

NORWEGIAN UNIVERSITY OF LIFE SCIENCES



# **Initial socio–economic and environmental aspects of petroleum sector development in Mainland Tanzania**



**A Thesis Submitted in Partial Fulfilment of the Requirement for the Degree of Master  
of Science in International Environmental Studies.**

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**Declaration**

I, Kristin Frodahl Rognerud, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Kristin Frodahl Rognerud, August 2012

Signature.....

Date.....



## **DEDICATION**

I dedicate this thesis to my wonderful boyfriend, my parents, and all my friends who have motivated and supported me through the challenging times of writing. Without you this thesis would not have been accomplished. Thank you. I love you all.





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## ABSTRACT

Recent gas discoveries made in the south-eastern parts of Tanzania indicates a huge potential for gas reserves in the country. President Kikwete has expressed expectations that petroleum resources could lead to a resource blessing for the country. However, the designated blocks for exploration and drilling activities are located in sensitive marine environments, which are important for the livelihoods of the country's coastal communities and biodiversity.

This study provides an initial analysis of socio-economic and environmental aspects of petroleum sector development in Tanzania, with a special focus on the coastal areas where the industry's activities are mainly located. Attention has been focused on institutions, companies and petroleum-related assistance programs that are involved in the Tanzanian petroleum sector, and how rights and responsibilities are shared between these. Six Tanzanian institutions, one Norwegian petroleum company, two assistance programs and one investor corporation were investigated. Accordingly, their roles and responsibilities were assessed to better understand how petroleum management is characterised by certain features, rules devised to constrain actions, institutional attributes and interactions.

To explore the interrelationship between social and natural systems, several underlying factors were analysed that may increase or decrease the vulnerability and resilience of petroleum development in the coastal system. Corruption, wealth inequalities, disregard for people's rights and lack of regulations were considered as factors that may compromise the resilience of the system. In addition, factors that may enhance or detract robustness from key institutions were analysed to better understand the robustness of the management system. This involved issues of funding, infrastructure, and access to financial and human resources.

Overall, the thesis scrutinises the early developments of gas and oil development in Tanzania, and related socio-economic and environmental challenges and opportunities. By drawing upon examples from countries with long histories of petroleum (Norway and Nigeria), the study offers a brief analysis of the overarching objectives of resource and environmental management, the ecosystems under management and the institutions involved in or granted a standing in resource decisions.



## TABLE OF CONTENTS

<b>1.0 INTRODUCTION</b> .....	1
1.1 Background.....	1
1.2 Petroleum Resources.....	2
1.3 Petroleum Resources in Africa.....	3
1.4 Statement of the Problem.....	4
1.5 Significance of the Study.....	5
1.6 Objectives.....	6
<b>2.0 THEORETICAL FRAMEWORK</b> .....	8
2.1 Resilience as an Overarching Idea.....	8
2.2 Vulnerability Approach.....	11
2.3 Robustness Framework.....	12
2.4 Resilience, Vulnerability and Robustness; Ways of Governing Complex Regimes ..	15
<b>3.0 METHODOLOGY</b> .....	16
3.1 Data Collection.....	16
3.2 Data Collection Methods.....	18
3.3 Methodological and Ethical Considerations.....	20
<b>4.0 COUNTRY DESCRIPTION</b> .....	23
4.1 Political Economy.....	23
4.2 The Mining Sector.....	25
4.3 Coastal and Marine Resources and Ecosystems.....	26
<b>5.0 HISTORY OF PETROLEUM IN TANZANIA</b> .....	33
5.1 Timeline.....	33
5.2. Policy Frameworks for Managing Petroleum Resources.....	37
5.2.1 International Conventions.....	40
<b>6.0 THE RESOURCE CURSE</b> .....	42
6.1 An Alternative to the Curse.....	43
6.2 Lessons from other Countries.....	43
6.2.1. Nigeria.....	43
6.2.2. Norway.....	47
<b>7.0 RESULTS</b> .....	51



