



Developing a biodiversity conservation strategy for the Niger Delta

Integrating biodiversity considerations into SPDC's operations



Developing a biodiversity conservation strategy for the Niger Delta

Integrating biodiversity considerations into SPDC's operations

The designation of geographical entities in this book, and the presentation of the material, do not imply the expression of any opinion whatsoever on the part of IUCN concerning the legal status of any country, territory, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The views expressed in this publication do not necessarily reflect those of IUCN.

Published by: IUCN, Gland, Switzerland

Copyright: © 2018 IUCN, International Union for Conservation of Nature and Natural Resources

Reproduction of this publication for educational or other non-commercial purposes is authorized without prior written permission from the copyright holder provided the source is fully acknowledged.

Reproduction of this publication for resale or other commercial purposes is prohibited without prior written permission of the copyright holder.

Citation: IUCN Niger Delta Panel, 2018. *Developing a biodiversity conservation strategy for the Niger Delta: Integrating biodiversity considerations into SPDC's operation*. Gland, Switzerland: IUCN, 2018. viii+36pp

DOI: <https://doi.org/10.2305/IUCN.CH.2018.07.en>

Cover photos: Image of the Niger Delta © Shell

Layout by: Imre Sebestyén, jr / UNITgraphics.com

Produced by: IUCN Niger Delta Panel

Available from: IUCN (International Union for Conservation of Nature)
Business and Biodiversity Programme
Rue Mauverney 28
1196 Gland
Switzerland
Tel +41 22 999 0000
Fax +41 22 999 0002
www.iucn.org/resources/publications

TABLE OF CONTENTS

Acknowledgments	iv
Abbreviations	v
Executive summary	vi
PART I INTRODUCTION AND CONTEXT	1
1. BACKGROUND AND OBJECTIVES	2
1.1 Background	2
1.2 Objectives	3
2. STUDY METHODOLOGY AND STRUCTURE OF THE REPORT	4
2.1 Methodology	4
2.2 Structure of the report	5
2. BIODIVERSITY ENDOWMENT OF THE NIGER DELTA	6
3.1 Ecological zones	6
3.2 Global significance of Niger Delta's biodiversity	6
3.3 Offshore waters in the Gulf of Guinea	9
4. DAMAGE AND THREATS TO COMPONENTS OF BIODIVERSITY FROM OIL SPILLS	11
4.1 Sources of threat	11
4.2 Impacts of oil spills	12
5. STATUS OF EFFORTS TO DEVELOP A REGIONAL BIODIVERSITY STRATEGY	15
5.1 Network of protected areas	15
5.2 Niger Delta Environment Survey (NDES), 1998-2004	17
5.3 National strategies	18
5.4 Niger Delta Regional Development Master Plan (NDRDMP)	18
5.5 UNEP's Environmental Assessment and Hydrocarbon Pollution Restoration Project (HYPREP) in Ogoniland	19
5.6 UNDP/GEF Niger Delta Biodiversity Project	20
PART II RECOMMENDATIONS	21
6. INTEGRATION OF BIODIVERSITY CONSIDERATIONS INTO SPDC'S OPERATIONS AND CONTRIBUTIONS TO THE WIDER BIODIVERSITY STRATEGY OF THE NIGER DELTA	22
6.1 SPDC effort at biodiversity management	22
6.2 SPDC Biodiversity Strategy 2012–2017	22
6.3 Biodiversity Action Plans	23
6.4 Remediation Standard	23
6.5 SEPCiN Impact Assessment Process	24
6.6 Conceptual Site Models (CSMs)	25
6.7 Community and other stakeholder engagement	26
6.8 Biodiversity considerations in the off-shore environment	26
7. DEVELOPING AND IMPLEMENTING A NIGER DELTA BIODIVERSITY STRATEGY	27
7.1 Policy	27
7.2 Legislation	28
7.3 Institutional coordination	30
7.4 Institutional capacity for implementation	31
7.5 Research, monitoring and information management	32
7.6 Funding	33
REFERENCES	34

Acknowledgments

The IUCN Niger Delta Panel would like to thank all of the experts involved in the creation and production of this report, *Developing a biodiversity conservation strategy for the Niger Delta: Integrating biodiversity considerations in SPDC's operations*. The IUCN-led independent panel is also grateful to the peer review experts for their helpful comments and observations.

This main report has been supported by two commissioned pieces of work, which helped to share its overall findings and recommendations. Specifically, these reports are:

- Okali, D.U.U. et. al, 2014. *Integration of biodiversity considerations into SPDC's operations and its contributions towards a wider Niger delta biodiversity strategy. Interim Report of a Study to support IUCN-NDP Analysis and Recommendations to SPDC on Biodiversity Management in the Niger Delta*. Unpublished report. 27pp.
- Okali, D.U.U., Imevbore, A.M.A., and Eniang, E.A., 2015. *Effects of free (mobile) and trapped (immobile) oil on biodiversity: biological indicators in the Niger Delta. Report on a Study of Biological Indicators to support IUCN NDP Recommendations to SPDC on Biodiversity Management in the Niger Delta*. Unpublished report. 68pp.

Therefore, the IUCN Niger Delta Panel is especially thankful to the following scientists in Nigeria, who put time and effort into all of these reports: David U.U. Okali, Anthony M.A. Imevbore, Augustine O. Isichei, Godfrey C. Akani, Augustine U. Ezealor and Edem A. Eniang.

While the supporting documents are available upon request via IUCN's Business and Biodiversity Programme, they remain the work of the corresponding authors, and their content therefore should not and cannot be taken to represent the views of either the independent IUCN Niger Delta Panel or Shell Petroleum Development Company of Nigeria Limited (SPDC). Likewise, any errors or omissions remain the responsibility of the relevant authors.

Abbreviations

BAP	Biodiversity Action Plan
CBO	Community Based Organisation
CSM	Conceptual Site Model
DPR	Department of Petroleum Resources
EBSA	Ecologically or Biologically Sensitive Area
EGASPIN	Environmental Guidelines and Standards for the Petroleum Industry in Nigeria
EIA	Environmental Impact Assessment
FME	Federal Ministry of Environment
GIS	Geographic Information System
GMoU	Global Memorandum of Understanding
HSE	Health, Safety & Environment
IBAs	Important Bird Areas
IFC	International Finance Corporation
IFC PS	International Finance Corporation's Performance Standards
IOCs	International Oil Companies
IPIECA	International Petroleum Industry Environmental Conservation Association
IUCN	International Union for Conservation of Nature
IUCN BBP	IUCN Business and Biodiversity Programme
IUCN NDP	IUCN Niger Delta Panel
JTF	Joint Task Force
LCCI	Lagos Chamber of Commerce and Industry
NBSAP	National Biodiversity Strategy and Action Plan
NCF	Nigerian Conservation Foundation
NCS	National Conservation Strategy
NDDC	Niger Delta Development Commission
NDES	Niger Delta Environmental Survey
NDRMP	Niger Delta Regional Master Plan
NESREA	National Environmental Standards Regulatory and Enforcement Agency
NEST	Nigerian Environment Study/Action Team
NNPC	Nigerian National Petroleum Corporation
NOSDRA	National Oil Spill Detection and Regulation Agency
NPE	National Policy on Environment
OPTS	Oil Producers Trade Section of LCCI
OSRRMS	Oil Spill Response and Remediation Management System
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PPMC	Pipelines and Products Marketing Company
PPTF	Pipelines Protection Task Force
QA/QC	Quality Assurance and Quality Control
RMS	Remediation Management Systems
SEA	Strategic Environmental Assessment
SEPCoN	Shell Exploration and Production Companies in Nigeria
SPDC	The Shell Petroleum Development Company of Nigeria Limited
UNEP	United Nations Environment Programme
WHO	World Health Organisation

EXECUTIVE SUMMARY

In 2013, the IUCN Niger Delta Panel published the report, *Sustainable Remediation and Rehabilitation of Biodiversity and Habitats of Oil Spill Sites in the Niger Delta: Main Report including Recommendations*. In this report, it was recognised that the critical step in the sustainable rehabilitation of biodiversity and habitats of oil spill sites in the Niger Delta is the prevention and/ or quick and efficient clean-up of the oil spill in the first place. Therefore, a large number of the recommendations in the report related to oil spill response procedures and effective remediation techniques that best take account of biodiversity requirements.

In respect to biodiversity itself, the 2013 report recommended follow-up analyses that would lead to:

- Redefinition of receptors in SPDC's internal environment management process to include representation of key native biodiversity;
- Introduction of conservation and management of important areas of natural habitats and biodiversity hotspots in SPDC's oil spill response procedures;
- Initiation of programmes to rehabilitate critical habitats, including mangroves, in SPDC's bioremediation and rehabilitation procedures;
- Development of a socio-environmental strategy to engage communities in biodiversity management and restoration; and
- Development of a best practice strategy for the biodiversity of the wider Niger Delta.

This new report, *Developing a biodiversity conservation strategy for the Niger Delta: Integrating biodiversity considerations into SPDC's operation*, presents the findings and recommendations arising from one of these analyses, which reviewed the biodiversity value of the Niger Delta, the main threats from oil spills, and various attempts to develop a wider biodiversity strategy for the region. The Panel also examined SPDC's internal processes and procedures for biodiversity management.

The above exercise led IUCN-NDP to formulate two sets of recommendations. The first set is addressed to SPDC itself and focuses on the ways and means to improve the company's internal processes in a manner that achieves a more effective integration of biodiversity conservation concerns into its operations. The second set of recommendations refers to major stakeholders in oil & gas operations in the region and relates to actions needed to develop an effective and coherent biodiversity strategy for the wider Niger Delta. These latter recommendations are beyond the scope of SPDC and are mainly addressed to government agencies but will require the support of all players in the oil and gas industry.

The two sets of recommendations are summarized in the two tables presented below. The recommendations are categorized into short-term (by the middle of 2017), medium-term (2017-2019) and long-term (beyond 2019).

Table 1: Recommendations to SPDC for better integration of biodiversity Considerations into its operations

Recommendations to SPDC	Time frame
SPDC Biodiversity Strategy 2012–2017	
Recommendation 1: Speed up the implementation of the 2012–2017 SPDC Biodiversity Strategy by completing the Gbanran-Ubie BAP and a Mangrove Management Guidance Document for the Niger Delta in the first half of 2017 and commence their implementation immediately thereafter.	Short term
Also SPDC strategy should set quantitative targets for the number of Biodiversity Action Plans (BAPs) to be developed/implemented in known Areas of High Biodiversity Value (AHBVs) threatened by its operations.	Medium term
Recommendation 2: Produce and disseminate a document that highlights how SPDC comprehensively addresses biodiversity and Ecosystem Services in its operations and how its Biodiversity Strategy aligns with national and international standards as well as the linkages between its work on biodiversity and other areas such as community relations, oil spill response and remediation as well as HSE.	Short term
Biodiversity Action Plans	
Recommendation 3:	
<ul style="list-style-type: none"> In general, SPDC BAP should be made to conform better with IPECA guidelines by involving local stakeholders more deeply at the various stages of the BAP process. Supporting the enactment and enforcement of laws against abuses of bioresources; and 	Medium term Long term
Recommendation 4: In addition to the above, the following actions are recommended to improve the baseline studies towards better monitoring of change(s) in BAPs:	
<ul style="list-style-type: none"> Adequate time should be allocated to the survey of the biodiversity components of planning sites to ensure that flora and fauna are thoroughly understood; Where possible, effort should be made to include night sampling in the surveys to cover nocturnal animals- the Panel recognizes that this may be difficult due to security concerns; and Where possible, advanced technologies, e.g. camera-trapping and remote sensing should be included in the surveys to cover sites that are inaccessible because of difficult terrain or security challenges. 	Medium term Medium term Short term
Remediation Standard	
Recommendation 5: Update the definition of Areas of High Biodiversity Value (AHBV) in the SPDC Remediation Standard and develop a detailed manual and guidelines to support relevant SPDC teams involved in various remediation and rehabilitation stages in implementation of updated standard.	Short term
Recommendation 6:	Short term
SPDC's Relationship with Host or Neighbouring Communities	
Strengthen SPDC relationship with its host or neighbouring communities by ensuring that community leaders comply more strictly with the terms of any Memoranda of Understanding agreed with communities;	
Promote the employment of better fortified and organized Pipeline Protection Task Forces (PPTFs) formed from the communities to guard segments of pipelines traversing the communities;	
SEPCiN Impact Assessment Process	
Recommendation 7: SPDC to take advantage of the findings of this report and Appendix II to identify specific indicators to apply in monitoring biodiversity changes in different ecozones.	Medium term
<ul style="list-style-type: none"> Ensure effective linkage between SPDC teams responsible for EIAs with those responsible for BAPs so that EIA recommendations will extend beyond avoiding or minimizing impacts to include activities that result in benefits to biodiversity such as support for research. Where appropriate, make EIAs more thorough by stretching them to cover: <ul style="list-style-type: none"> a. Two seasons – dry season and wet season; b. Field observations of at least 2 – 4 weeks duration; and c. Sampling also at night to accommodate nocturnal animals; Where appropriate, include equipment (such as camera-traps and binoculars with cameras) in the contract for EIAs so that consultants will be able to acquire them; and In areas where significant biodiversity impacts are envisaged and/or AHBVs, consider pre-construction, construction and post-construction ecological monitoring for flora and fauna in all habitats, for better prediction of changes in biodiversity. 	Medium term Medium term Short term Medium term
Conceptual Site Models (CSMs)	
Recommendation 8: When developing CSMs for specific sites, use the recommended receptors for the three main ecological zones of the Niger Delta as summarized in Table 8 which are based on the information in Appendix II to this report.	Short term
Community and Other Stakeholder Engagement	
Recommendation 9: Reformat and re-introduce the annual Biodiversity Stakeholder Forum to contribute to regular engagement with biodiversity experts to exchange information for conservation of biodiversity.	Medium term

Recommendations to SPDC	Time frame
Biodiversity Considerations in the Off-shore Environment	
Recommendation 10: SPDC's transfer arrangements with new owners of its divested assets should include provisions for passing on SPDC-developed biodiversity conservation practices.	Short term
Recommendation 11: SPDC should expand its biodiversity conservation responsibilities to cover adequately the marine environment in its off-shore undertakings.	Short term

Table 2: Recommendations to major stakeholders for developing and implementing an effective Niger Delta biodiversity strategy

The recommendations in this section are beyond the remit of SPDC and are mostly addressed to Government agencies who have the primary interest and mandate to develop a wider Niger Delta biodiversity strategy. However, the government will need the support and collaboration of all stakeholders, especially those in the Oil & Gas industry.

Recommendation to stakeholders	Primary responsibility	Time frame
1. Policy		
Recommendation 1.1: Ensure policy coherence by adopting a scheme that requires Strategic Environmental Assessment (SEA) to assess the effects of certain policies, plans and programmes on biodiversity in the Niger Delta.	Federal Ministry of Environment (FMEnv)	Medium term
Recommendation 1.2: Ensure effective integration of biodiversity into the National Oil Spill Contingency Plan.	National Oil Spills Detection & Response Agency (NOSDRA)	Medium term
Recommendation 1.3: Build on past and ongoing initiatives to develop a regional biodiversity management strategy and action plan for the Niger Delta.	Niger Delta Development Commission (NDDC) and FMEnv	Medium term
Recommendation 1.4: Promote the development and implementation of Biodiversity Action Plans (BAPs) in areas that are important for biodiversity. Develop Guidelines for BAPs adapted to the Niger Delta and share best practice amongst stakeholders.	FMEnv	Short term
2. Legislation		
Recommendation 2.1: Strengthen the Environmental Impact Assessment (EIA) Act by ensuring effective supervision by Government as well as more transparency and accountability. EIA should also include the identification and monitoring of both primary and secondary impacts at relevant stages in the project life cycle.	National Assembly based on proposal from FMEnv	Medium term
Recommendation 2.2: Pass a Petroleum Industry Bill (PIB) that, at the minimum, retains the provisions for biodiversity that are contained in the 2015 draft.	National Assembly based on proposal from Ministry of Petroleum Resources (MPR)	Medium term
3. Institutional coordination		
Recommendation 3.1: Create a region-wide stakeholder collaborative mechanism that involves community representatives, Governments at all levels and Oil and Gas Companies whose purpose will be joint planning, implementation and monitoring of biodiversity projects that are beyond the scope of any one stakeholder as well as joint learning and sharing of best practice.	NDDC or FMEnv with support and cooperation from O&G companies and the communities	Medium term
4. Institutional Capacity for Implementation		
Recommendation 4.1: Create one or more National Parks for the conservation of areas of high significance for biodiversity.	National Assembly based on proposal from National Parks Service (NPS)	Medium term
Recommendation 4.2: Assess and strengthen capacity for biodiversity management in relevant institutions across the Niger Delta.	Higher Educational Institutions (HEIs), Governments & Donors	Short term
5. Research, Monitoring and Information Management		
Recommendation 5.1: Promote basic and applied research, monitoring of biodiversity and sharing of information amongst stakeholders. Use new technology such as satellite imagery to update Environmental Sensitivity Index (ESI) maps.	Universities, other HEIs, O&G companies	Short term
Recommendation 5.2: Geotagging biodiversity components of special conservation interest.	Researchers, Institutions with a mandate for biodiversity conservation	Short term
6. Funding		
Recommendation 6.1: Support the creation of a Biodiversity Trust Fund or the allocation of funds through other Trust Funds for Biodiversity.	Federal and State Governments, O&G companies and Donors	Short term



Part I

Introduction and context

BACKGROUND AND OBJECTIVES

1.1 Background

Biodiversity in the Niger Delta is facing tremendous threats. Most arise from pressures on habitats due to anthropogenic factors such as high population, pollution, urbanization, demands for more farmland, better roads and waterways. There are also significant direct threats from hunting and unsustainable harvesting of biodiversity resources, including widespread logging for timber. The main report of the IUCN-NDP, released in July 2013, recognized that in order to conserve habitats successfully, these threats need to be addressed from a much larger platform than the SPDC alone, and in a way that makes resources and methodologies to be pooled and shared by all stakeholder groups. Since oil spills disperse across large areas and in many cases across operational areas of more than one operator, especially in offshore settings, it is imperative that they address the issue in synergy. It will require the involvement of government authorities, the wider oil industry, communities and NGOs in order to jointly address issues of major concern.

