)

In 2008, the adult female mortality rate is 240.78 per 1000 people and has improved from 243.81 in 2004.

In 2008, the adult male mortality rate is 308.23 per 1000 people and has improved from 310.89 in 2004.

In 2008, the mortality rate for infants is 74.6 per 1000 live births and has improved from 75.5 in 2004.

In 2009, the Maternal mortality rate was estimated at 500 per 100,000 live births, down from 590 in 2005 (The World Bank 2008a).

HIV/AIDS EPIDEMIC

In 2002, the Government of Mauritania adopted a National Strategic Framework for the control of STD/HIV/AIDS (Mauritania 2007). A multi-sectoral AIDS control programme has been put in place, but has encountered difficulties with some prevention measures, as well as in its monitoring, because of many issues.

The HIV/AIDS Epidemic is a challenge for the country because of the increase in its prevalence and the presence of key factors for the propagation of the disease, namely chronic poverty, illiteracy, particularly among women and girls, stigmatization and discrimination, frequent divorces and remarriages, etc. In 2007, the prevalence of HIV rate for the population between 15-49 was estimated at 0.8% and has remained constant since 2005.²⁶ This is well below the 5.0% average for sub-Saharan Africa. In 2007, there were 14,000 people living with AIDS of which 3,900 were women 15 and over and less than 500 were children (ages 0-14). There were 3,000 AIDS orphans (ages 0-17) and less than 1,000 deaths from AIDS (Trading Economics 2009).

TRANSMISSIBLE DISEASES

Malaria is among the *other transmissible diseases* which constitute a major public health problem in Mauritania because of its impact on mortality, and morbidity in general, and its harmful socio-economic effects. It accounts for 22% of the causes of morbidity and over 51% of the causes of death recorded in health structures (African Development Bank 2008). In 2007, the percentage of children under 5 with fever receiving antimalarial drugs is 20.7% (The World Bank 2008a)

In 2009, the incidence of Tuberculosis in Malaria is estimated at 320 cases per 100,000 people as compared to 280 cases per 100,000 in 2000. The tuberculosis treatment success rate was 66% in 2007, as compared to 55% in 2005 (The World Bank 2008a)

ACCESS TO HEALTH CARE

Statistics provided by the Republic of Mauritania shows that in 2007 the percentage of the population that is within a 5km radius to the nearest health facility is 65%. This is up from 58.7% in 2004. The number of doctors in Mauritania has increased from 426, in 2006 to 458 in 2008. There has also been an increase in the number of health clinics and health centres since 2004. In 2008, there were 426 health clinics and 67 health centres up from 379 and 64 respectively.

7.10 LOCAL, MUNICIPAL, REGIONAL AND NATIONAL GOVERNMENT

ADMINISTRATIVE DIVISIONS

There are twelve provinces and the autonomous district of Nouakchott, the capital city. The provinces are in turn divided into 49 departments and 219 elected municipal councils.

7.11 VULNERABLE GROUPS

Due to Mauritania's arid conditions and isolation, the livelihoods of the Mauritanian coastal communities are highly dependent on fishing and on physical resources, such as pirogues, engines, nets and other fishing equipment. These vulnerable groups live in the large urban centres Nouakchott and Noudihbou, as well as in smaller areas including Mamghar and N'Diogo.

Despite the significant decline in poverty among the socioeconomic group of households headed by self-employed farmers over the 2000-2004 period, this group is the one most affected by poverty.

The agriculture and livestock sector are highly susceptible to drought and desertification. Mauritania and its economy remain extremely vulnerable to exogenous shocks, particularly to the volume and prices of its primary export products: iron and fish and, soon to come, oil and gas.

Weakness of capital productivity continues to compromise the dynamics of the main sectors of the economy (agriculture, livestock farming, mining, and fisheries)(CSLP 35).

7.12 ECONOMIC LIVELIHOODS AND ACTIVITIES - FISHERIES

The waters off the coast of Mauritania are among the richest fishing grounds in the world. Fishing activities in the LME have increased over the last three decades. In addition to small national fleets and local artisanal fishers, these waters are subject to large distant-water industrial fleets from the European Union, Russia and Asia. The Mauritanian 200-nautical mile EEZ covers 234 000 km². The following table (Table 7-4) presents the number of fishing vessels by nationality fishing in the Mauritanian EEZ (Republique Islamique de Mauritanie 2009).

Table 7-4: Fishing Vessels by Nationality in the EEZ

Unit/Year	2004	2005	2006	2007	2008
Total	504	357	266	368	220
Mauritians	198	165	133	193	116
Foreigners	306	192	133	175	104
Pelagic Fisheries	74	71	20	154	30
Mauritians	0	4	0	77	0
Foreigners	74	67	20	77	30
High-seas Fishing	227	211	155	137	130
Mauritians	173	161	117	107	107
Foreigners	54	50	38	30	23
Other Fisheries	203	75	91	77	60
Mauritians	25	0	16	9	9
Foreigners	178	75	75	68	51

Source: *Republique Islamique de Mauritanie (2009)*

Marine fisheries in Mauritania target two basic groups of fish: (i) demersal species - associated with the bottom of the sea and including octopus, lobster, shrimp, hake, and bream; and, (ii) pelagic species - which are surface associated - and consisting of mackerel, sardine, sardinella, and tuna.

7.12.1 INDUSTRIAL FISHING

The foreign industrial commercial fleets operate under chartering or licences, and access agreements between the Mauritanian government and each country or under private access agreements between operators and the Mauritanian government. These bilateral international treaties regulate the foreign vessel activities in the waters under Mauritanian jurisdiction for which license fees are collected by Mauritania.