7.1 Tanzanian Institutions .....	51
7.2 Petroleum Companies .....	62
7.3 Petroleum Related Assistance Programs and Investors .....	66
<b>8.0 DISCUSSION</b> .....	<b>73</b>
8.1 Vulnerability and Resilience .....	73
8.1.1 Factors that Increase Vulnerability .....	73
8.1.2 Factors that Increase Resilience .....	80
8.2 Robustness .....	87
B: Petroleum Users .....	90
Link 1: Petroleum Resources and Petroleum Users .....	91
Link 2: Petroleum Users and Petroleum Institutions .....	91
Link 3: Petroleum Institutions and Infrastructure .....	94
Link 4: Infrastructure and Petroleum Resources .....	95
Link 5: Petroleum Resources and Petroleum Institutions .....	96
Link 6: Petroleum Users and Infrastructure .....	98
Link 7: External forces on petroleum resources and infrastructure .....	99
Link 8: External Forces on Petroleum Institutions .....	101
8.3 Adaptive Governance .....	103
<b>9.0 CONCLUSION AND FUTURE SCENARIOS</b> .....	<b>111</b>
9.1 Conclusion .....	111
9.2 Future Scenarios .....	112
<b>10.0 REFERENCES</b> .....	<b>116</b>
<b>11.0 APPENDICES</b> .....	<b>135</b>

## **LIST OF ACRONYMS**

AFD – African Development Bank  
BG – British Gas  
CSR – Corporate Social Responsibility  
DoF – Department of Fisheries  
EIA – Environmental Impact Assessment  
ESCAP – Energy Assistance Capacity Project  
GDP – Gross Domestic Product  
GoT – Government of Tanzania  
IFC – International Finance Corporation  
IMF – International Monetary Fund  
IMS – Institute of Marine Science  
IRA – Institute of Resource Assessment  
IUCN – International Union for Conservation of Nature  
MoE - Norwegian Ministry of Environment  
NEMC – National Environmental Management Council  
NGO – Non-Governmental Organization  
NICM – National Integrated Coastal Management  
NORAD – Norwegian Agency for Development Corporation  
NOSRPP – National Oil Spill Response Preparedness Plan  
OfD – Oil for Development  
OSRP – Oil Spill Response Plan  
PSA – Production Sharing Agreement  
S(E)IA – Strategic (Environmental) Impact Assessment  
SUMATRA – Surface and Marine Transport Regulatory Authority  
TANESCO - Tanzania Electrical Supply Corporation  
TCMP – Tanzania Coastal Management Programme  
TPDC – Tanzania Petroleum Development Corporation  
UNCTAD – United Nations Conference on Trade and Development  
UNEP – United Nations Environmental Programme  
WB – World Bank  
WIOMSA – Western Indian Ocean Marine Association  
WIOMPHp – Western Indian Ocean Marine Highway project

## LIST OF FIGURES

<b>Figure 1:</b> A conceptual model of a social ecological system (Source: Anderies et. al. 2004).....	13
<b>Figure 2:</b> The Tanzanian coastline and its major rivers. (Source: Google Earth 2012) .....	26
<b>Figure 3:</b> Mangrove roots in the Kawe District, Dar es Salaam.....	28
<b>Figure 4:</b> Artisanal fish boat in the Kawe District, Dar es Salaam.....	30
<b>Figure 5:</b> Map over licensed blocks (Source: Derrick Petroleum, 2012).....	35
<b>Figure 6:</b> The gas and oil development represented in an East African newspaper.....	36
<b>Figure 7:</b> An organizational map of the Tanzanian institutions.....	52
<b>Figure 8:</b> The conceptual model of a social-ecological system adapted to the context of the petroleum sector in Tanzania (Based on Anderies et al.2004).....	87
<b>Figure 9:</b> Mangrove roots, showing the vulnerable pneumatophores (breathing roots) that have been clogged by the oil pollution at Kigamboni, south of Dar es Salaam harbour entrance in 1984 (Photo by: Ian Bryceson).....	96
<b>Figure 10:</b> Oil spill response equipment stationed in MIMP (Photo by: Ian Bryceson).....	105

## LIST OF TABLES

<b>Table 1:</b> Overview and explanation of linkages (Source: Anderies et al. 2004).....	14
<b>Table 2:</b> The visions, roles and responsibilities of the different Tanzanian institutions (Sources: the respective institutions’ website, see Appendix A).....	60-61
<b>Table 3:</b> The roles and responsibilities of the Norwegian institutions (Sources: The respective institutions’ website and the Norad Report “Oil for Development 2007 – 2008”), see Appendix B).....	66-68
<b>Table 4:</b> The Tanzanian petroleum resources in a social and ecological system of interactions (Based on Anderies et al. 2004).....	88-89
<b>Table 5:</b> A summary of the response actions and addressed challenges to petroleum management in the Tanzanian institutions, Statoil, OfD and ESCAP.....	108-110

## APPENDICES

- APPENDIX A:** Websites for Tanzanian institutions.
- APPENDIX B:** Websites for Norwegian Institutions.
- APPENDIX C:** Best Practice Principles by TPDC.