It will also require the development of a region-wide strategy that sets out the ways and means to halt the massive degradation of biodiversity, mitigate future impacts of the oil industry and address those that have already happened. Since the development of oil industry activity began in the Niger Delta in the 1950s, there has not been a comprehensive strategic plan that will conserve its biodiversity and ensure its sustainable use. Oil and gas related activities are rampant in the Delta, including in its most sensitive sites and habitats. This has led to serious damage to the environment and severe loss of biological resources. Biodiversity rehabilitation has to some degree been addressed through a disjointed set of activities undertaken by disparate stakeholders with the result that not enough is being done, in time or in scale, to remedy the situation.

It is the view of the IUCN-NDP that based on SPDC's position as the largest explorer and producer of oil

and gas in the region, it should be a major contributor to the establishment of a regional level collaborative platform to address the direct and indirect threats to the biodiversity as well as the development of a comprehensive biodiversity protection strategy for the wider Niger Delta. That is why the recommendations in the IUCN-NDP Report aimed to improve biodiversity considerations in SPDC's operations, among other ways, specifically, by:

- Redefining receptors in SPDC's internal environment management process to include representation of key native biodiversity;
- Introducing conservation and management of pristine areas and biodiversity hotspots in SPDC's field activities including oil spill response procedures;
- Initiating programmes to rehabilitate critical habitats, including mangroves, in SPDC's bioremediation and rehabilitation procedures;
- Developing a socio-environmental strategy to engage communities in biodiversity management and restoration; and
- Developing a best practice strategy for the biodiversity of the wider Niger Delta.

1.2 Objectives

This study builds on the previous IUCN-NDP recommendations to:

- Determine what components of the Delta's biodiversity, including critical habitats and species, are likely to be most impacted by oil exploration, production and spills and how to avoid or minimise these impacts.
- Map out and assess past and on-going initiatives towards developing a wider Niger Delta biodiversity strategy and make specific recommendations on how SPDC and other primary stakeholders in the oil and gas industry could better coordinate their efforts to address threats to biodiversity in the region.
- Analyse the under-listed SPDC processes with respect to biodiversity and for each; identify gaps, if any, in comparison to national and international best practice and propose ways and means to address such gaps where they exist:
 - ◇ Company biodiversity strategy;
 - ◇ Remediation standards;
 - ◇ Impact assessment process;
 - ◇ Biodiversity action planning; and
 - ◇ Biodiversity restoration initiatives.
- Based on the findings of the study, make specific recommendations on how SPDC can implement sound biodiversity conservation practices throughout the life cycle of its oil and gas operations in the Niger Delta.

2.

STUDY METHODOLOGY AND STRUCTURE OF THE REPORT

2.1 Methodology

The study was conducted in several steps as follows:

- A group of Nigeria-based biodiversity experts was commissioned to produce a report synthesizing their findings to support the IUCN-NDP's analysis and make recommendations to SPDC on biodiversity management in the Niger Delta.
- A member of the IUCN-NDP, together with other experts, undertook a field study to some sites in Edo State to study first-hand the implementation of SPDC's Biodiversity Action Plan (BAP);
- Many biodiversity related agencies in Port Harcourt, Lagos and Abuja were visited to obtain documents and information to support the study; and
- Several meetings were held between some members of the Panel and relevant SPDC staff to obtain clarifications and further information on SPDC's biodiversity strategies, policies and processes and their implementation.

This report relies heavily on the work of the commissioned in-country biodiversity experts. The team was made up of some of the most distinguished biodiversity professionals in the country. They include:

- Professor D.U.U Okali (Team Leader) – Chairman of Nigeria Environmental Study/Action Team (NEST), IUCN member organization. He is Emeritus Professor of Forest Ecology at the University of Ibadan, Nigeria and past president of the Nigerian Academy of Sciences. Amongst his land mark biodiversity studies are the inventories that led to the designation of protected areas in Omo Forest Man and Biosphere Reserve, Hadejia-Nguru Wetlands Ramsar Site and Cross River National Park.
- Professor A.M.A. Imevbore – Chairman, Environmental Resource Managers Ltd. Formerly

of Obafemi Awolowo University and a Fellow of the Nigerian Academy of Sciences. He was the leader of the team that produced a six-volume report for the Niger Delta River Basin Development Authority on Environmental Pollution Monitoring of the Niger Delta. His company (ERML) was the main Consultant for the Niger Delta Environmental Survey (NDES).

- Professor A.O. Isichei – Professor of Botany, Obafemi Awolowo University, Ife. He is an expert in botany and ecology with more than 43 publications. He is involved in the Federal Ministry of Environment's UNDP-GEF Niger Delta Biodiversity Project.
- Professor G.C. Akani – Professor of Wildlife and Biodiversity Conservation in the Department of Applied and Environmental Biology, Rivers State University of Science & Technology. He has over 90 publications relating to the environment and the Niger Delta. He is a consultant to several oil producing companies on biodiversity monitoring and conservation in the Delta.
- Dr E.A. Eniang – undertakes teaching and research at the University of Uyo, Akwa Ibom State on wildlife management, biodiversity conservation and protected areas. He has undertaken numerous surveys of biodiversity and was instrumental in the discovery of a new species of gecko in the Niger Delta which has now been named after him, *Hemidactylus eniangii*.
- Professor A.U. Ezealor – Formerly Professor at Ahmadu Bello University Zaria, now at Michael Opara University of Agriculture, Umudike. He is Nigeria's foremost ornithologist and led the study and compiled the inventory of Important Bird Areas (IBAs) in Nigeria.

For the Nigerian team to carry out its assignment, the objectives and key questions were resolved into four

sets of tasks (a, b, c & d) allocated to four specialists to accomplish:

- a. Provision of good background information on the critical biodiversity endowment of the entire Niger Delta, in terms of habitats and species, to guide proactive action in SPDC operations. In the process major threats and their key sources can be established, determining aspects of these threats that SPDC can address, acting alone, or in concert with other stakeholders.
- b. Delineation of the important areas of natural habitat in the Niger Delta, in the process identifying biodiversity hotspots and key species, to provide a baseline for understanding the impact of oil and gas operations on biodiversity of the region. Along with this is the need to assess the efforts at developing a region wide strategy for biodiversity management in the Niger Delta, balancing the pressures from all stakeholders.
- c. Evaluation of SPDC's efforts at biodiversity management by:
 - ◇ determining the components of the Delta's biodiversity (critical habitats and species) that have been most impacted by oil spills;
 - ◇ assessing the efforts to rehabilitate and restore impacted biodiversity; and
 - ◇ mapping past and on-going SPDC initiatives towards contributing to developing a region wide biodiversity strategy for the Niger Delta.

- d. Assessment of SPDC's performance by examining the company's internal policies and processes, with respect to biodiversity management, against national and international standards to suggest best restoration options for severely impacted biodiversity in SPDC operational areas.

The above tasks were to be accomplished against the background of a review of the biodiversity findings and recommendations in the IUCN-NDP 2013 report. A report synthesizing the findings of the specialists that worked separately on the above sets of tasks is available upon request to IUCN. During discussions between IUCN-NDP and SPDC staff on biodiversity issues, it became clear that there is a gap in knowledge regarding specific components that will work best as biodiversity receptors in developing Conceptual Site Models (CSMs) for the remediation and rehabilitation of biodiversity in oil spill situations. IUCN-NDP therefore found it expedient to extend the scope of the work of the team of Nigerian biodiversity experts to undertake this exercise. This led to the production of a second report which is attached as Appendix II to this report.

The synthesis report of the team of Nigerian biodiversity experts, their report on biodiversity receptors, field visits and interviews conducted by Panel members in the Niger Delta and beyond, as well as further desk study by the Panel were used in developing this report.

2.2 Structure of the report

The report is divided into two parts. Chapters 1–5 provide the introduction and context for the recommendations and form Part I of the report. Chapters 6 and 7 provide the main recommendations and comprise Part II of the report.

In Part I, Chapter 1 states the background and main objectives of the analysis while Chapter 2 outlines the study methodology. Chapter 3 highlights what we know about the biodiversity richness of the Niger Delta and demonstrates its significance at national, regional and global levels, but also concerns over lack of recent inventories and status reviews. Chapter 4 identifies the main threats to biodiversity, focusing particularly on the threat posed by oil spills to various components of biodiversity. In Chapter 5, we give an overview of past and current efforts to develop a region-wide biodiversity strategy for the Niger Delta.

Using the findings in Part I of the report, Part II presents the recommendations of the IUCN-NDP. Specific recommendations to SPDC aimed at the improvement of its biodiversity policies, procedures and plans are set out in Chapter 6; and recommendations geared towards the integration of biodiversity considerations into oil and gas operations in the wider Niger Delta are addressed to major stakeholders in Chapter 7.

BIODIVERSITY ENDOWMENT OF THE NIGER DELTA

3.1 Ecological zones

There are several classifications of the ecological zones of the Niger Delta (eg NDES, 2005; IUCN-NDP, 2013 and Okali *et. al.*, 2015). The Panel in its original report (IUCN-NDP, 2013) has adopted four broad ecological zones in the delta for the purpose of its work. They are the lowland forests, freshwater swamps, mangroves and barrier islands. These zones are recognized by delineation of soil and vegetation types as influenced by hydrological dynamics, tides, and fluvial processes of the Niger River as well as wave action of the Atlantic Ocean on the shoreline morphology (Abam, 2001; Stutz and Pilkey, 2002). SPDC also appears to have adopted this classification in its proposed Conceptual Site Models (SPDC, unpublished). Table 1 attempts to align the zones recognized by the Panel with other existing classifications.

For consistency, this report adopts the classification earlier used by the Panel in IUCN-NDP (2013) whereby the Niger Delta essentially consists of four main ecological zones:

- lowland forests
- the upper freshwater riverine floodplain;
- the lower tidal floodplain comprised of estuaries, mangroves, and creeks; and
- the outer chain of barrier islands (a special dynamic and ephemeral land formation/coastal vegetation type similar to the lowland rain forest).

A brief description of each of these zones is given in IUCN-NDP (2013).

Figure 1 presents a map of the broad ecological zones as developed by the GIS unit at SPDC, adapted from the study conducted by NDES (2005).

Table 3: Comparison of classification of ecological zones in the Niger Delta

Anon (2012)	Powell (1995), NDES (2005)	IUCN-NDP (2013) and SPDC (Unpublished)	Okali (2015)
Deltaic Plain	Lowland Forest	Lowland Rain Forests	Freshwater Floodplain
Coastal Sand Plains	Marsh (Eastern) Zone		
Western Coastal Plains	Marsh (Western) Zone		
Niger Flood Zone	Niger Floodplain	Freshwater Swamp Forests	
Lower Niger Flood Plain			
Mangrove Forest	Mangrove Zone	Mangrove Forests	Tidal Floodplain
Beach & Barrier Islands	Barrier Islands	Barrier Islands	Barrier Islands

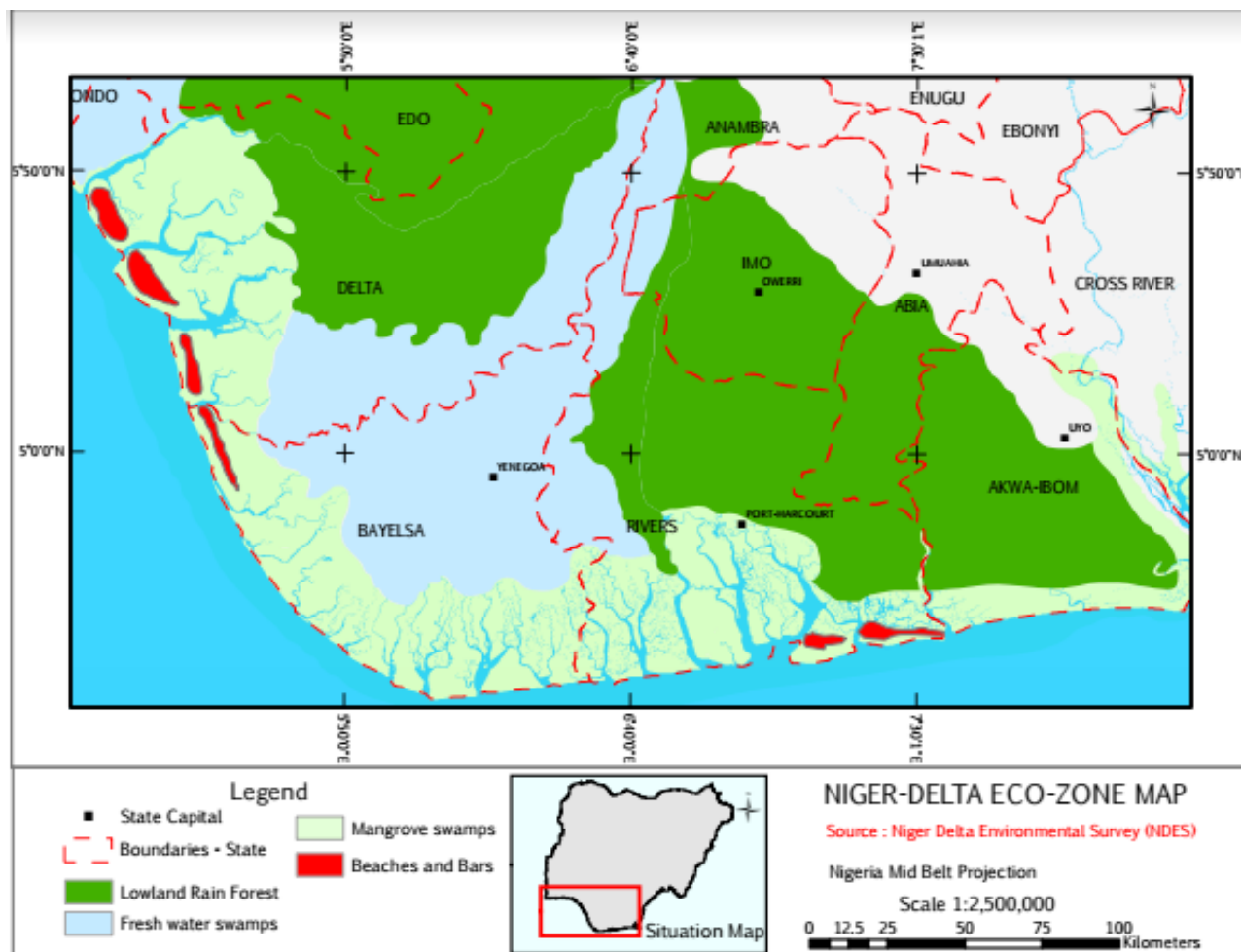
3.2 Global significance of Niger Delta's biodiversity

Despite varied challenges of pollution and impacts from agriculture and extractive industries, most particularly oil, the Niger Delta still holds a significant proportion of Nigeria's unique coastal and tropical rainforest biodiversity. An additional threat to the biodiversity is the widespread poaching for bush-meat.

An elaborate and systematic survey of the biodiversity of the Niger Delta was conducted by Powell (1993). Although relatively little field work has been carried out in the area in the past 15 years, due to social insecurity, existing data and some limited information available in recent times reconfirm the ecosystem richness of the Niger Delta. Blench (2007) has presented an overview

Figure 1: Ecological zones of the Niger Delta

(Source: SPDC 2015, adapted from NDES, 2005)



of the mammals of the Niger Delta developed from materials left by Bruce Powell and Kay Williamson and incorporating updated field materials and analyses but that in itself is about 10 years ago. Several researchers from universities in the region have undertaken limited and focused surveys since but these have had a narrow focus due to the challenges mentioned.

Despite the limitations of chronology or scope, available studies have shown that the Niger Delta is very rich in biodiversity. Some of the most highly endangered species of primates in the world such as the Sclater's guenon, the White-throated guenon, the Niger Delta red colobus, the Nigeria-Cameroon Chimpanzee (Angelici *et. al.* 1998; Angelici and Luiselli, 1999; Luiselli *et. al.*, 1999; Eniang and Luiselli, 2002; Angelici, 2005; Angelici and Luiselli, 2005; Lea *et. al.*, 2005; Luiselli *et. al.*, 2006 and Eniang, 2010) and the Cross River Gorilla are known to still exist in the Delta. The brackish water environment supports a rich fauna. The Delta is the home of some remarkable coastal wetlands and a high diversity of avian fauna (Ezealor,

2003). Investment of time and finance is required to develop biodiversity action programmes in the Niger Delta and the complexity of biodiversity of the Niger Delta needs to be better understood as part of the integrated regional development of the area.

Although now out of date, the findings of the Niger Delta Environment Survey (NDES,2005) document:

- 70 mammalian species in 49 genera,
- 500 bird species,
- 219 fish species,
- 85 mollusk species,
- 1,773 insect species,
- 50 macro-crustacean species,
- 2,000 angiosperm (higher plants) species, and
- 500 phytoplankton species.

The study identified 16 rare and three endemic plant species, 27 mammalian species with declining populations and five rare mammalian species.