No vessel can legally fish in Mauritanian maritime waters without a license, which is issued to each vessel. Each type of industrial fishery has to follow specific regulations on allowed fishing areas, targeted species, legal sizes, by-catch levels, gear types, mesh sizes, engine power, etc. Areas of limited and prohibited fishing are determined.

In order to translate sustainability into optimum catch quantities, there was a need for an inventory of the pelagic fish stocks together with appropriate legislative measures. During this period, research has been carried out in this area by the French, Soviet and East-German scientists. To update the research on pelagic stocks, the European trawler owners even took the initiative to commission a study led by the "Netherlands Institute for Fisheries Research" on the pelagic fish stocks and their catch potential off the coast of Mauritania. They worked in close cooperation with scientists of the Mauritanian research institute "Centre National de Recherches Océanographiques et des Pêches" (CNROP) - which is now called "Institut Mauritanien de Recherches Océanographiques et des Pêches" (IMROP) - and the university of Las Palmas (Spain).

When the Soviet Union fleet of stern trawlers in West African waters significantly decreased, at the beginning of the 1990s, there was a situation of under utilization of the pelagic fish stocks. From a biological point of view, no objections existed then to start fishing on pelagic species.

Initially the government did not make an effort to license or control domestic fishing vessels or catches, because it was important to have seafood available to the populace. The government soon realized, however, that the country could rely on revenue generated from sales of fishing rights to foreigners. Because European fish stocks had declined sharply, the European Union - whose member nations account for about 85,000 fishing vessels - needed to find new fishing grounds. The EU signed its first fishing agreement with Mauritania in 1987. This cash helped to sustain the nation through hunger, conflict with Senegal (between 1989 and 1991) as well as some "coups d'état".

During the period 1991 to 1999, the number of vessels deployed by the Soviet fleet and then by the Russian Federation fleet, was by far the largest, followed by vessels flying the Ukrainian, Dutch and Lithuanian flags. In 2001, 223 foreign ships declared fishing activities in the Mauritania EEZ (slightly more than half are from the European Union). All these foreign boats abide to the fishing agreements (independent free licensing or chartering). For example, the average number of vessels operating in the Mauritanian area and fishing pelagic sardinella was about sixty each year. In terms of weight, sardinella catches since 1996 in the Mauritanian EEZ are the most important. This is partly due to the entry of a new pelagic fleet from the European Union that targeted the round sardinella (*Sardinella aurita*) in particular. The sampling on board these vessels over the past two years (1999-2000) has shown an annual percentage of sardinella catch of about 84% of the total catch. In 2008, the number of foreign vessels was reduced to 104, down from a high of 306 in 2004.

When negotiations on a new fishing treaty began in 2004, the EU promised to respect a United Nations treaty agreement against fishing depleted stock. On 24 July 2006, it was announced that a fisheries agreement had been reached between Mauritania and the European Union. The agreement, entered into force on 1 August 2006, has a duration of six years. In exchange, the EU grants financial compensation of 86 million Euros per year to Mauritania. An additional amount coming from ship owners contributions is estimated at € 22 million (in the event that all fishing possibilities are utilized). The money now provides one-third of the government's annual budget.

On March 16, 2010, China's Poly Technologies Inc announced (FIS 2010) the investment of US\$100 million in Mauritania's key fishing industry. The announcement, including of the construction of a fish factory able to produce 44,000 tonnes of food a year, comes after the company signed an agreement with Mauritania's fisheries ministry. The agreement also provides for building fishing boats and developing "value added" fish products. The action would create 2,500 direct jobs and allow Mauritania "to have a highly qualified workforce in transforming fish products, in naval construction, machine maintenance and management.

In Mauritanian waters, commercial vessels fish outside the 12-miles zone between 20 and 60 miles off the coast in the Exclusive Economic Zone, offshore from a line between Cape Blanc and Cape Timiris. Fishing activities are monitored by local authorities, the Navy and the Coast Guard i.e. DSCM (Délégation à la Surveillance et au Contrôle Maritime).

7.12.2 PELAGIC FISHING

Pelagic fishing done by purse seiners, and large freezer-trawlers and commercial tuna fishers. Recent annual landings in metric tonnes of pelagic species are presented below:

Table 7-5: Recent Annual Landings of Pelagic Species (in Mt)

Species/year	2004	2005	2006	2007	2008
Horse Mackerel	287,809	235,758	229,926	300,216	375,661
Sardinellas	122,217	153,889	55,687	173,865	188,453
Anchovies	139,563	79,749	81,251	119,583	106,396
Mackerels	93,462	38,457	23,582	79,218	64,853
Sardines	66,601	62,269	53,258	83,682	81,284
Swordfishes	15,431	8,029	4,311	7,103	2,128
Tunas	2,728	2,161	1,523	993	2,580
Totals	727,811	580,312	449,538	764,660	821,355

Source: *Republique Islamique de Mauritanie (2009)*

7.12.3 OTHER TYPES OF FISHING IN MAURITANIA

PURSE-SEINING

Purse seiners capture large aggregations of small pelagic fish that shoal in mid-water or near the surface by surrounding these concentrations with a deep curtain of netting, which is supported at the surface by floats.

A large purse seine can be as long as 1 km and 200 m deep. Purse seiners generally try to avoid bottom contact as the small mesh nylon netting is easily damaged.