# 1.0 INTRODUCTION

## 1.1 Background

The United Republic of Tanzania is known for its rich and diverse coastal ecosystems, ranging from coral reefs, mangroves, beaches, sea-grass beds, and tidal marches. These ecosystems serve as home and nourishment to many ecologically important species, and as buffers against storms and erosion. The people living along the coast rely on coastal ecosystems for social, cultural and economic services, ranging from fishing, tourism, mining- and conservation efforts.

Attention has recently turned to the large potentials of gas and oil resources along the Tanzanian coast. Several foreign petroleum companies have licensed areas for exploration, drilling and extraction. Among these, Statoil and BG have discovered large quantities of gas in their respective blocks offshore in southeastern part of Tanzania, and more discoveries are expected (see Figure 5). President Kikwete has announced that the gas resources have the potential to address problems of poor electricity supply and huge wealth disparities in the country. Zanzibar is also involved in the gas and oil sector development. However, given that Zanzibar and the mainland have separated government constellations this study only focuses on mainland Tanzania and its coastal areas.

In the early phases of resource extraction there is often uncertainty about the choice of management solutions, expected revenues, distribution and compensation issues (Kolstad et al. 2008a). Exploration and production operations have the potential to affect the environment in different ways, depending on the sensitivity of surrounding environment, and on pollution prevention, mitigation, and control capabilities. Thus, there are different challenges associated with developing the petroleum sector. How could the GoT and the petroleum companies ensure that petroleum is managed and governed for a long-term vision, and not be tempted by short-term profit and easy solutions? The hope is that gas and oil could become a blessing rather than a curse for the country. By learning from experiences with other petroleum rich countries Tanzania might gain some valuable input. For instance, Norway has often been fronted as an example of a successful petroleum nation where oil has stimulated to greater

social welfare, while Nigeria has experienced larger problems of poverty after oil extraction began. Some petroleum-based initiatives and programmes are seeking to assist the Tanzanian institutions to lift the sector off the ground in its early phases of gas and oil extraction. Norway is currently entering in bilateral agreements with Tanzania on an OfD Program, while the WB has launched an ESCAP.

This thesis investigates the roles and responsibilities of a selection of these institutions that are involved in the management and governance of Tanzania's gas and oil sector; characteristics, rules devised to constrain actions, institutional attributes and interactions. How could Tanzania increase its resilience and decrease its vulnerability in the years to come? Overall, the thesis scrutinises the early developments of gas and oil in Tanzania; its socio-economic and environmental challenges, opportunities, and what factors that are likely to enhance or detract from the robustness of the key institutions involved in the petroleum development. It analyses the overarching objectives of resource and environmental management, the ecosystems under management and the institutions involved in or granted a standing in resource decisions.

## 1.2 Petroleum Resources

The most traded product and valuable commodity in the world today is oil (Aarbo and Hersoug 2010). Over 80 % of the World's energy supply is based on fossil fuel, where oil and gas accounts for two thirds of that share (IEA 2009). Thus, petroleum resources are the energy resources that benefit societies worldwide in the form of transportation, heating, electricity and industrial applications. In this thesis, the term "petroleum resources" will be used as a generic term for oil and gas resources. According to OED (2012<sup>1</sup>) the designation on petroleum could be defined as "*all liquid and gaseous hydrocarbons existing in their natural state in the soil and other substances produced in association with such hydrocarbons*". While gas has already been found in Tanzania, oil is still an undiscovered resource, but one cannot exclude the chances of it being found in the future.