Biodiversity overview

- At least 11 Important Bird Areas (IBAs) recognized by BirdLife International.
- A WWF Global 200 Ecoregion (#155 - Niger Delta).
- Part of the Guinean Forests Hotspot designated by Conservation International
- Africa's largest mangrove area and the world's third largest
- The Niger Delta red colobus, is one of the world's 25 most endangered primates.
- The Niger Delta is one of the largest wetlands in the world and is Africa's largest Delta;
- The Delta's outermost coastal forest zone represents some of the last remaining pristine forest resources and centres of endemism in Africa
- All of Nigeria's endemic or near-endemic mammal species and six IUCN Red List mammals: the forest elephant (*Loxodonta africana cyclotis*), the West African manatee (*Trichechus senegalensis*), the Niger Delta red colobus monkey (*Procolobus badius epieni*) the White-throated guenon (*Cercopithecus erythrogaster*), the Sclater's guenon (*Cercopithecus sclateri*), the Heslop's pygmy hippopotamus (*Choeropsis liberiensis heslopi*) and the endangered Nigeria-Cameroon chimpanzee (*Pan troglodytes vellerosus*) The area is also home to a number of other mammalian species of conservation importance, namely; leopard (*Panthera pardus*, see Angelici, et. al. 1999), crested giant porcupine (*Hystrix cristata* see Eniang and Luiselli, 2002), Nigerian otter (*Aonyx capensis* and *Lutra maculicollis*, see Angelici, 2005), genets (*Genetta maculata* and *Genetta cristata*, see Angelici and Luiselli, 2005) as well as bats (Angelici, et. al. 2000).
- Within the Niger Delta ecosystem, the following are conspicuous members of the reptilian group; crocodiles (*Crocodilus niloticus sochus*) long snouted crocodile (*Mecistops cataphractus*), West Africa dwarf crocodiles (*Osteolaemus tetraspis* (Luiselli et. al. 1999), Nile monitor (*Varanus niloticus oranatus* (Luisella et. al. 1999, Angelici and Luiselli, 1999), Blanding's tree snake (*Boiga blandingi*) (Luiselli et. al. 1998), red lined snake (*Bothrophthalmus lineatus*) Luiselli et. al., 1999, Gaboon viper (*Bitis gabonca*) (Angelici et. al. 2000), African emerald snake (*Gastropyxis smaragdina*) (Luiselli et. al. 2000), Jameson's green mamba (*Dendroaspis jamesoni*) (Luiselli et. al. 2000), Tree viper (*Atheris squameger*) (Luiselli et. al. 2000), rock python (*Python sebae*) (Luiselli et. al. 2001), stiletto snakes (*Atractapis spp.*) (Akani et. al. 2001), Calabar ground python (*Calabaria reinhardtii*) (Luiselli et. al. 2002), Semi aquatic snake (*Afronatrix anoscopus* (Luiselli et. al. 2003), Water snake (*Grayia smythii*) (Akani et. al. 2001) The rich biodiversity of the Niger Delta have been elaborated by Eniang et. al. 2002a; Eniang et. al. 2002b). The recent discovery of the data deficient forest Zebra gecko (*Hemadictylis eniangii*), affirms the area as a biodiversity hotspot (Eniang and Luiselli, 2002). Pelomedusid turtle (*Pelusios castaneus castaneus*) (Luiselli, 1999; Luiselli et. al., 2000), soft-shelled turtle (*Trionyx triunguis*) (Akani et. al., 2001), sea turtles abound in the Niger Delta (Akani and Luiselli, 2009), forest hinged back tortoise (*Kinixys erosa*), Luiselli, 2003; Luiselli, et. al. 2003; Luiselli, 2005; Akani et. al. 2004; Luiselli et. al. 2006a; Luiselli et. al. 2006b), bull frog (Eniang et. al. 2003), Goliath frog (Eniang et. al. 2003)
- The endangered Nigeria-Cameroon chimpanzee (*Pan troglodytes vellerosus*)
- Globally outstanding fish fauna that displays exceptional evolutionary phenomena with its higher taxonomic endemism and distinct species assemblages with a minimum of 314 species (313 being indigenous) from 158 genera and 64 families found in the Delta.
- At least 20 endemic species of fish have been recorded so far in the Delta. Unique conditions in the Delta have nurtured the evolution of five monotypic fish Families -- Denticipidae, Pantodontidae, Phractolaemidae, Hepsetidae and Gymnarchidae -- the highest concentration of monotypic families of any freshwater eco-region in the world.
- Three of the 11 Ramsar sites in Nigeria (Apoi Creek Forest Reserve in Bayelsa State, Upper Orashi Forest Reserve in Rivers State, and Oguta Lake in Imo State, along the River Niger floodplain) are located in the Niger Delta. Taylor Creek and Nun River Forest Reserves have also recently been proposed as additional Ramsar sites.
- As many as 41 of the 91 endemic plant species in Nigeria are reported to be housed in the Oban Division of Cross River National Park, besides some that occur also in other parts of the region like Ukon River Forest Reserve (Cross River State), Eket (Akwa Ibom State) and Degema (Bayelsa State) (Borokini, 2014b).
- A recent review of IUCN Red List of threatened plant species in Nigeria (Borokini 2014a), suggests that 21 of the 164 threatened plant species in the country are endemic, and that all of the 21 threatened endemic species are in the Niger Delta – 10 referable to Eket in Akwa Ibom State, 8 to Oban Division of the Cross River National Park in Cross River State, and 3 to Degema in Bayelsa State.

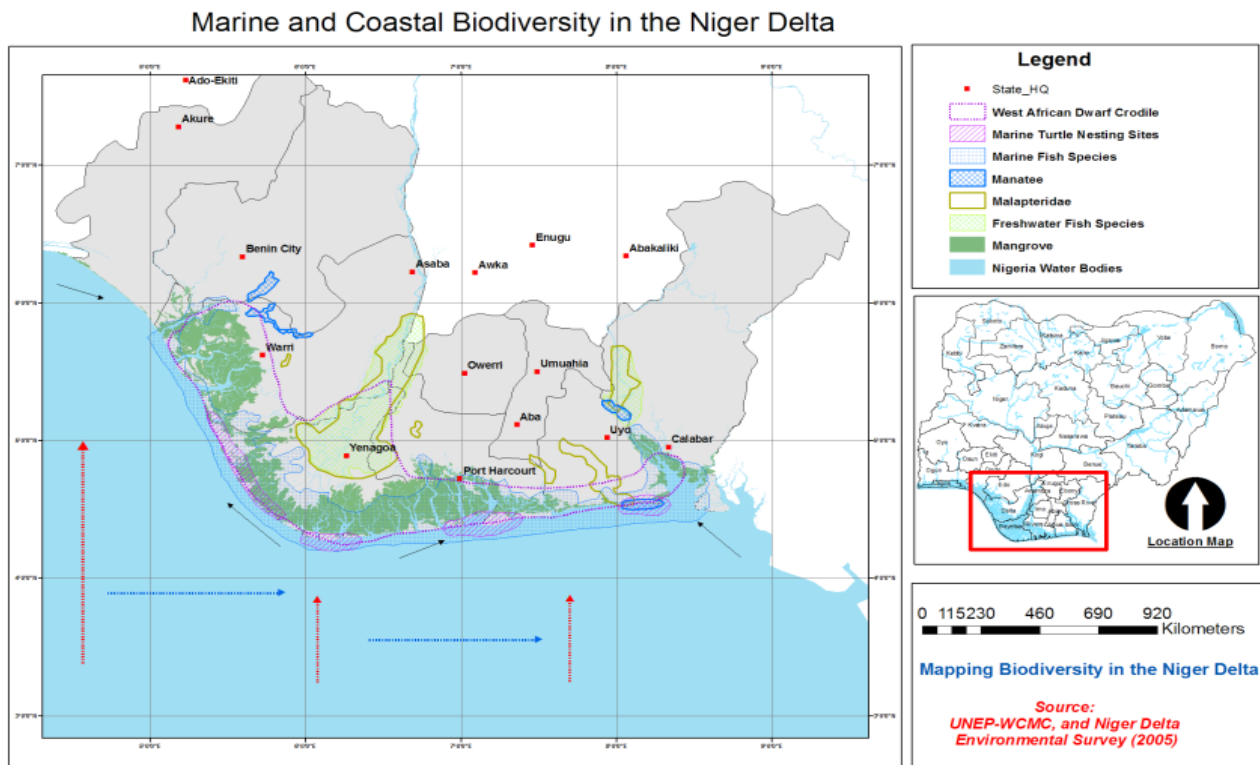
The summary below provides some facts about the biodiversity hot spots as well as particularly vulnerable species in the Niger Delta.

IUCN-NDP notes the lack of more recent surveys and species status reviews, and the dependency here on a limited number of studies, and recognises that this

may not now reflect current biodiversity richness of the Delta.

A spatial distribution of some of the significant marine and coastal biodiversity in the Niger Delta is presented in Figure 2.

Figure 2: Distribution of some marine species in the Niger Delta



3.3 Offshore waters in the Gulf of Guinea

Information in this section has been obtained from Bamy et. al (2010) and Jones (1994).

The warm tropical water of the Gulf of Guinea offshore is separated from deeper, more-saline, and colder water by a shallow thermocline—a layer of water between upper and lower levels that lies usually less than 100 feet (30 m) deep. Coastal upwelling, and hence a rich production of plant and animal life, occurs seasonally and locally off the central gulf coasts of Ghana and Côte d'Ivoire.

The entire northern coast of the Gulf of Guinea is washed by the eastward flow of the Guinea Current, which extends 250–300 miles (400–480 km) offshore from Senegal to the Bight of Biafra. The gulf's tropical water is separated from the Equator-ward flow of the cool Benguela current from the south and Canary

current from the north by sharp frontal regions off the Congo and Senegal rivers, respectively. The Benguela Current, as it swings westward, forms the South Equatorial Current to the south of, and running counter to, the Guinea Current.

The diversity of the marine flora and fauna of the Gulf of Guinea is limited when compared with that of the western tropical Atlantic and, especially, with the Indo-Pacific biogeographic realm. This relative biological poverty results from (1) a lack of coral-reef ecosystems because of low salinity and the high turbidity of Guinea Current water and (2) the climatic regression to cool conditions during the Miocene Epoch (i.e., some 23 to 5.3 million years ago), during which far fewer refuges for tropical species of animals and plants were available in the Atlantic than in the Indo-Pacific region.



© Shell

Large marine mammals in the Gulf of Guinea includes seven species of cetaceans. The seasonal presence of three confirmed humpback whales, leads to the hypothesis that these whales may comprise the north-westernmost range of the population that breeds/overwinters in coastal waters of the Bight of Benin, northern Gulf of Guinea. Small cetaceans are landed as by-catch but there is no evidence of substantial takes of this group, either targeted or as by-catch. However, concern is raised about even minimal takes of the vulnerable Atlantic humpback dolphin.

The Gulf of Guinea contains a number of islands that are of great interest from a biodiversity and evolutionary perspectives. Each island, of greatly differing size and degree of isolation, has evolved its unique sub-set of plants and animals separately from the neighbouring mainland. In particular coral reef fish and marginellid molluscs, whilst not particularly species diverse, show high levels of endemism.

The area has been studied as part of the GEF-funded Large Marine Ecosystem programme. As part of such studies the productivity of the ecosystem has been surveyed using for example Continuous Plankton Recorders providing information on the pelagic micro and meio flora and fauna of the Gulf of Guinea.

4.

DAMAGE AND THREATS TO COMPONENTS OF BIODIVERSITY FROM OIL SPILLS

4.1 Sources of threat

Not all of the threats to the Niger Delta's biodiversity are linked to the oil and gas sector. Threats such as from hunting, land clearings for agriculture, bush burning, unsustainable harvest of trees, fish and other biological resources are commonly seen throughout the Delta. These threats are highly significant. Threats related to the oil industry are locally affecting both land and water. These include impacts of spills, gas flaring and land clearings for establishing various infrastructures such as wells, pipelines and other facilities.

A significant direct threat from the oil and gas industry arises from oil spills and hence the focus of IUCN-NDP on this aspect. Water pollution such as from oil spills is the single most important threat to freshwater-, coastal-, and marine ecosystems of the Niger Delta. Such spills in fresh water regions of the Delta impacts the drinking water quality, fisheries and the survival of mangroves.

The main causes of oil spills in the Niger Delta are sabotage of oil installations, illegal refining of stolen oil, corrosion of pipelines and storage tanks as well as accidents in oil production operations. Prior to the 1990s when militancy had not yet commenced in the region, spills were mainly due to operational reasons. However, criminal activities such as illegal refining and theft have assumed increasing importance and are presently responsible for most of the pollution incidences in the Delta.

Fires and leakages are also associated with natural gas production and transportation. Accidental leakages and vandalisation of gas pipelines result in fires that burn uncontrollably leading to environmental degradation and destruction of the affected area.

In the last five decades that oil and gas industry activities have become a regular aspect of the Niger Delta

landscape, varying amounts of spilled oil have been claimed by different actors in the region. In recent past, acceptable figures on the number of oil spill incidents, the volume of oil spilled and the source of the spill were not available. Those obtained from government agencies, the oil companies and the communities differ markedly due to poor record keeping, lack of transparency and stakeholder interests.

A survey (World Bank, 1995) had observed that oil companies understate the incidents of oil spillage. The Department of Petroleum Resources (DPR) estimated that 2.4 million barrels of petroleum were spilled into the Niger Delta between 1976 and 1996 in 4,835 incidents (Vidal, 2010). Dublin-Green *et al* (1999) reported that between 1976 and 1997, there were 5,334 reported cases of oil spillages, releasing around 2.8 million barrels of oil. The official figures of SPDC (2004) show that between 1976 and 2001, 3 million barrels were spilled in 6,187 incidents.

However, since 2013, NOSDRA- the Nigerian oil spill environmental regulator has established a National Oil Spills Monitor (<https://oilspillmonitor.ng/>), a GIS web application where officially collected data on oil spills from all operators in the Niger Delta is displayed in an online map for public access. The map for November 2015 given in Figure 3 shows that a majority of onshore spills arise from illegal refining activities and oil theft, although a significant number still arose from operational failure. The map for January 2017 (Figure 4) shows a much larger preponderance of spills from illegal activities probably reflecting the resumption of militancy in the Delta during 2016.

Figure 3: Nigerian oil spills in November 2015

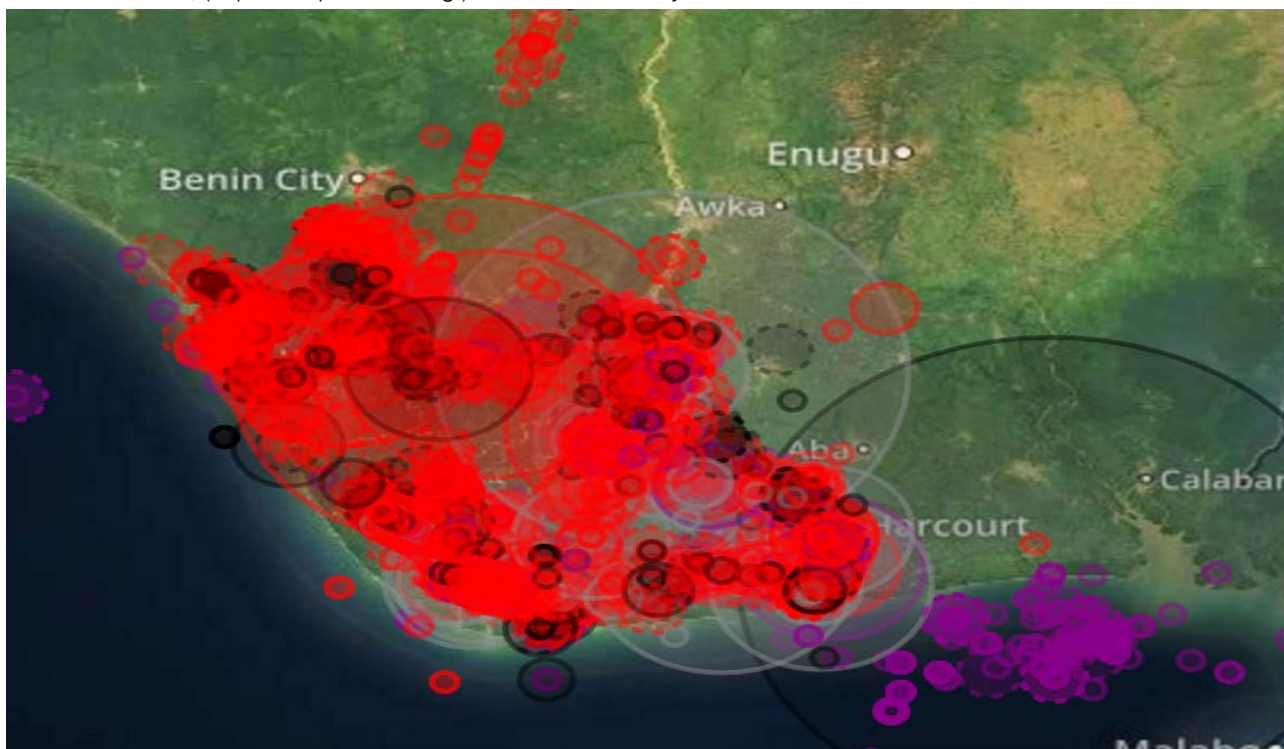
Source: NOSDRA, (<https://oilspillmonitor.ng/>) accessed 18 November 2015



Key: Illegal refining and theft ●, Oil company failure ●, Not visited ●

Figure 4: Nigerian oil spills in January 2017

Source: NOSDRA, (<https://oilspillmonitor.ng/>) accessed 7 January 2017



4.2 Impacts of oil spills

Activities of the oil industry are widespread across the length and breadth of the Niger Delta. There is virtually no part of the Delta that is protected from the influence of oil and gas exploration and production. This includes some of the most important sites and habitats

for biodiversity. For example, Table 4 below gives an example of the overlap between the activities of SPDC and some protected areas in 2015, while Table 5 shows the overlap of oil assets, which until recently were owned by SPDC, with protected areas in the region.