TUNA COMMERCIAL FISHING

Tuna fishing is of great economical interest as it allows the use of mother ships to supply the fleet with food and then collect harvests, which are transported back to the vessel owners' country. Tuna vessels spend much of the time at sea and very rarely come to port, except for mechanical failures. The following flagged vessels are present in Mauritanian waters: EU, Japan, Ghana, Senegal, Russia, Ukraine, Cabo Verde, Cyprus, St Vincent & Grenadines, Honduras, and Belize.

These large specialized vessels can stay away from their home ports for a year. Therefore tuna fishing campaigns last all year long, as tuna fishing stock is moving along the coasts of both Mauritania and Senegal.

PELEGIC (MIDWATER) TRAWLING

The pelagic fishing fleet is mostly made of large freezer-trawlers with a length ranging from 70 to 140 m in length. Today, most of the pelagic fleet has freezing equipment on board. Older vessels

have been upgraded over the years with on-board freezing equipment and processing facilities to maintain the freshness and quality to meet the newer EU standards. The catch capacity of a freezer trawler is in fact determined by its freezing capacity; the more capacity it has the longer it can stay in the sea, which means more catch and profits.

Commercial pelagic fishing is possible year around in Mauritania, but during the so called “biological rest period” i.e. from the 1st of September to the 30th of October. Some seasons of the year are more fruitful than others, depending upon the kind of fish and the movements of shoals.

There are no limitations enforced, either regarding the ship GRT, the fish weight, the fish size, or fish quantities. The sole limiting parameter is what the ship can actually catch. In fact it’s not the available fish resources, which is a concern, but rather the onboard processing capacity only. An average monthly catch of 3,000 tons to 5,000 mt is quite achievable, depending upon ship characteristics and time at sea. For example, the daily freezing capacity ranges between 100 and 150 mt for European built ships, i.e. $150t \times 30 = 4,500$ mt of harvest per month.

DEMERSAL (BOTTOM) FISHERIES

The Mauritanian bottomfish stocks appear to be clearly over-exploited as there are more than 180 Mauritanian fishing boats and an additional 150 European vessels fishing in Mauritanian waters. The Mauritanian authorities strictly regulate demersal fishing licenses.

BOTTOM TRAWLING

Deep-sea demersal trawling gear is large and heavy and may have a substantial impact on the seabed environment, depending on the bottom type. One deep-sea trawler may affect over 10 km² of seabed, daily.

LONG LINES

A traditional long line may consist of up to 30 long lines. Each line is typically made up of six strings of 16 hooks fastened together end to end. One vessel may use three or four great lines, with a total length of up to 20 km, bearing up to 12,000 hooks. With mechanized systems up to 48,000 hooks may be worked per day.

Lines are hauled using a constant tension combination hauler, which untwists and racks the line after smaller fish are removed by the hook cleaner. Larger fish may have to be gaffed aboard. As hauling proceeds the line magazines are automatically filled in sequence ready for shooting.

Long liners may spend many days, even weeks, at sea on fishing banks hundreds of miles offshore with the catch preserved on ice or frozen. Enclosed deck shelters as well as the machinery described above have considerably improved working conditions for crews in what has always been an arduous and sometimes perilous fishery.

BOTTOM SET-NETS

Set-nets are long walls of netting, which trap fish and shrimp either by gilling or entanglement, depending on the size of mesh and the tightness of the netting.

Larger vessels which fish offshore may have more elaborate machinery for hauling, clearing and stacking the nets and can work over 20 km of nets.

Set netters operating gillnets, during fishing operations the vessel is not attached to the gear. The size of the vessels varies from open boats up to large specialized drifters, operating on the high sea.

In coastal waters, it is very common that gillnetting is used as a second fishing method carried out by trawlers or beam trawlers, according to fishing season and targeted species.

BEAM TRAWLS

These trawlers use strong outrigger booms to tow their fishing gear. Fresh catch is stored in boxes or in containers chilled with ice. Larger vessels might freeze the catch.

DEMERSAL FISH HARVESTS

Total catches of demersal stocks on the Mauritania continental shelf decreased from 36,000 mt (1984) to 12,800 mt (1992), which could have reflected a change in fishing strategy (e.g. replacement of target species, increase of discarded fishes, incomplete statistics, etc.). Recent annual landings in metric tonnes of demersal fish species harvested by demersal gear is presented below.

Table 7-6: Recent Annual Landings of Demersal Fish Species (Mt)

Species/year	2004	2005	2006	2007	2008
Hake	10,356	8,799	8,090	7,469	6,164
Red Seabream	1,862	1,835	905	1,050	976
Rape	0	0	130	0	0
Scallops	180	72	1,286	498	297
Other fish	20,714	16,938	9,312	18,413	12,827
Totals	33,112	27,644	19,723	27,430	20,264

Source: *Republique Islamique de Mauritanie (2009)*

Table 7-7: Recent Annual Landings of Cephalopods (in Mt)

Species/year	2004	2005	2006	2007	2008
Octopus	21,563	24,790	15,589	18,634	18,306
Cuttlefish	4,602	4,559	2,831	3,912	3,407
Squid	1,093	1,488	603	1,523	1,929
Scallops	180	72	1,286	498	297
Totals	27,358	30,837	19,023	24,069	23,642

Source: *Republique Islamique de Mauritanie (2009)*

INDUSTRIAL FISH EXPORTS

The value of fish product exports for the last three quarters for which information is available is presented below:

Table 7-8: Industrial Fish Exports 4th Quarter 2008

Type	Ouguiya	US\$	Metric tons
Cephalopods	11,159,412,469	43,548,927	7,041
Pelegics	1,847,411,562	7,209,410	17,579
Demersals	1,182,161,767	4,613,314	3,718
Canned Sardines	60,805,600	237,290	21
Crustaceans	471,258,134	1,839,056	238
Fish Meal	363,051,488	1,416,786	4,983
Salted, Dry, smoked	138,790,051	541,620	874
Fish oils	3,270,523	12,760	43
Total	15,226,161,594	59,419,167	34,497

Source: *Head office of the Customs- Mauritania*

Table 7-9: Industrial Fish Exports 1st Quarter 2009

Type	Ouguiya	US\$	Metric tons
Céphalopods	14,866,832,038	58,005,587	10,531
Pélagics	944,641,782	3,685,688	9,949
Demersals	3,073,342,845	11,991,193	6,260
Canned Sardines	463,712,189	1,809,256	2,591
Crustaceans	368,160,636	1,436,444	194
Fish Meal	208,001,713	811,556	1,319
Fish livers and eggs	140,247,689	547,201	683
Fish oils	2,969,587	11,586	38
Salted, Dry, smoked	714,000	2,786	31
Total	20,068,622,479	78,303,297	31,595

Source: Head office of the Customs- Mauritania

Table 7-10: Industrial Fish Exports 2nd Quarter 2009

Type	Ouguiya	US\$	Metric tons
Céphalopods	10,825,567,017	42,237,874	10,092
Pélagics	2,442,667,262	9,530,500	22,934
Demersals	2,203,601,201	8,597,741	4,873
Canned Sardines	169,315,098	660,613	95
Crustaceans	118,916,709	463,975	86
Fish Meal	604,857,281	2,359,958	3,375
Fish oils	10,859,880	42,372	83
Salted, Dry, smoked	147,397,112	575,096	838
Total	16,523,181,560	64,468,129	43,232

Table 7-11: Industrial Fish export by quarter, January 2008 through June 2009 (Millions of Ouguiya)

	T1.08	T2.08	T3.08	T4.08	T1.09	T2.09
Value	19,565	21,559	10,299	15,226	20,069	16,523
Metric tons	42,494	56,185	41,390	34,497	31,595	43,232

Source: Head of Statistics- Mauritania

7.12.4 SEMI-INDUSTRIAL FISHING

The semi-industrial fishing fleet is sheltered in Nouadhibou (Etablissement Portuaire de la Baie du Lévrier). These fisheries may use the same types of gears described above, but on a smaller, local scale. One important special fishery is discussed below.

LOBSTER FISHING

Lobsters are located in deep ocean basins. They are fished by means of traps and stored on board in fish tanks. It's normal to catch up to 200 kg per day. The catch is then unloaded and stored alive on shore in fish tanks before being air shipped to final destination (a box filled with straw and iced water in plastic bags provides a 24 hour freshness period). The European demand is quite strong for Mauritanian pink lobster, which is said to be the tastiest in the world.

Since then, lobster fishing declined, and, although the resource is now back to normal abundance levels, it is at risk of being over-exploited.

Green lobster fishing has experienced uneven development. However, this type of fishery has been decreasing overall since the 1980s.

7.12.5 ARTISANAL FISHING

A drought in the 1970s and 1980s pushed people towards the coast. The number of small fishing vessels grew to 3,600 in 2000, from 500 in 1986, according to the European Union records. Artisanal and coastal fishing is mainly dedicated to the Mauritians but there exists within the framework of bilateral agreement between the RIM and Senegal an agreement of fishing authorizing 250 wooden boats from Senegal to fish in Mauritania. These Senegalese vessels transport their harvests (exclusively pelagic species, with the exception of mullet) to Senegal and unload in the port of Saint Louis. The other artisanal and coastal fishing vessels are Mauritanian.

The typical local piroguie-style, artisanal fleet is composed of vessels of small size, with a capacity from 1 to 5 gross tonnes, and are built out of wood, aluminium or fiber-glass. The artisanal fishery is mainly motorised except for the traditional Imragen fishers that fish the Banc d'Arguin. These boats use surrounding nets, the gill nets, the racks, the trawl line, the line, bow nets... etc. The fishing grounds of these boats are at 20 m of depth and inside the 6 miles. They generally target coastal species of fish. The total of the captures estimated per annum is of 80,000 tonnes.

According to the fishing season, camps are set up by various artisanal fishing companies. Fishermen at the camps and at the main centres (Nouakchott and Nouadhibou) sell their fish to middlemen or to agents of processing plants. Due to the lack of roads along the entire coast, it is necessary to use four-wheel drive vehicles along the beaches to transport fish to the main centres. Due to growing demand for fresh demersal species packed in ice, there has been rapid growth in the artisanal sector that targets these fish using iceboxes and/or going for short trips in order to maintain the high export quality demanded. This growth has created an influx of fishermen from mainly Senegal, Mali, Guinea Bissau, and Ghana in search of jobs and livelihoods. The development of the artisanal fisheries represents a main objective for the government. Implementation of technical assistance projects in favour of the artisanal fisheries is ongoing along with creating conditions for co-

management of the coastal fisheries resources. Recent annual landings (in mt) from the artisanal fisheries are presented below.