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<sup>1</sup> <http://www.npd.no/no/Om-OD/Informasjonstjenester/Oljeordliste/>



### 1.3 Petroleum Resources in Africa

Africa is well endowed with natural and mineral resources, including gas and oil. The continent is estimated to hold approximately 9.7 per cent of the world's oil reserves (AFD 2009). In reference to the African Development Bank, oil production is likely to continue to rise at an average rate of 6 per cent per year for the foreseeable future (AFD 2009). Production growth might be expected because the continent is still relatively unexplored for petroleum resources (Foss 2008). So far, Nigeria, Algeria, Libya, Angola, Sudan, Equatorial Guinea and Chad are the main countries with petroleum industries. According to the AFD (2009) consumption of natural gas in Africa is still very low. One reason for the low consumption could be the lack of infrastructure that hinders Nigeria to fuel the power needs of West Africa (AFD 2009). The continent has yet to see success stories in the case of gas and oil that benefit the populations. Instead, several countries have experienced negative consequences of resource extraction in terms of conflicts over unequal distribution of oil wealth and human right abuses by petroleum companies. For instance, Nigeria and Angola are among the top ranking of oil producing countries, but are ranked 156 and 148 on the HDI Index (UNDP 2011). The ranking may indicate that resource wealth is not equally distributed among the countries' populations.

Together, Angola, Nigeria and the rest of north and West Africa have sunk approximately 35 000 wells the past few decades, while East Africa only numbers of 500 wells (Mutch 2012). However, East Africa has received great attention internationally the last decade due to discoveries of gas and oil in Uganda, Mozambique, Tanzania, and Kenya. As a result, the entire east coast is now divided into blocks, and international companies are taking their shares in exploration- and drilling activities (WIOMSA and UNEP 2009). This development presents unique economic opportunities, but also serious challenges in terms of technological management, collection of revenues, governance, resource control, environmental protection, and transparency (AFD 2009).

## 1.4 Statement of the Problem

Petroleum industries sometimes operate in remote ecosystems with rich biodiversity, where governments have limited capacity to protect the environment or the people who live there (Kloff and Wicks 2004). When companies identify petroleum reserves, they start building roads, platforms, pipelines, bring in new crews and vehicles, and when petroleum is discovered their exploration activities are expanded for commercial extraction, which requires more infrastructure (O'Rourke and Connolly 2003). Sometimes biodiversity and ecosystems in coastal areas are harshly affected, which may escalate into socio-economic impacts for the people settled in coastal areas that depend upon these resources for their livelihoods. Greenhouse gas emissions and climate change are other indirect impacts. The net effect can be serious degradation of the planet's life-supporting system (Chapin et al. 2009). On the other hand, petroleum extraction can also be associated with positive impacts in form of employment opportunities, electricity supply, expansion of public services and energy security. A challenge is to balance the positive effects against the negative impacts of petroleum extraction.

Most of the current gas and oil exploration in Tanzania is situated offshore in sensitive marine environments, critical for the survival of coastal communities and biodiversity. Large-scale discoveries might increase the levels of industrial activities and infrastructure development along the coast. Land areas will be required for infrastructure development, which possibly implies cutting of mangroves and displacement of communities. Thus, potential impacts may be substantial for coastal communities and the national economy in Tanzania, which depends on coastal resources for a wide range of purposes (Miller et al. 2010). Tanzania's promising prognoses for large gas reserves have tempted several international companies, Statoil, Shell, Petrobras, BG, Ophir and Exxon, to establish exploration activities in the country. Since the amounts of gas found appear to be huge, the government has started to prepare the economy for major investments in the natural gas sector (Mutarubukwa 2012). The question is how will Tanzania manage its gas and oil sector, for the benefit of all Tanzanian citizens and not for the benefit of the few? The sector's anticipated rapid growth and economic value may overstretch the government's institutional capacity and ability to adopt long-term strategies. Poorly planned national frameworks could be detrimental to the coastal social-ecological systems.

The challenge will be to establish a fair petroleum management system that respects human rights and the environment, and balances short-term gains against future costs.

However, several factors may render this balance difficult to achieve; lack of standards, lack of resources, lack of competence, lack of transparency and accountability, corruption, lack of coordination and cooperation, lack of Infrastructure, and weak rules for compensations schemes.

When these factors characterize a system in transition, it is likely that petroleum extraction will involve winners and losers. Petroleum revenues are often unequally distributed. Companies or corrupt politicians may take advantage of weak regulatory systems, resulting in the poorest people benefitting least. The people living along the coast are likely to experience building of industrial infrastructure close to homes, farms, food and water resources. Consequently, this thesis emphasises management solutions that increase transparency and information sharing on petroleum related issues.