Table 4: SPDC operations in existing and proposed protected areas, 2015

No.	Protected area name	Area designation	IUCN cat (1a/b-4)	Area (ha)**	Operating company / field name	Operating company activities / operations
1.	Andoni	(Proposed) Forest Reserve	Not Known	320	Andoni / Opobo South	Wells, Manifold, Flowstation
2.	Egbedi Creek	(Proposed) Forest Reserve	Unset	6632	Okubotin, Koroama	Planned 3-D survey
3	Lower Imo River	(Proposed) Forest Reserve	Unset	5570	Yorla	Undeveloped wellheads, no current activity but development in the future
4	Lower Orashi	Forest Reserve	Unset	4765	Soku	Undeveloped wellheads
5	Nun River	Forest Reserve	Unset	9715	Gbaran,	Monitoring well
6	Obeaku	Forest Reserve	Unset	1700	Afam	No current activity
7	Ohaji	Forest Reserve	Unset	986	Egbema	Well.
8	Oguta Lake	Ramsar Site	Unset	572	Oguta	Wells, Flowstation
9	Olague	(Proposed) Forest Reserve	Unset	329	Otumara, Saghara	Wellheads, pipelines, Flowstation
10.	Otamiri River	(Proposed) Forest Reserve	Unset	15,044	Umuechem	Completed 3-D seismic survey; capped wellhead; pipelines and flowstation
11.	Sambreiro	(Proposed) Forest Reserve	Unset	19,350	Ahia, Mini Nta	Wellheads and pipelines
12.	Stubbs Creek	Forest Reserve	Unset	31,000	Uquolbeno, Utapate	Undeveloped wellheads and pipelines, no current activity but development in the future
13.	Taylor Creek	Forest Reserve	Unset	22,566	Biseni / Adibawa	Wellheads, pipelines, Flowstation
14.	Upper Imo River	(Proposed) Forest Reserve	Unset	11,528	Imo River	Completed 3-D seismic survey, well drilling, well heads and pipelines
15.	Upper Orashi	Forest Reserve	Unset	8,990	Kolo Creek, Enwhe	functional wellheads, pipelines
16.	Uremure-Yokri	(Proposed) Forest Reserve	Unset	3297	Escravos, ForcadosYokri	Wellheads, pipelines, manifold, flowstation

((Source – MPO Dore (2013). Literature Review of Protected Areas in the Niger Delta. SPDC report))

Table 5: Protected areas in SPDC divested assets in 2015

No.	Protected area name	Area designation	IUCN cat (1a/b-4)	Area (ha)	Field name	Operating company activities / operations
1	Apoi Creek	Ramsar Site	Unset	6477	Diebu Creek, Opugbene	functional wellheads, pipelines
2	Edumanom	(Proposed) Forest Reserve	Unset	9234	Okoroba, Oloibiri	completed 3-D seismic survey; undeveloped wellheads; pipelines
4	Gilli Gilli	Forest Reserve	IV	36300		Third Party wellheads and pipelines
5	Ikiebiri Creek	(Proposed) Forest Reserve		9171	Diebu Creek	Third Party wellheads
6	Okomu	Forest Reserve / National Park	Unset	108,200	Iguleba	No current activity
7	Sakpoba	Forest Reserve	Unset	53406	Oben	Completed seismic survey, well drilling and pipelines
8	Urhonigbe	Strict Nature Reserve	Ia	64	Oben	Third Party wellheads and pipelines
9	Ukpe Sobo	Forest Reserve	Unset	10,700	Sapele, Amukpe, Ovhon, Ubaleme	wellheads and pipelines

((Source – MPO Dore (2013) Literature Review of Protected areas in the Niger Delta. SPDC report))

The Delta's aquatic and marine environments have been affected the most by oil spills. It is estimated that 25% of the oil spill events have occurred in freshwater wetlands, 69% in the offshore environment and 6% on land (UNDP, 2006). The critical mangrove belt of the Delta is literally "caught in the middle" between oil spilled up stream in the freshwater wetland areas ultimately flows downstream into the mangroves, while wave and tidal action brings oil spilled offshore into the near-shore estuarine mangrove ecosystem.

The actual extent of the ecological damage in the Delta is uncertain. An estimated 10% of Nigerian mangrove ecosystems have been degraded or destroyed by oil pollution or settlement activity (Obot et al, 2003). Mangroves are highly susceptible to oil exposure, which can kill the vegetation within a few weeks to several months. Oil affects mangroves in two principal ways: first, from physical effects; second, from the true toxicological effects of the petroleum hydrocarbons. In terms of physical effects, mangroves have developed a



Niger Delta. © IUCN

complex series of physiological mechanisms to enable them to survive in low-oxygen, environments exposed to tidal fluctuations and highly varying salinities. Many, if not most, of these adaptations depend on unimpeded exchange with either air through the mangroves' pneumatophores and their lenticels or for the mediation of salts via water through the leaves and submerged roots of the mangrove.

Lighter oils are more acutely toxic to mangroves than are heavier oils. Oil-impacted mangroves may suffer yellowed leaves, defoliation, and subsequent tree death. More subtle responses include branching of pneumatophores (vertical root structures), germination failure, decreased canopy cover, increased rate of mutation, and increased sensitivity to other stresses (Naskar and Palit, 2015).

Oil pollution also creates other impacts, such as dead zones in aquatic and marine habitats. This happens when bacteria multiply to consume spilled hydrocarbons and other organic material. During the degradation most of the dissolved oxygen in the water is utilized creating dead zones where no higher aquatic or marine life can be sustained (Naskar and Palit, 2015).

Oil in water cause a number of chemical and biological effects in a wide array of organisms ranging from micro-organisms up to vertebrates, degrading the complex trophic chains of the wetlands including the regionally important mangrove vegetation. This means that fisheries in the Gulf of Guinea are jeopardized. By some estimates, over 60% of fish caught between the Gulf of Guinea and Angola breed in the mangrove belt of the Niger Delta (World Rainforest Movement 2002).

5.

STATUS OF EFFORTS TO DEVELOP A REGIONAL BIODIVERSITY STRATEGY

The protection of habitats and species has long been part and parcel of the traditions and practices of various cultures in the Niger Delta. Some communities conserved forests within their settlements purposely for hunting expeditions or established sacred groves

for the worship of their traditional deities. In other cases individual plants or animals valued for a particular purpose such as medicine, religion or food were preserved through taboos.

5.1 Network of protected areas

Organised region-wide conservation started in 1899, when a colonial officer was deployed to Calabar and given the responsibility for forestry affairs in the then Niger Coast Protectorate. Most of the existing protected areas in the Niger Delta were created as forest reserves during colonial rule. Currently there are 70 state-designated protected areas (PAs) covering about 13,000 sq.km accounting for 16% of the land area. These PAs have been established randomly and without any systematic analysis, for example to assess if areas of importance to critical species or the function

of the ecosystem have been included. Therefore areas of high biodiversity value have sometimes been excluded while areas of interest to the forestry sector have been included. The existing network of PAs therefore does not adequately capture the full richness of the biodiversity of the Delta, nor does this network fully cover the region's endangered species and habitats. The map below and Table 6 show the distribution of forest reserves in the Niger Delta as well as other areas of important natural habitats.

Figure 5: Distribution of forests in the Niger Delta

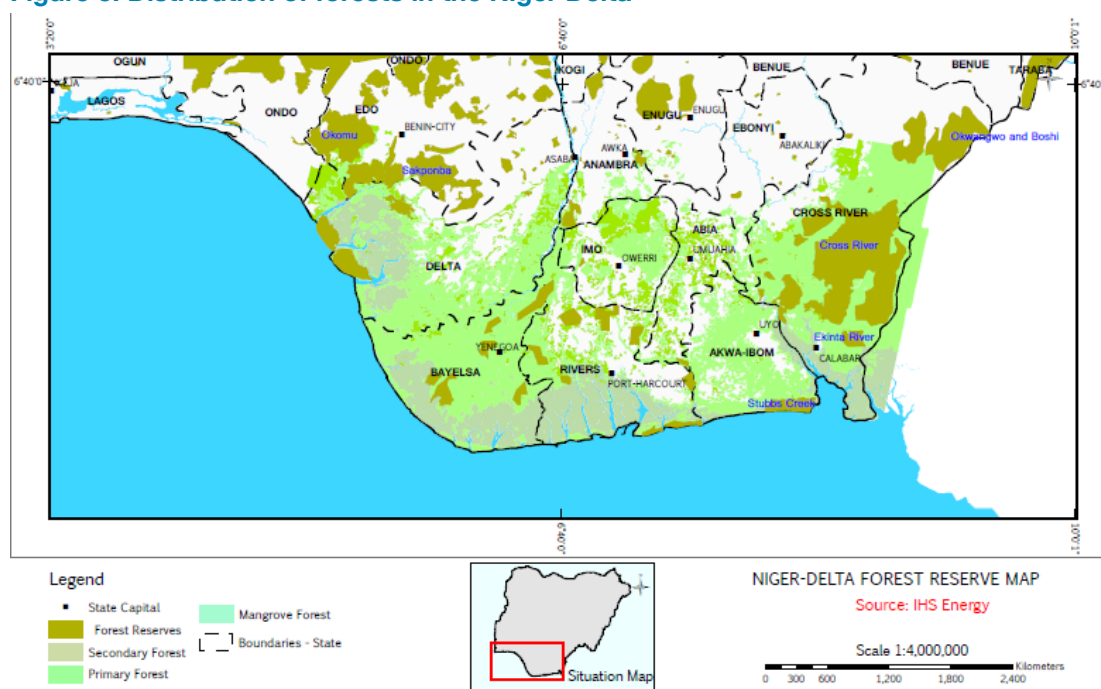


Table 6: Distribution of protected areas in the four core Niger Delta States: Akwa Ibom, Rivers, Bayelsa and Delta

S/No.	Name	Designation	Area km2
#	Akwa Ibom State		
1	Stubbs Creek	FR	310
2	Itu Swallow Roost	FR	ND
3	Ikot Uso Akpan	FR	ND
4	Nwanibia Game Reserve. Uruan LGA	GR	ND
5	Uyo Ravine	FR	ND
6	Obot Ndom	FR	12
	Sub-total	6	322
#	Bayelsa State		
1	Apoi creek	FR	64.77
2	Egbedi	FR	66.32
3	Nun	FR	122.5
4	Pennington	FR	Proposed
5	Taylor creek	FR	22.57
6	Brass	FR	Proposed
7	Edumanon (Etiema/Okoroba)	FR	86.76
8	Ikibiri Creek	FR	91.71
9	Akassa Forests	FR	ND
10	Ramos-Dodo-Pennington-Digatoro	FR	322
	Sub-total	10	776.63
#	Delta State		
1	Olague	FR	
2	Uremure-Yokri	FR	181
3	Ukpe-Urhobo	FR	107
4	Ogwashi-Uku	FR	4.51
5	Ishiagu	FR	23.31
6	Kwale	FR	2.93
7	Akiehe	FR	17.2
8	Atachi I	FR	12.95
9	Atachi II	FR	6.01
10	Ute-Ukpe	FR	18.31
11	Akumazi-Igbodo & Idumuje-Ugboko	FR	18.13
12	Iyocha	FR	8.75
13	Oko	FR	
	Sub-total	13	376.79
#	Rivers State		
1	Upper Orashi	FR	47.67
2	Lower Orashi	FR	47.67
3	Otamiri FR	FR	150.44
4	Upper Imo	FR	155.28
5	Lower Imo	FR	55.7
6	Andoni	GS	ND
7	Ikodi	BS	0.1
8	Sombreiro Mangrove Forest	FR	Proposed
	Sub-total	8	446.86
Grand total number of km2 of State designated areas in the core Delta states.		37	1,932.27

Key: FR = Forest Reserve, GR = Game Reserve, GS = Game Sanctuary, BS = Bird Sanctuary
ND = Not Determined

There are no federal government PAs in the Niger Delta. The PAs are all state-level, most of them being forest reserves, lacking infrastructure, management plans, budgetary allocations and staff to manage them. There is no enforcement of any regulations,

for example related to protection from hunting or tree cutting. These areas are, in essence, “paper parks” where illegal logging and poaching is rampant. The marine and coastal biodiversity is not protected either by state or federal laws.

In Nigeria, there are 11 Ramsar sites, with a total coverage of 1,076,728 hectares. Three of these sites are in the Niger Delta, namely – Apoi Creek Forest in Bayelsa State, Upper Orashi Forests in Rivers State, and Oguta Lake in Imo State, along the River Niger Floodplain. It is noteworthy that Taylor Creek and Nun River Forest Reserves have recently been proposed

as additions to the list. In a comprehensive study of wetlands in Nigeria to identify candidate sites for Ramsar designation, NCF (2002) reported that additional wetlands in the Niger Delta, including the Akassa Forests, Taylor's Creek and Nun River also met the Ramsar criteria.

5.2 Niger Delta Environment Survey (NDES), 1998-2004

The atmosphere of local discontent and public and international outcry over economic and social dislocation in the Niger Delta in the mid-1990s led to the establishment of the Niger Delta Environment Survey, initiated by SPDC in 1995, but executed in concert with the Oil Producers Trade Section (OPTS). The objectives of the NDES were to work “in concert with communities and other stakeholders to undertake a comprehensive survey of the Niger Delta, establish the causes of ecological and socio-economic change over time and induce corrective action by encouraging relevant stakeholders to address specific environmental and related socio-economic problems identified during the survey to improve the quality of life of the people and achieve sustainable development in the region” (NDES, 2005).

Conducting the survey involved many experts at home and abroad. It was conducted in two phases, thereby extending its envisaged duration from 18 months to 66 months and overshooting its budget by a substantial amount. One of its aims was to produce an Indicative Niger Delta Masterplan that was to encompass a strategy for biodiversity and related aspects. In the final analysis, it ended up producing an enormous amount of data that for Phase 2 alone was documented in 52 volumes most of which have not been released in the public domain. It also did not provide concrete

proposals for a biodiversity strategy of the wider Niger Delta.

At best, and for the very few who currently have access to its voluminous reports, the main achievement of the NDES exercise is that it presents data that could be used to establish baselines going back to the mid- and late 1990s. The survey also identified 16 sites which are rich in biodiversity that was deemed suitable for conservation (See Table 7). Some of these sites were not previously on the radar of conservationists.

The NDES experience also demonstrates the challenges of developing multi-stakeholder platforms to address biodiversity (and social) issues in the Delta. Although initiated by SPDC, other members of the Oil Producers' Trade Section (OPTS) of the Lagos Chamber of Commerce and Industry agreed jointly to provide limited funding in the expectation that contributions will come from other national and international stakeholders. NDES was also conceived as an independent body steered by a Committee with balanced representation from communities, government, national and international NGOs, the UN and academic institutions. In practice, however, NDES became largely an SPDC affair with other players showing little interest to fund or participate in its activities.

Table 7: Sites rich in biodiversity and suitable for conservation

1	Taylor Creek Forest Reserve	9	Nun River Forest
2	Upper Orashi River Reserve	10	Lower Orashi River Reserve
3	Apoi Creek Reserve	11	Edumanon (Etiema/ Okoroba) Forest
4	Egbedi Creek Forest	12	Ikibiri Creek Forest
5	Andoni Game Sanctuary	13	Ikodi Bird (Parrot) Sanctuary
6	Pennington River Mangrove and Forest	14	Buan Forests
7	Sombreiro River Mangrove and Forest	15	Uzere Forests
8	Brass River Mangrove and Forest	16	Ibendo Forest Reserve

(Source: NDES, 2005)

5.3 National strategies

Nigeria's National Conservation Strategy (NCS) was the first attempt to redress the problem of lack of a national framework for biodiversity conservation in the country. It was developed in 1985 by the then Natural Resources Conservation Council (NARESCON). It covered three categories of biological resources, namely: forest and forage resources, fisheries and marine resources and wildlife resources. Amongst others, the NCS aimed to:

- Formulate a clear National Forest Policy defining the forest estate and forestry objectives as well as a National Policy for Wildlife Found Outside of Conservation Areas;
- Discourage state governments from de-reserving protected areas;
- Provide in the National Development Plan for the establishment of conservation areas; and
- Ensure that fisheries, especially breeding grounds, are pollution free.

Since then, Nigeria has become a signatory to the Convention on Biological Diversity (CBD) and as a requirement of the Convention, developed a National Biodiversity Strategy and Action Plan (NBSAP) in 2006. A process of revising and updating the NBSAP commenced in 2012 and has identified the following issues, amongst others, as priorities for action.

- Recognition of national parks as Nigeria's reservoir of biodiversity;
- Special focus on the Niger Delta;
- Creation of a platform for the Biodiversity Sensitivity Index to protect major watersheds and important wetlands; and
- The need to mainstream biodiversity, especially in marine and coastal resource management.