Table 7-12: Recent Annual Landings (in Mt) from the Artisanal Fisheries

Mode/year	2004	2005	2006	2007	2008
Traditional	17,966	22,561	50,762	N/A	N/A
Modern	10,213	12,825	28,857	N/A	N/A
Totals	28,179	35,386	79,619	79,619	75,881

Source: *Republique Islamique de Mauritanie (2009)*

7.12.6 FISHING-RELATED ACTIVITIES

Completely turned towards export markets, the Mauritanian production system experiences a lack of product diversification and processing. Nouadhibou is the main Mauritanian fishing harbour for both commercial and small scale fleets. The “Port Autonome de Nouadhibou” comprises three specialized wharfs with 700 m of pier and eight loading stations. The Ministry of Fishing and Maritime Economy (MFME) lists 67 business in Nouadhibou and Nouakchott, where fish are unloaded from the industrial and artisanal (small scale) boats for processing, freezing and storing, or for shipping as fresh products. Quality and sanitary standards are matching EU requirements.

Reported capacities for these 67 companies are 29,251 tons of storage on land and a freezing capacity of 1,232 tons per day. There are 39 are located in Nouadhibou and 28 in Nouakchott. The major units (COMACOP, MCP, SMEF) declare storage capacities of 3,800, 3,500, and 3,000 tons respectively and a freezing capacity between 40 and 80 tons per day. Their operational capacity, however, is estimated at only 600 tons per day.

8. CULTURAL AND ARCHAEOLOGICAL HERITAGE

8.1 ARCHAEOLOGICAL, CULTURAL AND RELIGIOUS SITES

For the purposes of this report, seven archaeological sites are worth mentioning.

Many of these sites share similar historical traits as trading and stopover centres for caravans travelling along the main cross-Saharan routes. Four sites, Ouadane, Chinguetti, Tichit, and Oualata, were added to the UNESCO World Heritage Centre in 1996.



Source

Map 8-1: Archeological Sites

AZOUGUI

The Archaeological site of Azougui, on the Adrar Plateau, dates back to the eleventh century however; the site appears to be even older from the existence of seventh century rock carvings. The most relevant component of the site consists of a dry-stone citadel which is a remnant of the Almoravids, an indigenous dynasty of the Sahara. The Almoravids were a religious movement, native of the tribes of the Adrar Mountains. The movement conquered the Ghana Empire in the eleventh century and unified all of West Africa and Morocco. Adjacent to the citadel, a necropolis still partially stands containing the mausoleum of Imam Hadrami, the most important religious leader of the Almoravids. Several archaeological campaigns organised in the twentieth century has revealed that the site played an important role in the trading industry across the Sahara.

KOUMBI SALEH

Koumbi Saleh, is a large settlement in south east Mauritania. The city was founded in the third century when it controlled the trade routes between Koumbi Saleh, Audaghost, and Timbuktu. In the seventh century, the city became the capital of the Ghana Empire. At that time, it consisted of two separated parts, the former serving as a religious centre with a number of mosques and the latter as the seat of the royal palace, with the residential areas located between. The city was conquered by Berber tribes and then by the Almoravids, who expanded the entire Ghana Empire. The city was abandoned in the thirteenth century following changes in the trans-Saharan commercial routes to Timbuktu which were shifted to the north across the concurrent towns of Oualata and Tichitt. This was a consequence of the increased religious and cultural prestige of these two towns.

AOUDAGHOST/TEGDAOUST

Aoudaghost was an oasis town which nowadays corresponds to the area of the ruins of Tegdaoust in southern Mauritania. Tegdaoust flourished as an important trade city for gold, iron and copper, and has remained for centuries as an important stopover on the trans-Saharan tracks linking the Magheb to the Sudanian area. The archaeological remains date back to the eighth century with the site remaining populated until at least the thirteenth century. Aoudaghost was ruled by the Ghana Empire till the middle of the eleventh century and was then conquered by the Almoravides, following the same fate of Koumbi Saleh and Azougui. It later disappeared because of the shift northwards of the trans-Saharan trade routes.

THE ANCIENT KSOUR OF OUADANE, CHINGUETTI, TICHITT AND OUALATA

These four cities were all founded in the eleventh and twelfth centuries. They function as stopovers for caravans crossing and trading through the Sahara, partially replacing the ancient route across the cities of Koumbi Saleh and Audaghost. They eventually become important trading and religious centres of Islamic culture and study.

In comparison to the three previously mentioned sites, Ouadane, Chinguetti, Tichitt and Oualata still have well preserved urban structures and standing buildings which date back to times between the twelfth and sixteenth century. These urban centres typically include basic housing structures with patios, which crowd along narrow streets and converge to the main mosque. These four ancient cities are all listed as one single site in the UNESCO World Heritage, since they are considered to “constitute exceptional examples of settlements built to serve the important trade routes of the Sahara Desert. These cities functioned as cultural, social and economic hubs for many centuries”.

CHINGUETTI

Located southeast of Ouadane on the Adra Plateau, Chinguetti is the primary city of the four ksar (middle-age trading centres) classified in the UNESCO World Heritage system.

The city was founded in the 8th century as a Berber settlement and later in the eleventh century an Almoravit centre. After two centuries of decay, the city began to flourish again as a result from the fortifying of the cross-Saharan trading centres connecting the Magrheb and Mediterranean with the Sub-Saharan territories. Present remains date back to the second foundation, whereas the original

architecture of the Berber era have disappeared. The architecture of the city still reflects the religious imprinting given by the Almoravids. The city became a center of Islamic and scientific education. Most prevalent features are the dry stone Friday Mosque with square minaret architecture, several ancient libraries with religious and scientific manuscripts, a French fortress, and a water tower.