## 1.5 Significance of the Study

The scope of socio-economic and environmental questions, both terrestrial and marine, brings in the complexity of resource management issues. This complexity confirms that gas and oil resources are not isolated from other coastal and marine resources, and therefore cannot be managed in isolation from the rest of the social and ecological system. Thus, when resource management excludes important variables, the ecological health, social and economic value of supporting coastal and marine ecosystems may worsen. The thesis suggests that the outcomes of a petroleum industry in Tanzania are likely to depend on institutional capacities to integrate uncertainty and a holistic view into its management strategies.

How could Tanzania increase the resilience of the petroleum sector, both in terms of the social and the natural environment? Instead of looking at technical or environmental aspects of an operating petroleum industry, science could also focus on social features that are significant in responding to an expansion of the petroleum sector in Tanzania, and how these link institutions with ecosystems and social learning in shaping the change towards integrating the petroleum sector.

Hopefully, the thesis will contribute to a better understanding of how Tanzania may be able to manage its gas and oil resources in a resilient manner for future generations. It may also serve to complement other research focused on the technical- and environmental aspects

of the petroleum industry. Since Tanzania is now in the new focus of attention for the gas and oil industry, the thesis raises attention to;

- The complexity in petroleum exploration, and the importance of adapting social and ecological considerations holistically into management strategies.
- Institutions involved in resource management, and the need to clarify their roles and responsibilities.
- Without the improvement of infrastructure utilization of petroleum resources becomes a challenge. This raises several challenging issues, such as the questions around clearing of valuable forests, biodiversity loss and displacement of communities.
- That a transformation to a gas and oil dependent economy may offer unequally distribution of costs and benefits.
- That dialogue between affected parties could open up more knowledge about the coastal ecological system, and increase the chances for a fair and equal distribution of revenues.

## 1.6 Objectives

The objective is first to investigate some central institutions involved in Tanzania's petroleum sector at the national, regional and international level. Each institution will be analysed in terms of its roles, responsibilities and their inter-linkages with other institutions. Could these institutions limit the negative socio-economic and environmental impacts of resource exploitation? Secondly, a vulnerability framework will be used to explore system characteristics, and institutional robustness will be invoked to examine the key institutions. The thesis is a study of the discovery and early developments of gas and oil in Tanzania, and examines some of the main social and environmental challenges and opportunities for Tanzania's petroleum sector.

### ***Research Questions:***

- What are the Tanzanian institutions' roles and responsibilities?
- What links have the Tanzanian institutions formed with Norwegian institutions and the World Bank?

- In what way have institutions involved in the petroleum sector responded to the discoveries and challenges?

By applying a vulnerability approach, the social ecological system (SES) will be looked at holistically to uncover factors that expose pressure or sensitivity to the system. How will the institutions respond to the challenges in a robust manner?

*Thus, the thesis will attempt to answer:*

- What are the key stressors that increase or decrease the resilience and vulnerability of the Tanzanian coastal SES?
- What factors are likely to enhance or detract from the robustness of the key institutions?
- How could attributes of adaptive governance reduce or increase the resilience and vulnerability of the SES?

*Research Question:*

- What are the likely future scenarios for the Tanzanian petroleum sector?



## 2.0 THEORETICAL FRAMEWORK

### 2.1 Resilience as an Overarching Idea

The rate of ecological change is accelerating, and the human footprints on planet are likely to continue to increase (Gunderson et al. 2010). Human actions seem to reduce the capacity of landscapes and seascapes to generate important ecosystem services upon which societal development rests (Folke et al. 2005; Boyd and Folke 2012). Even in absence of anthropogenic disturbance, gradually changing conditions like climate, nutrient loading and habitat fragmentation may surpass threshold levels, triggering an abrupt system response (Resilience Alliance 2002a). The quality of feedback that institutions obtain varies according to how natural resources are used and affected by anthropogenic intervention. Research has often been focused on how petroleum rich countries could reduce uncertainty by better managing the system to avoid possible disasters, such as waste pollution, oil spills and destruction of habitat. However, to what extent is it possible to control a system in a long-term perspective? This thesis argues that resilience can be degraded by a large number of factors including loss of biodiversity, toxic pollution and inflexible institutions (Resilience Alliance 2002a). Resilience provides a collection of ideas about how to interpret such complex systems, and provide heuristics for living in a complex world (Anderies et al. 2006; Anderies et al. 2012). According to Ostrom and Cox (2010:451) resilience moves the research beyond simple panaceas and maps the several factors that influence interactions “*to enable a holistic understanding of the management problem at hand*”.