- The points of entry in mainstreaming, with regard to coastal and marine resources management, were identified as:
 - The outcome of the Gulf of Guinea Large Marine Ecosystem Project which carried out an ecosystem assessment and developed a strategic action plan that were aimed at assisting countries in the Gulf of Guinea marine ecosystem to manage coastal resources in a more sustainable manner;
 - The outcome of the Niger Delta Environmental Survey, which documented the biodiversity and habitat characteristics of the Niger Delta and also addressed wetland values in relation to socio-economic development. However, after over 10 years, the NDES is considered outdated and does not provide up-to-date information on the current status of biodiversity and its challenges in the Niger Delta. As a consequence there is a need for a follow up survey on the current realities and challenges of biodiversity conservation; and
 - The paramount need to establish a Marine Park under Category II of IUCN, in order to ensure that the ecosystems in Nigeria are fully represented in the network of nationally protected areas.

The revision and update of the NBSAP was carried out in November 2015 and it presented an opportunity to serve as a framework for the development of regional strategies such as in the Niger Delta. This will be an improvement from business-as-usual where policies are developed at the Federal level and either remain there, or at best are aligned with those of State governments, leaving a gap at the regional level.

5.4 Niger Delta Regional Development Master Plan (NDRDMP)

The NDRDMP developed by the Niger Delta Development Commission (NDDC) in 2002 sets out some strategic goals and policies for the management of the Delta's natural environment. So far, this is the only serious attempt at regional biodiversity planning in Nigeria. The goals on the natural environment as listed in Section 5.9 of the Master Plan include to:

- Protect the biodiversity and ecosystems and preserve the natural heritage of the Niger Delta region;
- Give priority to the protection of areas that are of international importance or designated at the national level;

- Ensure equitable and sustainable use of the environment and natural resources for the benefit of present and future generations, and
- Incorporate environmental considerations in all policies and programmes for the Niger Delta.

The NDRDMP also includes 15 policy commitments of which the following are directly relevant to the current study:

- NDDC will undertake a comprehensive review of the protected areas and biodiversity status in the Niger Delta;
- All policies for development in the region shall be subjected to sustainability appraisal in respect of their impact on natural resources including biodiversity;
- Consideration will be given to the creation of a Sustainable Development Forum with the

responsibility of maintaining an overview on sustainable development matters, including biodiversity issues in the region;

- Efforts shall be made to move the responsibility to manage biological resources more to the local level;
- Create and strengthen programmes for stakeholder participation in key areas of land, fisheries and forest management; and
- In oil-impacted areas, an intensive programme of remedial action will be prepared in consultation with the local communities and other stakeholders. Action programmes will be implemented to tackle environmental pollution and degradation due to oil and gas operations.

It is an indication of the absence of political will that 13 years after these goals and policies were adopted, they have not been implemented.

5.5 UNEP's Environmental Assessment and Hydrocarbon Pollution Restoration Project (HYPREP) in Ogoniland

This initiative has assessed various aspects of the impact of oil pollution on a sub-region, Ogoniland, within the Niger Delta. It has also developed and is beginning to implement a wide ranging restoration plan that will include the rehabilitation of the mangrove vegetation. The assessment phase was an independent study, conducted at the request of the Federal Government of Nigeria by the United Nations Environment Programme (UNEP, 2011). It revealed the nature and extent of oil contamination in Ogoniland. It covered contaminated land, groundwater, surface water, sediment, vegetation, air pollution, public health, industry practices and institutional issues. Among its findings, the following extracts are directly relevant to biodiversity;

- Oil pollution in many intertidal creeks has left mangroves denuded of leaves and stems, leaving roots coated in a bitumen-like substance, sometimes 1 cm or more thick. Mangroves are spawning areas for fish and nurseries for juvenile fish and the extensive pollution of these areas is impacting the fish life-cycle.
- When an oil spill occurs on land, there is a possible fire out break if not properly managed. Where a fire follows a spill, vegetation is damaged and a crust is created over the land, making remediation or re-vegetation difficult.

- Channels have been widened and the resulting dredged materials are clearly evident in satellite images, decades after the dredging operation. Without proper rehabilitation, former mangrove areas which have been converted to bare ground are being colonized by invasive species, such as Nipa Palm (which appears to be more resistant to heavy hydrocarbon pollution than native vegetation).
- In Bodo West, in Gokana LGA, an increase in artisanal refining between 2007 and 2011 has been accompanied by a 10% loss of healthy mangrove cover, or 307,381 m². If left unchecked, this may lead to irreversible loss of mangrove habitat in this area.
- The wetlands around Ogoniland are highly degraded and face disintegration. The study concludes that while it is technically feasible to restore effective ecosystem functioning of the wetlands, this will only be possible if technical and political initiatives are undertaken.

The report of the assessment was completed in 2011, and it contains several recommendations amongst which are the decontamination of soils and the restoration of swampland and mangrove habitats.

As a result of this assessment, in 2012, the Federal Government established the Hydrocarbon Pollution

Restoration Project (HYPREP) under the control of the Ministry of Petroleum Resources. Although initially focused on Ogoniland, the broader mandate of HYPREP is to:

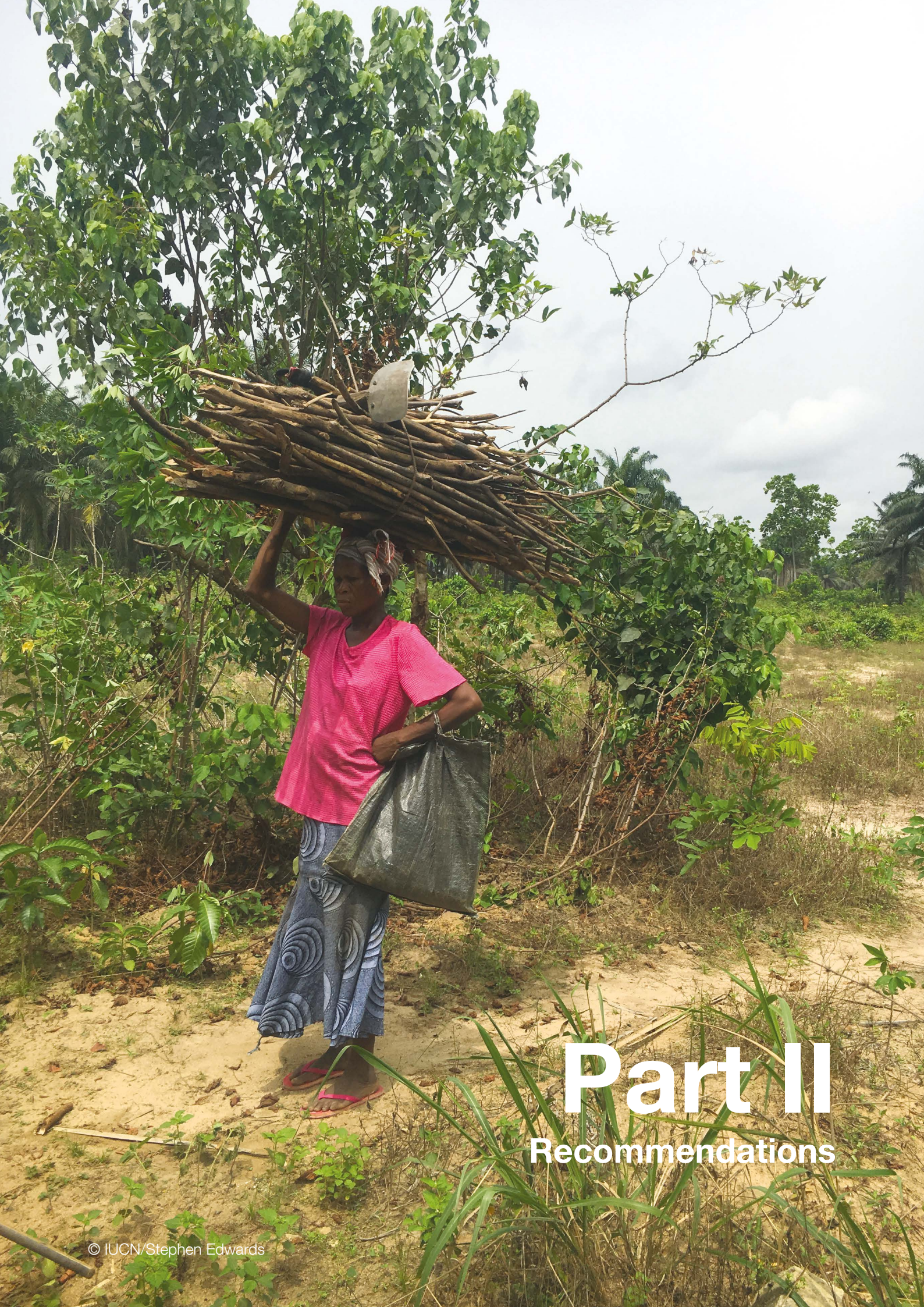
- Investigate and evaluate all hydrocarbon polluted communities and sites in Nigeria and make recommendations to the Federal Government;
- Restore all communities and sites established as impacted by hydrocarbon pollution in Nigeria, and any/all matters that the Federal Government may assign to it; and
- Implement the actionable recommendations in the UNEP assessment report on Ogoniland.

5.6 UNDP/GEF Niger Delta Biodiversity Project

This project started in 2013. Its goal is to contribute to the conservation and sustainable use of globally significant biological diversity in the Niger Delta. The project objective is “to mainstream biodiversity management priorities into the Niger Delta Oil and Gas sector development policies and operations.” The project’s three main outcomes designed to achieve this objective are:

- ◇ Strengthening by stakeholders of the governance framework of law, policy, and institutional capacity to enable the mainstreaming of biodiversity management into the oil and gas sector in the Niger Delta;
- ◇ Adoption and piloting by Government, the oil and gas industry and local communities of new biodiversity action planning tools for proactive biodiversity mainstreaming in the Niger Delta; and
- ◇ Stakeholder support of long-term biodiversity management and the use of these new tools in the Niger Delta by capitalizing the Niger Delta Biodiversity Trust with a collaborative engagement mechanism for local communities, oil and gas companies, and Government at its core.

This is an ambitious project that holds much promise in addressing the fundamentals of integrating biodiversity considerations into the operations of the oil and gas industry in the Niger Delta.



Part II

Recommendations

INTEGRATION OF BIODIVERSITY CONSIDERATIONS INTO SPDC'S OPERATIONS AND CONTRIBUTIONS TO THE WIDER BIODIVERSITY STRATEGY OF THE NIGER DELTA

6.1 SPDC effort at biodiversity management

SPDC is the industry leader in terms of consideration given to biodiversity in Nigeria's O&G industry operations. This is not surprising since, as the dominant company in the country, it has had to shoulder a lot of the blame for the shortcomings of the sector in this regard. It has developed internal processes and procedures to address biodiversity in its operations, many of which are adaptations from its parent company, Shell International. In certain areas such as the development of Biodiversity Action Plans (BAPs), SPDC has established good practice, which is being showcased at national and international levels.

It is a mark of its demonstrable leadership that SPDC is involved in several collaborative biodiversity initiatives in the Niger Delta. These include IUCN-NDP, UNEP-Ogoni Restoration Project, UNDP-GEF Niger Delta Biodiversity Project, Wetlands International Sustainable Livelihoods and Biodiversity Project and others. It has also developed

internal biodiversity standards and requirements to guide its operations.

In this report, IUCN-NDP and its commissioned Nigerian experts have examined SPDC's current policy documents and their implementation with a view to making recommendations for improvement. The aspects studied include;

- SPDC Biodiversity Strategy 2012–2017 and its implementation;
- SEPCiN Impact Assessment Process Manual and its implementation;
- Biodiversity Action Plans;
- Oil Spill Response and Remediation Management Systems;
- Conceptual Site Models;
- Outline of Mangrove Management Guide;
- Community participation and stakeholder engagement; and
- Biodiversity in offshore operations

6.2 SPDC Biodiversity Strategy 2012–2017

This document outlines the main thrust of SPDC's strategy for mainstreaming biodiversity into its operations, which is to formulate and implement BAPs and to undertake the restoration of mangroves. BAPs are widely acknowledged as a useful tool for integrating biodiversity considerations into O&G industry operations and SPDC's prioritization of this tool is commendable. Similarly, the importance of the Niger Delta's mangrove ecosystem to national and global biodiversity, and its susceptibility and exposure to damaging oil industry activities justify the focus on mangrove restoration.

The IUCN-NDP supports the main priorities identified in the Strategy but notes that more than half way into the period covered by the Strategy, the BAP for Gbanran-Ubie is still in draft form. IUCN-NDP also notes that SPDC has implemented several mangrove restoration projects and that it has initiated the development of a systematic and coherent process for mangrove restoration in the Delta.

The Biodiversity Strategy document is concise and only elaborates on the two strategic focus areas highlighted above. The Panel is of the view that an accompanying document that sets out more broadly

the many ways in which SPDC deals with biodiversity, including how it ensures that practice complies with local regulation and Shell's global HSSE and SP Control Framework requirements, and aligns with OSRRMS and SEPCiN Impact Assessment systems will be a good communication tool for the company.

Recommendation 1: Speed up the implementation of the 2012–2017 SPDC Biodiversity Strategy by completing the Gbanran-Ubie BAP and the Mangrove Management Guide for the Niger Delta in the first half of 2017 and commence their implementation immediately thereafter. Also Strategy should set

6.3 Biodiversity Action Plans

The company Biodiversity Strategy, which in theory is soundly formulated to respond to the local context, finds its clearest practical expression in the company's Biodiversity Action Planning. SPDC has commissioned more Biodiversity Action Plans and has executed them much better than any other institution working in the Niger Delta. This is an area where the company is by far ahead of the rest of the O&G industry in the Delta.

However, the recommendations here are aimed at improvement rather than criticism. IUCN-NDP is of the view that one of the planks on which both the Strategy and Action Plans should rest is the participation of affected and relevant local communities, through schemes that engender support for facility protection, oil spill remediation and biodiversity protection and rehabilitation.

IUCN-NDP is aware that extensive consultations were held with members of the various communities particularly in the development of the Gele Gele and Uronigbe BAPs by SPDC's consultants. However responses to our questions suggest that in at least one of these sites, the enterprises that the project sought to promote were determined by the consultants without adequate consultation of the beneficiaries; the funds for micro-enterprises were poorly administered and the project did not take into consideration the illegal use of bioresources. These could pose challenges during BAP implementation.

6.4 Remediation Standard

IUCN-NDP is pleased to see that in the revised OSRRMS, SPDC has implemented the IUCN-NDP (2013) recommendation to redefine its receptors

quantitative targets for the number of BAPs to be developed/ implemented in known AHBVs threatened by SPDC's operations.

Recommendation 2: Produce a document that highlights how SPDC comprehensively addresses biodiversity and ecosystem services in its operations and how its Biodiversity Strategy aligns with national and international standards as well as the linkages between its work on biodiversity and other areas, such as community relations, oil spill response and remediation, as well as HSE.

Recommendation 3: SPDC can improve its interventions in this regard by:

- Ensuring that SPDC BAPs are made to conform better with IPIECA guidelines by involving local stakeholders more deeply at the various stages of the BAP process; and
- Supporting the enforcement of laws against bioresources abuses.

Recommendation 4: In addition to the above, the following actions are recommended to improve the baseline studies towards better monitoring of change in BAPs:

- Adequate time should be allocated to the survey of the biodiversity components of planning sites to enhance thoroughness;
- Where possible, effort should be made to include night sampling in the surveys to cover nocturnal animals, although the Panel recognizes that this may be difficult due to security concerns; and
- Where possible, advanced technologies, e.g. camera-trappers and remote sensing, should be included in the surveys to cover sites that are inaccessible because of difficult terrain or security challenges.

to take account of biodiversity. It is also pleased to note that SPDC has made efforts to identify specific components of biodiversity as receptors in the draft

Conceptual Site Model framework. IUCN-NDP will make further recommendations in this regard under the relevant section of this report.

The broad definition of biodiversity given in the revised OSRRMS is very good as it follows the internationally accepted norm adopted by the Convention on Biological Diversity. However the Panel notes that Areas of High Biodiversity Value (AHBV) are defined as only those belonging to protected areas in IUCN Categories V and VI. This might be an inadvertent error since Shell standards encompass IUCN I–VI as well as the IFC's Performance Standard 6.

Recommendation 5: Update the definition of Areas of High Biodiversity Value (AHBV) in the SPDC Remediation Standard and develop detailed manual and guidelines to support relevant SPDC teams involved in various remediation and rehabilitation stages in implementation of the updated standard.

However, an area which remains unresolved is the IUCN-NDP (2013) recommendation on deeper engagement of communities in SPDC's oil spill remediation and biodiversity rehabilitation process. Here we revisit this aspect based on our findings in the field that some communities do not fully cooperate in the protection of pipelines, early detection and reporting of pipeline

leakages and oil spills because they feel, rightly or wrongly, that SPDC might be in breach of the GMoU with them. Furthermore, there were noticeable weaknesses in some Pipeline Protection Task Forces (PPTF). The IUCN-NDP is aware that the primary responsibility for security rests with government agencies and that SPDC exercises very little influence over their operations. However we recommend that it works on the following measures:

Recommendation 6:

Strengthen SPDC relationship with communities affected by its operations by ensuring that community leaders comply more strictly with the terms of any Memoranda of Understanding agreed with communities;

Provide support in the employment of better fortified and organised PPTFs formed from the communities to guard segments of pipelines traversing the communities; support the recommendation that each task force, to be headed by a member of the Joint Task Force (JTF), will have the responsibility of promptly reporting any pipeline leakage or spill, providing and facilitating access to clamping of the facility and ensuring that oiled bush is not set on fire; the JTF heads of Task Forces should be periodically changed, while defaulting or non-performing PPTFs should be promptly replaced.