OUADANE

Ouadane is situated in north-western Mauritania on the Adrar Plateau, less than 100 km northeast of Chinguetti. The town was founded by Berber tribes in the twelfth century and functioned as a trading centre on one of the most important trans-Saharan routes.

Presently the town is divided into an old town inside the walls, dating back to the twelfth century and a more recent settlement outside. The centre contains a mosque. Just outside the town are the ruins of a Portuguese fortress.

TICHIT (OR TICHITT)

Tichit is a partly abandoned village at the foot of the Tagant plateau known for its characteristic architecture. The Dhar Tichitt region forms a long sandstone cliff structure that defines the northern limit of the Hodh depression. The area was settled by late stone age agro-pastoral communities around the fifth century. The settlements were generally situated on cliffs and constructed of stone. Hundreds of rock art images have been discovered, depicting various animals and hunting scenes, giving it significance as a UNESCO World Heritage site.

OUALATA

Oualata (or Walata) is a small oasis town in the south-east of the country which flourished in the thirteenth and fourteenth centuries as a trade centre on the southern portion of the trans-Sahara trading route.

Oualata is believed to be among the oldest stone settlements on the African continent. The town came to existence during the beginning of the Ghana Empire and was one of its major trade centres. At the beginning of the thirteenth century Oualata replaced Aoudaghost as the principal southern terminus for the trans-Saharan trade causing its decline, and developed into an important commercial and religious centre. The city then became part of the Mali Emperor. Timbuktu eventually responsible for its decline as it became a more ubiquitous trading centre. Oualata is known for its characteristic architecture and house ornaments, consisting in flower shaped decoration and red-painted walls.

9. APPENDICES

APPENDIX A: ENVIRONMENTAL IMPACT ASSESSMENT LAW (DECREE NUMBER 94/2004, LAST AMENDED BY DECREE NUMBER 105/2007)

List of clauses required for the approval process:

- MEDD has 14 days to frame and review the formal validity of the references of the submitted project, and lack of response is considered as approval (Art. 13);
- There is then 30 days for gathering public comments (Art. 22);
- The enquiring commission may then request additional documents or clarification of the Proponent and hold public hearings of any interested citizen or stakeholder within 7 days (Art. 23);
- The same commission has 7 more days to complete all ordinary investigations (Art. 24);
- Local authorities (the Hakem and representative body of the local community where the project should be carried out) have 5 days upon the investigations completion to give their advice (*Ibidem*);
- In the meantime, 20 days after completing its investigations, the enquiring commission must file its report (with its favorable or negative advice) to the MEDD (Art. 25-26);
- Finally, the MEDD has only 20 days upon the report reception to pronounce on the project feasibility. Once again, MEDD's silence after this term equals approval (Art. 31).

APPENDIX B: THE NEW PROJECT CODE FOR HYDROCARBONS

List of changes introduced by the New Code in relation to Ordinance number 151/1988):

- The Ministry responsible for issuing all the relevant authorizations and monitoring the sector development is the MPEM (instead of the Ministry of Mining) (Art 5);
- Creation of a Technical Interdepartmental Committee (Changkakoti, Gray et al.) which assists the Ministry in the new procedure for the selection of contractors in the exploration-production agreements (Art. 18);
- The exploration-production contracts must be approved by the Council of Ministries by Decree (and no more by the Parliament through legislation);
- The duration of the research contract is now divided from the beginning in three phases with a length set by the contract (Art. 20), while previously it was three years renewable two times;
- The duration of the exploitation contract is now different for oil and gas fields, respectively 25 and 30 years. Moreover, this term may now be renewed only once for the additional 10 years if the fields have commercial potential (Art. 20);
- The Ministry has a new task as a “facilitator” of the procedure for obtaining all the necessary authorizations from the other Ministries and other public agencies (Art. 23);
- The obligation to submit a “minimum working plan” specifying the minimum activities the contractor undertakes to complete is now referred to each phase of the contract and requires the deposit of a warranty of equivalent value (Art. 24);
- The contractor must obtain the Ministry approbation of a yearly budget plan for the research operations and an assessment plan in case the contractor wish to explore the commercial potential of new fields discovered (Art. 25);
- It is now specified that, after each phase of the contract, the perimeter of the exploration/exploitation area is reduced by 25% (Art. 27);
- The contractor must abide with state of the art rules and techniques common to the international oil industries, particularly with regard to environmental protection and industrial security (Art. 31);
- The contractor is responsible for every damage caused by or connected to the Oil Operation and must subscribe a specific assurance plan to cover those risks (Art. 32);
- The contractor must share with the Ministry all the data and researches gathered during the contract implementation (Art. 33);
- After ascertaining the commercial potential of a field, the contractor must submit a request of authorization for the exploitation to the Ministry, together with a plan of development and an Environmental Impact Assessment plan (Art. 36);