6.5 SEPCiN Impact Assessment Process

The Impact Assessment Process manual used by SPDC in Nigeria is robust and in conformity with both national and international standards. However, due to the peculiarities of the Niger Delta, especially regarding the security situation, implementation is often adapted to the prevailing conditions. In our interviews with some consultants used by SPDC to conduct EIAs, they enumerated the following challenges;

- The absence of standard biodiversity indicators for different types of impacts in different ecozones.
- SPDC teams responsible for EIA mainly focus lower down on the mitigation hierarchy. Recommendations that go beyond avoiding or minimizing impacts are seen to be outside their scope;
- Sometimes, EIAs have limited coverage, such as ecological monitoring undertaken during one season only, or very short duration, or day-time assessment only, or only at one or two stages of the project; and

- Consultants may lack appropriate tools which are expensive such as camera traps or binoculars with cameras.

Recommendation 7:

- SPDC to take advantage of the findings of this report and specifically Annex II of the 2013 report to identify specific indicators for use, and applying these to monitor biodiversity changes in different ecozones;
- Ensure effective linkage between SPDC teams responsible for EIAs with those responsible for BAPs so that EIA recommendations will extend beyond avoiding or minimizing impacts to include activities that result in benefits to biodiversity such as support for research.
- Where appropriate, make EIAs more thorough by stretching them to cover
 - ◇ Two seasons – dry season and wet season;
 - ◇ Field observations of at least 2 – 4 weeks duration; and

- ◊ Sampling also at night to accommodate nocturnal animals
- Where appropriate, include equipment (such as camera-trapper and binoculars with cameras) in the contract for EIAs, so that consultants will be able to acquire them; and
- Where there is likelihood of significant biodiversity impact and/or in AHBVs, consider pre-construction, construction and post-construction ecological monitoring for flora and fauna in all habitats, for better prediction of changes in biodiversity.

6.6 Conceptual Site Models (CSMs)

IUCN-NDP commends SPDC for the development of a framework for its Conceptual Site Models (CSMs), which it intends to use for the remediation and rehabilitation of biodiversity in oil spill sites in the Niger Delta. IUCN-NDP welcomes the comprehensive list of potential biodiversity receptors in SPDC's framework. To support the identification of the most appropriate receptors in each ecological zone, IUCN-NDP commissioned a small group of Nigerian experts to propose a short and manageable list for SPDC's consideration. A summary of the result of this exercise is shown in Table 8.

The scope for redefinition of receptors in the management of biodiversity against impacts of the oil and gas industry in the Niger Delta is greatly expanded by this study, through the detailed description of the critical biodiversity components of the region and through the analysis in Annex II of the 2013 report. The main ecological zones with their biodiversity conservation importance are characterized. Sites that harbour species of conservation concern because

the species are rare, endemic or threatened, and the species themselves, have been highlighted, while many species and life forms that are sensitive, as adults or at their early developmental stages, and therefore have the potential to serve as biomarkers, to oil pollution or to agents used in combating oil spills, have been identified.

The various animal forms that have been listed as potential receptors are those which are known to be highly susceptible to oil pollution. In addition, the green algae, floating macrophytes like *Nymphaealotus*, *Azolla* sp., *Lemna* sp., *Pistia striatolites*, *Ceratophyllum demersum* and submerged macrophytes like *Cyrtosperma senegalense*, *Polygonium* sp and *Nephrolepis biserata*, can also be used as indicators/receptors as they too are sensitive to oil contamination.

Recommendation 8: Based partly on the information above, recommended receptors for the three main ecological zones of the Niger Delta are summarized in the table below.

Table 8: Potential receptors for the main ecological zones of the Niger Delta

Vertebrates					
(Reptiles)	<i>Osteolaemus teraspis</i>	Short nose crocodile	+		+
	<i>Crocodylus niloticus</i>	Nile Crocodile	+	+	+
	<i>Peliosus niger</i>	Mud turtle	+		+
	<i>Python sebae</i>	Rock python	+		+
	<i>Python regius</i>	Royal python	+		+
	<i>Calabaria reinhardtii</i>	Calabar python	+		+
	<i>Lygosoma fernandi</i>	Red /fire skink	+		+
(Amphibia)	<i>Amietophrynus</i> sp (tadpoles)	Common toad	+		+
	<i>Ptychadaena</i> sp (tadpoles)	Frogs	+		+
	Caecilians	Leg-less amphibians	+		+
Pisces	<i>Periophthalmus</i> sp	Mudskipper	+	+	
	<i>Bostrychus africanus</i>	Sleeper Goby		+	
Invertebrates					
	<i>Pilaovata</i>	Water snail	+		+
	<i>Archachatina</i> sp	African Giant snail	+		+
	<i>Neritina</i> sp			+	
	<i>Egeria raddiata</i>	Freshwater clam			+

Taxa	Species name	Common name	Coastal Barrier Is	Mangrove Swamp forest	Freshwater Flood & swamp forest
	<i>Anadara</i> sp	Estuarine Clam		+	
	<i>Thais</i> sp	Whelk		+	
	<i>Tympanotonus fuscatus</i> sp	Spiny Periwinkle		+	
	<i>Pachymelania aurita</i>	Smooth-shelled Periwinkle			
	<i>Crassostrea</i> sp	Oyster		+	
	<i>Polychaeta (Capitellacapitata)</i>	Rag worm		+	
	<i>Nereis</i>	-do-		+	
	<i>Tubifex</i> sp	Oligochaete worm			+
	<i>Alma</i> sp	Oligochaete worm	+		+
	<i>Nais</i> sp	Oligochaete worm	+		+
	<i>Huridinea</i> sp	Leech	+		+
	Chironomid larvae	-			+
	Ocypod crab e.g <i>Ucatangeri</i>	Ghost crab		+	
	Shrimps	Mud shrimp larvae		+	

(Source: Okali *et al*, 2015)

6.7 Community and other stakeholder engagement

In the late 1980s, SPDC organized a series of environmental workshops where stakeholders were invited. In these workshops, SPDC consulted widely with community stakeholders on planned programmes and projects, which dealt with environmental and community matters. These workshops were found to be particularly useful in bridging the information gap between planned activities and their implementation. Through these workshops, community representatives and NGOs were fully briefed and their

confidence was enhanced as objections to approaches were dealt with prior to the start of the planned project activities. Following the introduction of GMoUs, these workshops were discontinued.

Recommendation 9: Reformat and re-introduce an annual Biodiversity Stakeholder Forum to contribute to regular engagement with biodiversity experts to exchange information for conservation of biodiversity.

6.8 Biodiversity considerations in the off-shore environment

IOCs are increasingly divesting their assets onshore and moving to the off-shore environment for exploration and production activities. The Nigerian sector falls under the Gulf of Guinea Large Marine Ecosystem (GOG-LME) whose biodiversity is rich and not well documented. In this changing architecture of ownership of oil and gas operations, SPDC will be faced with two crucial questions:

- What happens to the biodiversity projects SPDC initiated in its divested assets?
- How does SPDC fully take account of biodiversity in its operations in the challenging offshore environment?

Recommendation 10: SPDC's transfer arrangements with new owners of its divested assets should include provisions for passing on at least, SPDC-developed biodiversity conservation practices.

Recommendation 11: SPDC should expand its biodiversity conservation responsibilities to cover adequately the marine environment in its off-shore undertakings.

DEVELOPING AND IMPLEMENTING A NIGER DELTA BIODIVERSITY STRATEGY

Despite the local, national and global significance of Niger Delta biodiversity, the region suffers from the lack of a plan that communicates a clear message on the strategic vision for its critical species, sites and habitats. Furthermore there is also a lack of a comprehensive vision how such a plan will be realized.

Our findings have identified six main challenges that need to be addressed if an effective strategy for the wider biodiversity of the Niger Delta is to be developed and implemented. These relate to policy, legislation,

institutional coordination, capacity, research, monitoring and information management, as well as funding. This chapter will examine each of these areas, identify the challenges, and propose recommendations to address them. The recommendations in this section are beyond the remit of SPDC and are mostly addressed to government agencies as having the primary interest and mandate to develop a wider Niger Delta biodiversity strategy. However, the government will need the support and collaboration of all stakeholders, especially those in the oil and gas industry.

7.1 Policy

Although the National Policy on Environment (NPE), the National Biodiversity Strategy and Action Plan (NBSAP) and the Niger Delta Regional Development Master Plan (NDRDMP) set out the broad policy goals on biodiversity, such goals are lower in priority when they compete with other sectors such as infrastructure, agriculture or oil and gas. Most policies in the social and economic sectors do not take any account of biodiversity considerations.

At the state level, biodiversity barely gets a mention in policy documents. Rather, components of it are regarded as raw material for other sectors. For example, aspects of plant biodiversity are only addressed in forest policies. Meanwhile, the main focus of the forest policies is on the management of forests for timber exploitation. This stripping of biodiversity into its sub-components is an impediment to a holistic understanding of its importance. It also results in overlap and duplication of goals and programmes.

In Nigeria in general, policies are poorly coordinated amongst ministries and agencies at either the federal or state level and between the two tiers. This lack of coherence leads to high transactional costs and inefficiencies in achieving objectives. Better coordination and coherence will reduce duplication

and fragmentation while pooling resources in a more efficient manner. The existing confusion in the policy framework is a major barrier to developing a strategy to address the biodiversity of the wider Niger Delta.

The NDRDMP through its goals sketches out a vision for biodiversity in the Delta but it does not provide enough guidance for a strategic approach to operationalise its goals. Other policies and guidelines for the oil and gas industry such as EGASPIN (2002) and the National Oil Spill Contingency Plan do not address impacts on biodiversity or its rehabilitation.

Recommendation 1.1: Ensure policy coherence by adopting a scheme that requires Strategic Environmental Assessments (SEA) to assess the effects of certain policies, plans and programmes on biodiversity in the Niger Delta.

“SEA is a systematic process for evaluating the environmental consequences of proposed policy, plan or programme 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” (Sadler and Verheem, 1996).

The basic SEA process is similar to that of Environmental Impact Assessment (EIA) for projects, but SEA is not carried out to the same level of detail. SEA is generally more broad-brush, less detailed and quantitative, and more focused on broad directions of change although the precise level of detail will depend on the particular policy/plan/programme.

SEA is intended to help achieve a high level of environmental protection and is identified in key international agreements (notably the Convention on Biodiversity and the Ramsar Convention to which Nigeria is a signatory) as an important tool for promoting the conservation and sustainable use of biodiversity. This is consistent with two key principles for the conservation and sustainable use of biodiversity:

- The **precautionary** principle implies a presumption in favour of biodiversity protection where the knowledge required for effective mitigation or compensation for a significant adverse impact is lacking, as is often the case in the Niger Delta. It should also apply in situations where there is sufficient evidence to suggest that adverse impacts are possible, but not enough to confirm 'no significant impact'; and
- The **'no net loss'** principle requires the status quo to be maintained in terms of quantitative and qualitative aspects of biodiversity (how much is there, what there is, how it is structured and distributed). Nigeria is signatory to international agreements based on the premise that further losses of biodiversity must be arrested.

SEA can help to ensure that plans are consistent with policies and priority actions for biodiversity conservation, protection and sustainable use, notably with systems for site-designation and species-protection and with BAPs.

Recommendation 1.2: Ensure effective integration of biodiversity into the National Oil Spill Contingency Plan.

Recommendation 1.3: Build on past and ongoing initiatives to develop a regional biodiversity management strategy and action plan for the Niger Delta.

7.2 Legislation

Annex II of the Panel's seminal report (IUCN-NDP, 2013) outlines the legal framework for biodiversity nationally and in the Niger Delta. They show a multiplicity of laws that are not aligned or in synergy with each other. The

The World Bank (1995) has pointed out that mainstreaming biodiversity in development will entail the following:

- (i) Engaging and empowering local communities, NGOs and other stakeholders as partners in designing and implementing projects;
- (ii) Providing for financial sustainability, including stable recurrent cost financing;
- (iii) Monitoring and evaluating arrangements in projects and adopting an action-learning approach with the flexibility to adapt project activities to take account of lessons learned during implementation; and
- (iv) Promoting biodiversity conservation at the macro level, so that including biodiversity as a subset of environmental concerns is considered appropriate when economic wide policies and development programmes are determined.

This chapter has recommendations on each of the above aspects. Stakeholders should draw on these to promote the building of a regional biodiversity management strategy and action plan for the Niger Delta that draws on past initiatives to:

- Provide a regional component of the National Biodiversity Strategy and Action Plan for Nigeria (NBSAP);
- Build on the resources of the Niger Delta Environmental Survey (NDES) to focus on biodiversity management and conservation action;
- Actualize the initiatives in the Niger Delta Development Commission (NDDC) Master Plan,
- Build on the ongoing GEF/UNDP/FGN Study to promote the use of bioresources on a sustainable basis and the mainstreaming of biodiversity in all activities of the oil and gas companies; and
- Incorporate local BAPs.

Recommendation 1.4: Promote the development and implementation of BAPs in areas that are important for biodiversity. Develop guidelines for BAPs adapted to the Niger Delta and share best practice among stakeholders.

oil sector is the dominant revenue earner for all tiers of government in Nigeria and the laws, at various levels, reflect this by promoting the interest of that sector to the exclusion of other competing interests.

In Nigeria, the Environmental Impact Assessment (EIA) Act is the main legislation for regulating the potential impacts of the oil and gas and other industries on the environment. The EIA process in Nigeria is company-led as opposed to other countries such as the USA, where government takes the lead. The former is most appropriate in Nigeria for practical considerations since Nigerian government agencies do not have the resources or capability to satisfy the potential demand.

However, the way it currently stands, the law does not adequately address the existing set of applicable government standards and requirements relating to biodiversity or the protection of biological resources. It falls short in several ways including;

- The EIA guidelines do not have clear biodiversity management standards and management objectives.;
- The law does not adequately address secondary impacts on biodiversity such as when the laying pipelines for oil transportation provides access for hunters to indiscriminately kill wildlife;
- It does not make enough provision to monitor impacts on biodiversity at relevant stages throughout the life of a project, ensure compliance with terms and conditions of approval, monitor the impacts of development and the effectiveness of mitigation measures, take any actions necessary to ameliorate problems, and provide feedback to improve future applications of the ESIA process;
- There is weak and ineffective government supervision of the process; and
- There is insufficient transparency and accountability. Stakeholder consultation during the EIA process is often inadequate and the process and duration of review and feedback at the Federal Ministry of Environment is unsatisfactory.

In two attempts to carry out a major overhaul of oil and gas legislation in Nigeria, the sixth and seventh National Assemblies have failed to enact a Petroleum Industries bill (PIB) into law. The Bill would have provided omnibus legislation that consolidates and updates the provisions of several statutes into a single Act. In its most recent form, it had the following relevant provisions:

- Environmental quality management through submission of environmental programme/ environmental quality management plan;
- Consultation with state departments;
- Financial provision by licensee/lessee for remediation of environmental damage;

- Financial provisions by state and local governments, in cases where damage has been caused by sabotage;
- Decommissioning and Abandonment in accordance with guidelines issued by the National Petroleum Inspectorate;
- Restoration in the aftermath of harm to the environment (i.e. compensation only will no longer be acceptable); and
- Implementation of specific community development projects aimed at ameliorating the negative impacts of petroleum activities to encourage and ensure peace and development in the petroleum producing areas of the country.

Recommendation 2.1: Strengthen the EIA Act by ensuring effective supervision by Government as well as more transparency and accountability. The EIA should also include the identification and monitoring of both primary and secondary impacts at relevant stages in the project life cycle.

The National Assembly is currently in the process of revising and updating the EIA Act. The revision should take account of the following:

- a) Ensure effective supervision of the EIA process by Government;
- b) Ensure sufficient transparency and accountability during the consultation and review and feedback phases;
- c) Adequately address secondary impacts on biodiversity.
- d) Include the monitoring of impacts on biodiversity at relevant stages throughout the life of a project, and
- e) Incorporate clear biodiversity management standards and management objectives in the EIA Guidelines.

Recommendation 2.2: Pass a PIB that, at the minimum, retains the provisions for biodiversity that are contained in the most recent draft.

The PIB has been with the National Assembly in one form or the other since 2008. The Parliament has failed to pass the bill due to serious contention regarding some of its key provisions. There is growing consensus that the bill was highly contested because of its broad scope. Previous drafts seek to, among others, restructure the regulatory and commercial institutions in the petroleum industry, change the fiscal dynamics and reform the operational mechanisms of the upstream, downstream and natural gas industries. The strategy of the current administration is to break it

down and submit separate aspects as bills for passage by the national assembly. They have prioritized the governance aspect and have submitted the “Petroleum Industry Governance Bill” for consideration by the parliament.

In the next submission of the bill to Parliament, we recommend the prioritisation of the following provisions:

- a) Environmental quality management through submission of environmental programme/ environmental quality management plan;
- b) Financial provision by licensee/lessee for remediation of environmental damage;
- c) Restoration in the aftermath of harm to the environment (i.e. go beyond “compensation and remediation” to include biodiversity rehabilitation); and
- d) Establishment of a Trust Fund.

7.3 Institutional coordination

Annex I of this report lists some of the institutions at federal and state government levels that have some form of oversight on biodiversity and oil and gas operations in the Niger Delta. It can be surmised that the institutional context with regard to biodiversity management in the operations of the oil and gas industry is quite complex. There are too many regulators, often with similar or overlapping mandates. There is dire need for better coordination, both vertically and horizontally.

Although the situation is not as bad with the private sector, it is also challenging. On most issues, oil and gas companies collaborate very closely under the umbrella of the Oil Producers Trade Section (OPTS) of the Lagos Chamber of Commerce and Industry. However, on biodiversity rehabilitation, there is a distinct lack of appetite for such collaboration. This is one of the key lessons learnt from the experience of the Niger Delta Environment Survey (NDES), where what was supposed to be an independent initiative with participation and financial contributions from all companies ended up being an exclusively SPDC affair.

Recommendation 3: Create a region-wide stakeholder collaborative mechanism that involves community representatives, governments at all levels and oil and gas companies with the purpose of joint planning, implementation and monitoring of biodiversity projects that are beyond the scope of any one stakeholder, as well as joint learning and sharing of best practice.

The success of recommendations to rehabilitate biodiversity is directly linked to involvement of the wider oil industry in the biodiversity strategy because in some cases, there are operational overlaps amongst operators and proximity of receptors to onshore/ offshore spills makes this a concern for all.

Therefore, there is a need for collaboration within the oil industry under an umbrella institution to facilitate better and quicker access to modern scientific technology, materials and equipment to respond to major oil spills within 48 hours. For offshore sites especially, produced water is appearing to be an increasing concern, showing up residues for PAHs and its intermediaries, which will have significant impacts on marine life. Several international oil & gas companies are operating offshore and since there is no easy way to delineate or apportion responsibilities in such offshore situations, this could be a project for the wider involvement of oil and gas companies operating in Nigerian waters.

This ethos cuts across boundaries of the oil industry. It calls for shared responsibility for better trained contractors and CBOs delivering similar projects for remediation and the rehabilitation of biodiversity in the Niger Delta.

Two federal entities plan initiatives in this regard;

- The Niger Delta Development Commission (NDDC) states in the Niger Delta Regional Development Master Plan (NDRDMP) that it will give consideration to the creation of a Sustainable Development Forum with the responsibility of maintaining an overview on sustainable development matters, including biodiversity issues in the region; and
- The Federal Ministry of Environment is implementing the GEF/UNDP Biodiversity Project. Outcome 3 of the project aims to ensure that stakeholders support long-term biodiversity management in the Niger Delta by capitalizing and accessing the Niger Delta Biodiversity Trust (NDBT) as a collaborative engagement mechanism for local communities, oil and gas companies and Government at its core.

In addition, a body or group to be known as Nigerian Oil Spill Response Volunteers Organization (NOSRVO) should be established. The group can be organized

in partnership with the relevant competent authority of the Federal Government (The Nigerian National Volunteers Service) to help facilitate the process. The necessity to build a strong volunteer network that will develop grassroots awareness and interest in voluntary oil spill response, remediation and conservation of biodiversity should be evaluated. In this regard, it is

recommended that the authorities study the Algerian approach as described in Okali *et al* (2014) with a view to adopting it, including organizing annually a train-the-trainer workshop to raise a sizeable core of volunteers and other stakeholders with capacity, knowledge and skills for voluntary oil spill management, oil-polluted shoreline clean up, and oiled wildlife response.

7.4 Institutional capacity for implementation

By far the most significant factor responsible for the low compliance with relevant biodiversity policies, laws, guidelines and standards is the inadequate capacity of the regulatory and implementing institutions. As part of the preparation of a UNDP-GEF project on mainstreaming biodiversity into oil and gas activities in the Niger Delta, the UNDP evaluated the capacity of the Federal Ministry of Environment and its two subsidiaries, NOSDRA and NESREA, to undertake their regulatory and oversight functions. The numerical results of these exercises showed huge capacity gaps in terms of these institutions' capacities for engagement (11%); their capacities to generate, access and use information and knowledge (7%); their capacities for strategies, policy and legislation development (22%); their capacities for monitoring and evaluation (17%); and crucially, their capacities for management and implementation (0%).

Capacity is even weaker at the state and local levels. Institutions have few or no staff with the requisite knowledge and skills relating to biodiversity management. Financial and material resources are grossly insufficient. Most training institutions do not have appropriate modules, staffing, facilities or equipment to address the capacity needs.

Recommendation 4.1: Create a national park for the conservation and sustainable use of areas of high significance for biodiversity.

Many forest reserves in the Niger Delta are 'paper parks' and the game reserves are facing 'empty forests' syndrome because the wildlife has been severely hunted and depleted. This is largely because of the weak capacity of state authorities that have the responsibility to manage them. In Nigeria, state governments manage forest and game reserves while the Federal Government manages the national parks. The Federal Government retains a larger proportion of the national earnings than the 36 States and 774 Local Government Councils (LGCs) combined. Thus, it has more resources and, in general, its institutions are stronger. The National Park

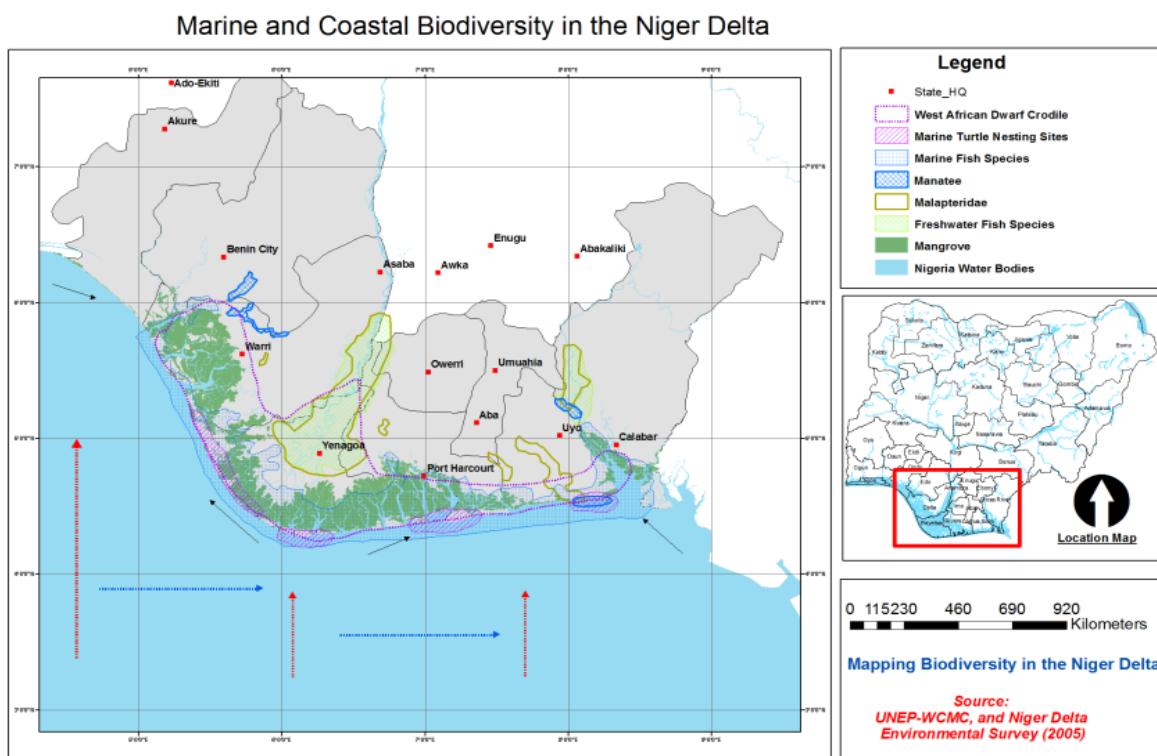
Service is the most effective biodiversity conservation institution in the country. For this reason, there have been strident calls for the creation of a national park in the core Niger Delta to save the last remaining intact habitats in the region.

At present the two national parks in the Niger Delta are outside the core zone of oil activities (Rivers, Bayelsa, Delta and Akwa Ibom states). Thus, the entire coastline and marine ecosystem is currently not protected under the country's National Park System.

A plausible means of achieving this objective would be to go along with the proposal already made from the GEF-UNDP-Federal Government of Nigeria Study, to create a special national park (the Niger Delta National Park - NDNP), which will be managed like a typical large biosphere reserve, with core undisturbed zones, recuperation/restoration areas and areas of varying levels of use or intervention. The envisaged park will be multi-sectoral, comprising core areas and various zones. The coastal sector including the marine ecosystem will be patterned after the Mayumba National Park of Gabon. Suggestions as to which areas should comprise the core areas have varied. The GEF/UNDP study suggests four game reserves, namely; Uremure-Yokri Game Reserve, Akassa Forests, Taylor Creek Forest Reserve and Stubbs Creek Forest Reserve (See Figure 6). Of recent, news media have reported that the Federal Government has given tentative approval for the Edumanom and Apoi Creek Forest Reserves to form the core of the proposed Park. Meanwhile, some academics and stakeholders have urged Government to add Taylor Creek Forest Reserve to the latter two.

The IUCN-NDP recommends that a thorough gap analysis should be carried out before a final decision is taken on the boundaries of the proposed national park.

Figure 6. Niger Delta National Park: Four sectors (shown in green ellipses) of recommended Niger Delta National Park (NDNP)*.



*The approximate locations of the park sectors will have (from the most westerly to the most easterly) Uremure-Yokri Game Reserve, Akassa Forests, Taylor's Creek Forest Reserve and Stubb's Creek Forest Reserve as the core areas of the four sectors of that would-be national park.

(Source of base map is unpublished report of the UNDP, GEF and Federal Government of Nigeria "Niger Delta Biodiversity Project").

The park will be under the management of the Nigerian National Parks Service, but funding could be contributed by key players in the oil and gas sector. Wildlife reintroduction and translocation programmes will be employed to address the problems of depleted and severely threatened fauna, while enrichment planting, with seedlings raised through organized seed collection of threatened plants of the Delta, will be rigorously pursued and implemented. Involvement of the oil and gas industry players in funding the park provides the opportunity for companies in the industry to collaborate and interact with local communities, massively supporting activities, such as those listed in Annex II of the 2013 report aimed at total conservation of the living resources of the region,

including awareness raising, development of livelihood approaches that minimize over-exploitation of biodiversity, and encouragement of more productive, intensified agricultural practices and ecotourism. The distinct advantage of the national park approach over that of forest reserves is that better-trained personnel will be available to tackle problems. Further, because the proposed park sectors will be larger in comparison to existing forest reserves, problems of maintaining minimum viable population of wild animal species will be easier to solve.

Recommendation 4.2: Assess and strengthen capacity for biodiversity management in relevant institutions across the Niger Delta.

7.5 Research, monitoring and information management

Militancy in the 2000s restricted access to most parts of the Niger Delta; consequently, researchers were unable to investigate and monitor the biodiversity of the region during that period. Things have improved somewhat of recent but biodiversity studies are still

scarce. This has rendered most of the information available out-of-date.

Available information is also held by different authorities and most of it is in hard copy therefore

not easily accessible. Some forest reserves that were important refuges for animals have now been found to have been emptied of their wildlife. On the other hand, new species are still being discovered in the Delta. Without information on such trends it will be difficult for any company to take appropriate actions on mainstreaming biodiversity.

There has been no gap analysis of the Protected Areas Network in the Delta and tools such as the Environmental Sensitivity Index map developed by NOSDRA and used by the oil industry have big information gaps.

The trend in oil and gas exploration and production in Nigeria is moving towards drilling in deep and shallow waters offshore, yet very little research has been carried out on Nigeria's marine biodiversity.

Recommendation 5.1: Promote basic and applied research, monitoring of biodiversity and sharing of information amongst stakeholders. Use new technology such as satellite imagery to update Environmental Sensitivity Index (ESI) maps.

7.6 Funding

The oil and gas industry brings billions of US dollars into Nigeria every year. If planned well, only a small proportion of such earnings will be required to address the damage to biodiversity. Unfortunately, aggregate spending by all stakeholders is insignificant. An analysis conducted in preparation for the UNDP/GEF Project shows that in 2009, the total amount appropriated for biodiversity projects in the Niger Delta by the Federal Government and the four core states together was US\$ 365,541. This was a large increase from the average yearly allocation of US\$ 99,718 in the period between 2006 and 2008. Additional funding comes from bilateral and multilateral agencies, as well as some oil and gas companies. SPDC is one of the higher spenders. All the same, the total spending from other sources is estimated at about an order of magnitude higher than the government allocation.

The problem of very low funding is compounded by the allocation and spending mechanism. Each stakeholder allocates any amount it deems fit and spends it in any way it desires. There is no estimation of the amount needed to make a difference or of where spending will make the most impact. It is no surprise, therefore, that money and effort have been dissipated with very little demonstrable result. The situation demands that not

Research and monitoring of biodiversity is at intermittent in the Niger Delta due to security concerns. In addition, the information that exists is not easily available. These are serious impediments to informed decision making. At present, governments are taking decisions to create protected areas or de-gazette existing ones without a proper inventory of the biodiversity therein or gap analysis.

Recommendation 5.2: Geotagging biodiversity components of special conservation interest.

The use of species as receptors or indicators, or the appreciation of the global biodiversity significance of the Niger Delta, will be greatly facilitated or enhanced by geotagging of species locations or sites of special conservation interest. This will help to document exactly where a specific image is captured, so others can find the spot and make their own inputs to the knowledge base towards conservation. It should, however, be borne in mind that posting digital images that have GPS information on the website shows every reader where the photographs were taken.

only should considerably more money be spent but also that it must be spent in smarter ways.

Recommendation 6.1: Support the creation of a Biodiversity Trust Fund or the allocation of funds through other trust funds for biodiversity.

There are several initiatives that have either already created, or plan to create, a trust fund for one purpose or another in the Niger Delta. At a regional level, the PIB has a provision for a Community Trust Fund while the UNDP/GEF Project also plans to establish a Niger Delta Biodiversity Trust Fund. At the community level, several oil and gas companies, such as SPDC, have established Trust Funds under the GMoUs. The IUCN-NDP recognizes that these funds could form the basis for sustainable financing of biodiversity initiatives and recommends their use for such purposes.

REFERENCES

- Abam, T.K.S. (2001). Regional hydrological research perspectives in the Niger Delta. *Hydrological Sciences- J' Journal des Sciences Hydrologiques*, 46(1): 13-25.
- Blench, R. (2007). Mammals of the Niger Delta, Nigeria. Developed from materials left by Bruce Powell (†) and Kay Williamson (†) and incorporating updated field materials and analyses.
- Akani, G.C., Capizzi, D., Luiselli, L. (2000): Diet of the soft-shell turtle, *Trionyx triunguis*, in an Afrotropical forested region. - *Chelonian Conservation and Biology*, Lunenburg; 2 (3): 415-417.
- Akani, G.C., Filippi, E., Luiselli, L. (2004): Aspects of the population and reproductive ecology of sympatric hinge-back tortoises (*Kinixys homeana* and *Kinixys erosa*) in southern Nigeria, on the basis of specimens traded in bush-meat markets. - *Italian Journal of Zoology*, Modena; 71: (suppl. 2) 245-247.
- Akani, G.C., Luiselli, L. (2009): Diversity and distribution of sea turtles in the Niger Delta, Nigeria. - *Revue d'Ecologie (Terre et Vie)*, Paris; 64: 369-374.
- Akani, G.C., Luiselli, L. (2001): Ecological studies on a population of the water snake *Grayia smythii* in a rainforest swamp of the Niger Delta, Nigeria. - *Contributions to Zoology*, Amsterdam; 70 (3): 139-146.
- Akani, G.C., Luiselli, L. (2010): Aspects of community ecology of amphibians and reptiles at Bonny Island (Nigeria), an area of priority relevance for petrochemical industry. - *African Journal of Ecology*, Cambridge; 48: 939-948.
- Akani, G.C., Luiselli, L., Angelici, F.M., Corti, C., Zuffi, M.A.L. (2001): The case of rainforest stiletto snakes (genus *Atractaspis*) in southern Nigeria. Evidence of diverging foraging strategies in grossly sympatric snakes with homogeneous body architecture? - *Ethology Ecology and Evolution*, Florence; 13 (1): 89-94.
- Akani, G.C., Luiselli, L., Eniang, E.A., Amuzie, C.C., Ebere, N. (2007): Aspects of the ecology of the spotted blindsnake, *Typhlops punctatus* in Port-Harcourt, Nigeria. - *African Journal of Ecology*, Cambridge; 46 (3): 533-539.
- Akani, G.C., Luiselli, L., Eniang, E.A., Ebere, N. (2007): Community structure and ecology of snakes in fields of oil palm trees (*Elaeis guineensis*) in the Niger Delta, southern Nigeria. - *African Journal of Ecology*, Cambridge; 46 (3): 500-506.
- Akani, G.C., Luiselli, L., Eniang, E.A., Rugiero, L. (2007): Life in the tropical suburbs: Food type partitioning among sympatric house snakes of the genus *Lamprophis* (Colubridae). - *Italian Journal of Zoology*, Modena; 75 (4): 395-399.
- Akani, G.C., Luiselli, L., Ogbeibu, A.E., Onwuteaka, J.N., Chuku, E., Osakwe, J.A., Bombi, P., Amuzie, C.C., Uwagbae, M., Gijo, H.A. (2010): Aspects of species richness and seasonality of amphibians and reptiles in the coastal barrier island of Brass (Nigeria). - *Revue d'Ecologie (Terre et Vie)*, Paris; 65: 151-161.
- Akani, G.C., Luiselli, L., Ogbeibu, A.E., Uwaegbu, M., Ebere, N. (2009): Activity patterns and habitat selection in a population of the African fire skink (*Lygosoma ferdandi*) from the Niger Delta, Nigeria. - *Herpetological Journal*, London; 19: 207-211.
- Angelici, F.M., Akani, G.C., Luiselli, L. (1998): The leopard (*Panthera pardus*) in southeastern Nigeria: Status, ecological correlates of occurrence, and conservation implications. - *Italian Journal of Zoology*, Modena; 65 (3): 303-305.
- Angelici, F.M., Effah, C., Inyang, M.A., Luiselli, L. (2000): A preliminary radiotracking study of movements, activity patterns and habitat use of free-ranging Gaboon vipers, *Bitis gabonica*. - *Revue d'Ecologie (Terre et Vie)*, Paris, 55 (1): 45-55.
- Angelici, F.M., Luiselli, L. (1999): Aspects of the ecology of *Varanus niloticus* (Reptilia, Varanidae) in southeastern Nigeria and their contribution to the knowledge of the evolutionary history of *V. niloticus* species complex. - *Revue d'Ecologie (Terre et Vie)*, Paris, 54 (1): 29-42.
- Angelici, F.M., Luiselli, L. (2005): Habitat associations and dietary relationships between two genets, *Genetta maculata* and *Genetta cristata*. - *Revue d'Ecologie (Terre et Vie)*, Paris, 60 (4): 341-354.
- Angelici, F.M., Politano, E., Bodugue, A.J., Luiselli, L. (2005): Distribution and habitat of otters (*Aonyx capensis* and *Lutra maculicollis*) in southern Nigeria. - *Italian Journal of Zoology*, Modena; 72: 223-227.
- Angelici, F.M., Wariboko, S.M., Luiselli, L., Politano, E. (2000): A long-term ecological survey of bats (Mammalia, Chiroptera) in the eastern Niger Delta (Nigeria). - *Italian Journal of Zoology*, Modena; 67 (2): 169-174.
- Baird J (2010). "Oil's Shame in Africa". Newsweek: 27. July 26, 2010.
- Bamy I.L., Van Waerebeek K., Bah S.S., Dia M., Kaba B., Keita N. and Konate S. (2010) Species occurrence of cetaceans in Guinea, including humpback whales with southern hemisphere seasonality. Marine Biodiversity Records 3 (e48): page 1 of 10. # Marine Biological Association of the United Kingdom, 2010, doi:10.1017/S1755267210000436.
- Blench, R. (2007). Mammals of the Niger delta, Nigeria. Unpublished paper developed from materials left by Bruce Powell and Kay Williamson and incorporating updated field materials and analyses. Mallam Dendo. Kay Williamson Education Foundation. Cambridge, UK. 64pp
- Bombi, P., Akani, G.C., Ebere, N., Luiselli, L. (2010): Potential effects of climate change on high- and low-abundance populations of the Gaboon viper (*Bitis gabonica*) and the nose-horned viper (*Bitis nasicornis*) in southern Nigeria. - *Herpetological Journal*, London; 21 (1): 59-64.
- Borokini, T.I. (2014). A systematic compilation of endemic flora in Nigeria for conservation management. Journal of Threatened Taxa 6(11): 6406-6426; <http://dx.doi.org/10.11609/JOTT.o4010.6406-26>
- Bronwen Manby: The Price of Oil Human Rights Watch. 1999. Retrieved November 9, 2007
- Chindah (2011). Effects of crude oil on the development of white mangrove seedlings (*Avicennia germans*) in the Niger Delta; Polish Journal of Environmental Studies Vol 20; no 2 (2011) 275-284.
- Chindah A.C Braide, Amakiri J, and Onukurhefe (2007). Effect of crude oil on the development of mangrove (*Rhizophora mangle* L) seedlings from the Niger Delta; Institute of Pollution Studies River state, University of Science and Technology Port Harcourt Rivers State.