- Part of the annual production - up to 60% for the oil fields and 65% for the gas fields – is reserved to cover the costs borne by the contractor. What is left is then shared between the Country and the contractor according to the contract (Art. 38);
- Natural gas produced in Mauritania enjoys a priority access to the internal market (Art. 39);
- Natural gas flaring is forbidden with a few exception for emergencies or with the specific authorization of the Ministry (Art. 40);
- All contracts must require the contractor to submit to the Ministry a reclamation plan with a correspondent budget before the exhaustion of the fields (Art. 43);
- All contracts must include a clause giving Mauritania an option to participate to the contractor rights and obligations with a minimum shareholding set by the contract above 20% (Art. 44);
- All disputes arising from the contract interpretation or execution or the Code implementation are submitted to international arbitration (whereas previously there was a conciliation phase before submitting the dispute to a not necessarily international arbitration) (Art. 49);
- It is now specified that the law applicable to all contracts is the Mauritanian law and the relevant principles of international law (Art. 50);
- The contracts may include a “legal context stability clause” allowing the contractor to ask the non application of new regulations or laws enacted after the entry into force of the contract if such reforms could disrupt the contract economic balance (Art. 51);
- After the contract expiration, the ownership of all infrastructures, instalments, material and equipment necessary for the Oil Operation is transferred to the Country for free. All things which the Country does not wish to acquire must be moved out by the contractor according to the reclamation plan (Art. 52);
- If a field with commercial potential is spread in the perimeters of two or more contractors, these must agree on a joint development and exploitation plan to be submitted to the Ministry for approbation;
- The contractor has the right to use all material extracted from the ground for the Oil Operations. In case this material is drinkable or irrigation water, an additional tax may be imposed for its use (Art. 54.4);
- The contractor is not required to pay indemnification for the occupation of public domain land, while he must indemnify private owners with an annual fee equal to the yearly revenue of the area before oil exploitation. If the private land is occupied for more than two years, the owner may require the contractor to buy it. Any disputes arising from indemnifications are submitted to the Country’s civil courts jurisdiction (Art. 56);
- All terrain, installations and material used for the Oil Operations may be declared of public utility and expropriated. In this case, the contractor shall bear all the fee and costs

connected with the expropriation procedure and shall be entitled to an indemnification based on the land use before oil exploitation. Any disputes arising from indemnifications are submitted to the Country's civil courts jurisdiction (Art. 57);

- The contract provides the contractor with a right to build pipelines within the national territory. The trail must be chosen based on the best technical, economical and environmental conditions (Art. 59); and
- All the money due by the contractor to the Country is deposited in the National Fund of Hydrocarbon Revenus (NFHR) established by Ordinance n.8/2006 (Art. 97).

APPENDIX C: ORDINANCE N. 37/2007 FOR THE PROTECTION, DEVELOPMENT AND MANAGEMENT OF THE COASTAL ZONE

The Ordinance includes:

- States the need for the MEDD to elaborate a plan for the management of the littoral. This plan needs to be adopted by governmental Decree and its implementation shall rely on specific Directives for the development of the littoral (DAL).
- Creates the National Consultative Council of the Coastal Zone (CCNL) to review and endorse the littoral management plan and the DALs. This Council shall be chaired by the MEDD.
- Creates an “Observatory” to monitor the environment of the Mauritanian littoral, to constitute a body of knowledge on the littoral and to disseminate the available information. It should be noted however that the plan (PDALM) has been drafted but not yet approved by the government. As for the “Observatory” no progress has been made so far.
- Defines the rules for the littoral management and protection from environmental degradation including specific measures for the coastal dune (“*cordon*”).
- Clarifies the legal parameters to identify infractions and the corresponding penalties.

APPENDIX D: OTHER PLANS, PROGRAMS AND STRATEGIES

NATIONAL STRATEGY FOR SUSTAINABLE DEVELOPMENT (NSSD / SNDD)

The NSSD was approved in 2006. The strategy is to establish a common understanding and vision for the sustainable development of Mauritania. It states that economic growth, good governance, and poverty reduction can be established through good governance. The program extends to a period of ten years (2005-2015) and is associated with other programs - Poverty Reduction Strategy Program (PRSP) and the Millennium Development Goals (MDGs). The objectives of the program are:

- Reinforce institutions and policies to manage environment and natural resources;
- Promote sustainable access to basic services to reduce poverty;
- Efficient use of natural resources through integrated and participative management methods;
- Compliance to International agreements; and
- Develop financing mechanism to support National Environmental Action Plan.

NATIONAL STRATEGY AND NATIONAL MONOGRAPH ON BIODIVERSITY

The National Strategy on Biological Diversity (NSBD) aims to achieve all the objectives of the International Convention on Biological Diversity as follows:

- Emphasis upon biodiversity conservation;
- Sustainable use of biodiversity components; and
- Equitable division of benefits resulting from the exploitation of genetic resources.

At the same time, while attempting to contribute to solving environmental problems in Mauritania, this strategy establishes the links between environmental problems and socioeconomic development of the various sectors of society in order to achieve sustainable development. This strategy advocates the conservation of biological diversity, the regulation of sustainable management of natural resources, the management of environmental risks, and integrated development of the land.

NSBD shares with NEAP/PANE its main objective, summed up as sustainable development through the improvement of the management of the environment and the same participatory methodology.

UNEP SHELF PROGRAM

The UNEP Shelf Programme is coordinated by UNEP/GRID (Global Resource Information Database)-Arendal in Norway, and was established to assist developing States and Small Island Developing States (SIDS) to complete the activities required to delineate the outer limits of their continental shelf.

Due to limited technical and financial capacity many, developing States and SIDS will not be able to complete the submission process without considerable external support, both technical and financial. Technical support is directly offered by the UNEP Shelf Program in addition to assistance related to identifying and accessing potential sources of funding to support the work process.

The process of the delineation of the outer limits of the continental shelf is driven by the 1982 UN Convention on the Law of the Sea (UNCLOS). The seabed and the subsoil of the continental shelf constitute the outermost maritime zone over which coastal states have jurisdiction.

Once the delineation process is completed (if necessary with the technical advice of the Program), coastal states will have responsibility for protecting the environment and managing the resources of these areas of the seafloor which may extend beyond the 200 nautical mile Exclusive Economic Zone based on the criteria outlined in Article 76 of the United Nations Convention on the Law of the Sea.

According to the Convention, the continental shelf of a coastal State comprises the submerged prolongation of the land territory of the coastal State; the seabed and subsoil of the submarine areas that extend beyond its territorial sea to the outer edge of the continental margin, or to a distance of 200 nautical miles where the outer edge of the continental margin does not extend up to that distance.

In more detail, the UNEP Shelf Program is designed to provide the following services:

- Store, handle, and facilitate geo-scientific marine research data to support Article 76 submissions;
- Assist in the processing and interpretation of the data;
- Provide in-country Article 76 task forces with access to training and workshops;
- Support the technical and legal foundations of a submission;
- Promote the establishment of national/regional/central databanks at the completion of the project;
- Build long-term capacity in information technology as applied to marine science data management and compliance with UNCLOS; and
- Raise awareness of the submission process.

As to funding sources, the Program has been supported by the Norwegian Ministry of Foreign Affairs since its establishment. This financial support covers the core activities of the Program and initial support to developing states.

When it comes to more extensive support the Program needs to recover some of the costs. This is normally done through development of project proposals with the developing countries that then are presented for bilateral funding or funding from the UN Trust Fund.

The UN has given a ten year time limit (from the State's UNCLOS ratification date) for submission to the Commission on the Limits of the Continental Shelf. For early signatories of UNCLOS such as Mauritania, the deadline was May 2009.

URBAN DEVELOPMENT PROGRAM – THE IMPLEMENTATION OF A SAFEGUARD PLAN FOR THE TOWN OF NOUAKCHOTT AND ITS INFRASTRUCTURES

In recent decades, the Nouakchott coastline has seen accelerated urbanization resulting from the deteriorating climate and the crisis in the rural environment. Nouakchott currently accommodates over 25% of the country's population, a great part of industry (fish processing, tourism, construction, etc.), of commerce, and of other socio-economic infrastructures. Most of the town's suburbs as well as numerous socio-economic infrastructures, some of which are vital to the development of the country, are in the low areas susceptible to Flooding (Sebkha and Aftouts). With the effects of climate change, it is the communities, accommodation, socio-economic infrastructures and the economy of the region, or even of the country which will be affected in a general way. This project is aimed at tackling these issues by reaching the following objectives:

- To institute and make compulsory the enforcement of standards for town planning, taking into consideration climate change and various scenarios of a rising sea level;
- To carry out a development plan for the coastline in Nouakchott and ensure security for the inhabitants by building a breakwater 1.5m to 2m high and 5 to 6m wide along the whole west front of Nouakchott by 2009;
- To relocate the infrastructures established on the dunes and remove all the others in the sectors potentially affected by climate change; and
- To create awareness in the building sector about the appropriate construction methods for areas at risk through an information, education, and communication (Margolese, Swoope et al.) strategy.

AGIRE 1- INSTALLATION AND INTEGRATED MANAGEMENT OF WATER

The project AGIRE (*Aménagement et Gestion Intégrée des Ressources en Eau*) main objective is to establish a working framework for the integrated, sustainable, and fair management of water resources and hydraulic infrastructures as a key instrument in the fight against poverty.

This objective shall be perused in this first two years phase of the project by developing the national water sector in three directions:

- First, the strengthening of the water sector governance capacities, in particular through a better coordination of management powers and activities, a participative decision making scheme, and a strategic approach tailored on Mauritania's specific needs;
- Second, experimenting decentralization of water management at the regional level, starting with Brakna as a pilot region, with the perspective of extending this approach to the whole Country once it has been duly tested by shifting to the second phase of the project: AGIRE-II; and

- Third, developing modern tools and methods for information management and decision making support in order to help implement the strategy of integrated management of water resources (GIRE) in all of its levels, with the final perspective of elaborating a National Action Plan for the sector (PANAGIRE) as required by the Water Code. This Plan would then be integrated within the Strategic Framework for the Fight against Poverty (CSLP 2006-2010) which considers water management as one of the four development priorities.

NATIONAL ACTION PLAN OF RISK MANAGEMENT FOR CATASTROPHES

- The majority of the rural population in Mauritania lives in vulnerable conditions as a result of high levels of poverty and unemployment, low standards of living, lack of access to resources, unequal patterns of asset ownership and distribution, and environmental degradation. In this situation, any environmental crisis may trigger a chain of emergencies that should be promptly tackled by tested risk management procedures.
- For instance, in January 2002, three regions in southern Mauritania – Trarza, Brakna, and Gorgol – were affected by a cold wave and heavy rains. These hazards caused significant deterioration of living conditions and crippled food and livestock production. Although the government did not launch a formal appeal to the international community, a request was submitted to the World Food Programme (WFP) to organise an emergency intervention.
- The crisis revealed a lack of capacity at the national level to respond promptly and in a coordinated manner to a given emergency situation. A joint OCHA/UNDP mission conducted in June 2002 determined that the response to the crisis “was characterized by the absence of prompt response from the national counterpart and the weak mobilization of donors, leading to an inaccurate assessment of emergency needs support.”
- However, the food shortage of the third quarter of 2002, which affected at least 60,000 Mauritians, received a better response both from the government and the UN, showing the great benefit of advance planning in handling emergencies. In 2003, a first planning for disaster management program was started to improve Mauritania response capacities.

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