- Dore, M. P. O. (2013). Literature Review of Protected Areas in the Niger Delta. Unpublished SPDC internal Report.
- Dublin-Green C O, L F Awosika and R Folorunsho (1999). *Climate Variability Research Activities in Nigeria*, report published by the Nigerian Institute for Oceanography and Marine Research, Victoria Island, Lagos, Nigeria.
- Ecologically or Biologically Significant Marine Areas- Special places in the world's oceans. <https://www.cbd.int/ebsa/> (accessed March 2016)
- Edem A. Eniang (2010). The Hotspot between Nigeria and Cameroon. International Tropical Timber Organization (ITTO). *Tropical Forests Update*. Vol. 20 No. 7. Journal of ITTO, Tokyo, Japan.
- Edem A. Eniang, Edwin C. Ekwali, Luca M. Luiselli, Ibukun A. Ayodele, Godfrey C. Akani & Nic Pacini (2006). Snake bushmeat from the forest markets of south-eastern Nigeria. *Natura – Soc. it. Sci. nat. Museo civ. Stor. nat. Milano*, 95 (2): 33-46.
- Ekwali E. C., King, R. P., Eniang Edem A., Obot E. A. (2005). Discovery of a new population of the Sclater's guenon, *Cercopithecus sclateri* in the Niger Delta wetlands, Nigeria. *Liv. Sys. Sus. Dev.*, 2 (4): 1-7.
- Obot, E. A., Augustine U. Ezealor, Richard King. Anthony Bassey and Edem A. Eniang (2003). A new Barn Swallow (*Hirundo rustica*) Roost at Itu Wetlands Akwa Ibom State, Nigeria. *Roan*. Vol. I, Nos 1 & 2. Pp 103 – 118.
- Eniang, E.A., King, R., Lea, J., Capizzi, D., Luiselli, L. (2003): Trophic niches of four sympatric rainforest anurans from southern Nigeria: Does resource partitioning play a role in structuring the community? - *Revue d'Ecologie (Terre et Vie)*, Paris, 58 (3): 321-335.
- Eniang, E.A., Luiselli, L. (2002): Ikpan wetland rainforest: an area of high biodiversity importance in south-eastern Nigeria. - *Revue d'Ecologie (Terre et Vie)*, Paris, 57 (1): 19-28.
- Eniang, Edem A., King, R., Lea, J.M., Capizzi, D. & Luiselli, L. (2003) Trophic Niches of Four Sympatric Afrotropical Anurans from Southern Nigeria: Does Resource Partitioning Play a Role in Structuring the Community? *Rev. Ecol.* 58: 321-335.
- Ezealor, A.U. (2003). Critical sites for biodiversity conservation in Nigeria- an inventory of important bird areas. Published by the Nigerian Conservation Foundation (NCF). 80pp.
- Hamme JD, Singh A, Ward OP.(2003) Recent advances in petroleum microbiology. *Microbiol Molec Biol Rev.* 2003;67:503–549. doi: 10.1128/MMBR.67.4.503-549.2003. [PMC free article] [PubMed] [Cross Ref]
- IUCN-NDP (2013). Sustainable remediation and rehabilitation of biodiversity and habitats of oil spill sites in the Niger Delta. Main report including recommendations for the future. A report by the independent IUCN - Niger Delta Panel (IUCN-NDP) to the Shell Petroleum Development Company of Nigeria (SPDC). January 2013. Gland, Switzerland: IUCN.
- Jones, P. J. (1994). Biodiversity in the Gulf of Guinea: an overview. *Biodiversity & Conservation*. December 1994, Volume 3, Issue 9, pp 772-784.
- Lea, J., Luiselli, L., Politano, E. (2005): Are there shifts in amphibian faunal composition in Nigerian landscapes undergoing long-term degradation? A case study from a montane environment. - *Revue d'Ecologie (Terre et Vie)*, Paris, 60 (1): 65-76.
- Luiselli, L. (1998): Food habits of the pelomedusid turtle *Pelusios castaneus castaneus* in southeastern Nigeria. - *Chelonian Conservation and Biology*, Lunenburg; 3 (1): 106-107.
- Luiselli, L. (2003): Assessing the impact of human hunting activities on populations of forest tortoises (genus *Kinixys*) in the Niger Delta, Nigeria. - *Chelonian Conservation and Biology*, Lunenburg; 4 (3): 735-738.
- Luiselli, L. (2005): Aspects of comparative thermal ecology of sympatric hinge-back tortoises (*Kinixys homeana* and *Kinixys erosa*) in the Niger Delta, Southern Nigeria. - *African Journal of Ecology*, Cambridge; 43 (1): 64-69.
- Luiselli, L., Akani, G.C., Angelici, F.M.(2000): Observations on the biology of the African emerald snake *Gastrophysus smaragdina* (Schlegel, 1837) in southern Nigeria. - *Herpetozoa*, Wien; 13 (1/2): 3-14.
- Luiselli, L., Akani, G.C., Angelici, F.M., Politano, E., Ude, L., Wariboko, S.M. (2003): Diet of the semi-aquatic snake, *Afronatrix anoscopus* (Colubridae) in southern Nigeria. - *African Journal of Herpetology*, Johannesburg; 52 (2): 123-126.
- Luiselli, L., Akani, G.C., Barieene, I.F. (1998): Observations on habitat, reproduction and feeding of *Boiga blandingi* (Colubridae) in south-eastern Nigeria. - *Amphibia-Reptilia*, Leiden, 19 (4): 430-436.
- Luiselli, L., Akani, G.C., Bello, O.A., Angelici, F.M., Ude, L. (2006b): Home range area may vary considerably in relation to habitat contamination in two African terrapins from pristine and oil polluted habitats. - *Amphibia-Reptilia*, Leiden; 27 (2): 255-261.
- Luiselli, L., Akani, G.C., Capizzi, D. (1999): Is there any interspecific competition between dwarf crocodiles (*Osteolaemus tetraspis*) and Nile monitors (*Varanus niloticus ornatus*) in the swamps of central Africa? A study from south-eastern Nigeria. - *Journal of Zoology*, London, 247 (2): 127-131.
- Luiselli, L., Akani, G.C., Ebere, N., Rugiero, L., Vignoli, L., Angelici, F.M., Eniang, E.A., Behangana, M. (2010): Food habits of a pelomedusid turtle, *Pelomedusa subrufa*, in Tropical Africa (Nigeria): The effects of sex, body size, season, and site. - *Chelonian Conservation and Biology*, Lunenburg; 10 (1): 138-144.
- Luiselli, L., Akani, G.C., Eniang, E.A., Politano, E. (2007): Comparative ecology and ecological modeling of sympatric pythons, *Python regius* and *P. sebae*. In: *Biology of the Boas and Pythons* (Henderson, R.W. & Powell, R., eds.). pp. 88-100. CPG/Biological Science Press, New York.
- Luiselli, L., Akani, G.C., Otonye, L.D., Ekanem, J.S., Capizzi, D.(1999): Additions to the knowledge of the natural history of *Bothrophthalmus lineatus* (Colubridae) from the Port Harcourt region of Nigeria. - *Amphibia-Reptilia*, Leiden, 20 (3): 318-326.
- Luiselli, L., Akani, G.C., Politano, E., Odegbune, E., Bello, O. (2004): Dietary shifts of sympatric freshwater turtles in pristine and oil-polluted habitats of the Niger Delta, Southern Nigeria. - *Herpetological Journal*, London, 14 (1): 57-64.
- Luiselli, L., Akani, G.C., Politano, E.: (2006c) Effects of habitat alteration caused by petrochemical activities and oil spill on the habitat use and interspecific relationships among four species of Afrotropical freshwater turtles. - *Biodiversity and Conservation*, Cambridge, 15: 3751-3767.
- Luiselli, L., Angelici, F.M., Akani, G.C. (2001): Food habits of *Python sebae* in suburban and natural habitats. - *African Journal of Ecology*, Cambridge; 39 (1): 116-118.

- Luiselli, L., Angelici, F.M., Akani, G.C.(2000): Arboreal habits and viper biology in the African rainforest: The ecology of *Atheris squamiger*. - *Israel Journal of Zoology*, Jerusalem; 46 (4): 273-286.
- Luiselli, L., Angelici, F.M., Akani, G.C.(2000): Large elapids and arboreality: the ecology of Jameson's green mamba (*Dendroaspis jamesoni*) in an Afrotropical forested region. - *Contributions to Zoology*, Amsterdam; 69 (3): 147-155.
- Luiselli, L., Angelici, F.M., Rugiero, L., Akani, G.C., Eniang, E.A., Pacini, N., Politano, E. (2007): Negative density dependence of sympatric Hinge-back Tortoises (*Kinixys erosa* and *K. homeana*) in West Africa. - *Acta Herpetologica*, Florence; 3 (1): 19-33.
- Luiselli, L., Effah, C., Angelici, F.M., Odegbune, E., Inyang, M.A., Akani, G.C., Politano, E.(2002): Female breeding frequency, clutch size, and dietary habits of a Nigerian population of Calabar ground python, *Calabaria reinhardtii*. - *Herpetological Journal*, London, 12 (3): 127-129.
- Luiselli, L., Eniang, E.A., Akani, G.C. (2007): Non-random structure of a guild of geckos in a fragmented, human altered African rainforest. - *Ecological Research*, Tokyo; 22: 593-603.
- Luiselli, L., Lea, J. (2009): Pollution: Petrochemicals and Heavy Metals. In: *Amphibian Biology* (Heatwole, H., ed.), volume 8: Decline, Diseases, Parasites, Maladies, Pollution. Harvard University Press/Surrey Beatty & Sons. Pp. 3239-3243.
- Luiselli, L., Politano, E., Akani, G.C. (2003): Seasonal incidence, sex-ratio, and population cohorts of hinge-back tortoises (genus *Kinixys*) in the wild and in bush-meat markets of the Niger Delta, southern Nigeria: Are human predation effects random? - *Revue d'Ecologie (Terre et Vie)*, Paris, 58 (2): 243-248.
- Luiselli, L., Politano, E., Angelici, F.M.(2000): Ecological correlates of the distribution of terrestrial and freshwater chelonians in the Niger Delta, Nigeria: A biodiversity assessment with conservation implications. - *Revue d'Ecologie (Terre et Vie)*, Paris, 55 (1): 3-23.
- Luiselli, L., Politano, E., Lea, J. (2005): Assessment of Vulnerable status of *Kinixys homeana* (Testudines: Testudinidae) for the IUCN Red List. - *Chelonian Conservation and Biology*, Lunenburg; 5 (1): 130-139.
- Moffat, D.; Linden, O. (1995). Perception and reality: assessing priorities for sustainable development in the Niger River delta. *Ambio* Stockholm [Ambio], vol. 24, no. 7-8, pp. 527-538
- Naskar, S. and Palit, P. K.(2015) Anatomical and physiological adaptations of mangroves. *Wetlands Ecol Manage*,23:357.doi:10.1007/s//273-014-9385-z
- NCF (2002). Potential Ramsar sites in the Niger Delta, Nigeria. An unpublished report produced by the Nigerian Conservation Foundation (NCF) for the Nigerian National Ramsar Committee.
- NDES (2005). Niger Delta Environmental Survey: Phase I Report. SPDC.
- Ogogo, A. U; Eniang, E. A; Nkamenyin, O. O (2010) Threats to the survival of the West African Manatee (*Trichechus senegalensis*) in Eniong Creek, South south , Nigeria. *International Journal of Agriculture*. Vol. 2, No. 1. 2010.
- Okali, D.U.U et al. (2014). Integration of biodiversity considerations into SPDC's operations and its contributions towards a wider Niger delta biodiversity strategy. Interim Report of a Study to support IUCN-NDP Analysis and Recommendations to SPDC on Biodiversity Management in the Niger Delta. Unpublished report. 27pp.
- Okali, D.U.U.; Imovbore, A.M.A. and Eniang, E. (2015). Effects of free (mobile) and trapped (immobile) oil on biodiversity: biological indicators in the Niger delta. Report on a Study of Biological Indicators to support IUCN-NDP Recommendations to SPDC on Biodiversity Management in the Niger Delta. Unpublished report. 68pp.
- Osuji L.C, Erundu E.S., Ogali R.E (2011). Upstream petroleum degradation of mangroves and intertidal shores: the Niger Delta experience. Published in "Chemistry and Biodiversity" – Vol7 P.116 -128
- Nwilo, P. C.; O. T. Badejo (2001): Impacts of Oil spills along the Nigerian coast The Association for Environmental Health and Sciences, 2001
- Powell. C.B. (1993). Sites and Species of Conservation Interest in the Central Axis of the Niger Delta (Yenagoa, Sagbama, Ekeremor, and Southern Ijo LGAs): A Report and Recommendations to the Natural Resources Conservation Council (NARESCON).
- Rugiero, L., Luiselli, L., Eniang, E.A., Akani, G.C. (2007): Diet of a guild of geckos in a fragmented, human altered African rainforest. - *African Journal of Herpetology*, Johannesburg; 56 (1): 91-96.
- SPDC (2004). Shell Petroleum Development Corporation, 2004 Annual report.
- Stutz, M.L., and H.O. Pilkey. (2002). Global Distribution and Morphology of Deltaic Barrier Island: *Journal of Coastal Research*, SI 36, p. 694-707.
- UNDP. (2006)"Niger Delta Human Development Report". UNDP. 2006. p. 76. Retrieved 19 June 2011.
- "Shell And The N15bn Oil Spill Judgement Debt". The Daily Independent (Lagos). 2010-07-19. Retrieved 27 July 2010.
- UNEP (2011). Environmental assessment of Ogoniland. A report produced by the United Nations Environment Programme (UNEP). 262pp.
- Vidal, John (2010). "Nigeria's agony dwarfs the Gulf oil spill. The US and Europe ignore it." The Observer. Retrieved 27 July 2010. Government's national oil spill detection and response agency (NOSDRA) says that between 1976 and 1996 alone, more than 2.4m barrels spilled in the delta.
- World Bank (1995). Defining an Environmental Strategy for the Niger Delta. World Bank, Washington DC. Industry and Energy Operations Division, West / Central Africa Division.
- World Rainforest Movement. (2002) 'Nigeria: threatened mangroves- oil and violence'. Monthly Bulletin of the World Rainforest Movement, December, 2002.



INTERNATIONAL UNION
FOR CONSERVATION OF NATURE

BUSINESS AND BIODIVERSITY
PROGRAMME
Rue Mauverney 28
1196 Gland
Switzerland
Tel +41 22 999 0000
Fax +41 22 999 0002
www.iucn.org