In the early phases, the concept of resilience was used to describe fluctuation patterns in ecology, but was later extended to describe the combination of complex social and ecological systems (SES). Berkes and Folke (1998) started to use the term SES to emphasize the integrated concept of humans in nature and to stress that they are interlinked. During the past three decades resilience has been used in this way to explain surprising- and nonlinear dynamics of complex SES in countries all over the world (Gunderson and Holling 2002; Walker et al. 2004 in Gunderson et al. 2010). Young (2009:379) defines resilience of SES as “*the ability to handle stress in an adaptive manner*”. Being adaptive often refers to the ability of the actors or institutions and broader system level attributes to influence or manage resilience through learning and adaptation (Walkers and Meyers 2004). The intention of applying a SES perspective to Tanzania’s petroleum sector is to create a better understanding of the national context of petroleum sector management regime. A comprehensive

understanding of the links between institutions involved in the petroleum sector is often crucial as a misguided effort to provide assistance or corporate strategies may destroy a resilient system (see Wade 1995; Anderies et al. 2004 in Fagerheim 2010).

With adopting resilience as a framework the intention is not to try to give a simple answer or to seek detailed knowledge about how a SES should be governed, but instead to improve understandings of the dynamics in the Tanzanian petroleum management as a whole. Hence, understanding management patterns and governance strategies in the SES through a resilience perspective may be useful in rethinking issues of governance. However, Dietz et al. (2008) emphasises, that the concept of resilience needs to be applied with sensitivity about the risk to overshadow crucial normative issues, such as power and democracy. Resilience theory is, hence, not a panacea to any ideal condition for governance, but it provides a good foundation for achieving sustainable patterns of resource use (Dietz et al. 2008).

Duit et al. (2010) ask whether there are certain forms of governance that are better equipped for addressing and managing processes characterized by complexity. Boyd and Folke (2012) argue that a resilience approach to governance enables a more refined understanding of interlinked and multi-scale change (Boyd and Folke 2012). Societies may increase their resilience by putting early warning systems in place, or by developing mechanisms and institutions that enable them to remember past events (Boyd and Folke 2012). Humans' predictive abilities are limited, due to the cross-scale nature of complex systems and prevailing uncertainty (Gunderson et al. 2010). Similarly, Miller et al. (2010) suggests that by analysing a SES one can trace factors that enhance resilience by reducing risks or adopt management practices that learns from experience. Although there is little guidance on how building resilience might actually be undertaken, building adaptive governance have been fronted as a strategy that is both sensitive to and has the capacity to react to changes within the SES being managed (Sandström and Rova 2010).

### ***Adaptive Governance***

Adaptive governance is an approach that embeds the complexity and uncertainty in management systems. It addresses the link between the management system and the SES into which it is embedded, and applies sensitivity to ecosystems by perceiving their full complexity (Olsson et al. 2004; Janssen et al. 2007; Sandström and Rova 2010). In other words, management structures that adhere to the “adaptive governance approach” are continuously reconsidering and adjusting to match a complex and ever changing environment. However, North (1990) stipulates that in addition to being flexible to changes, institutions

also need to adapt rules that create some form of stability over time in order to create trust among other segments of the society.

The concept of adaptive governance encapsulates the both adaptive management and co-management, which combined turns into adaptive co-management (Boyd and Folke 2012). This management strategy combines adaptive management and the linkage dimension of collaborative management in which rights and responsibilities are jointly shared (Resilience Alliance 2002b). Sandström and Rova (2010) highlight how co-management is a broad concept, which covers a wide range of ways to organize management. Despite divergences in how the concepts are defined co-management refer to multi-actor structures, spanning jurisdictional borders while regulating the state and transformation of natural resources (Walters 1997, Carlsson and Berkes 2005, Plummer and Armitage 2007). Attention is given to the creation of dialogue among interested institutions, organizations and other actors, combining institutional types and “*improving evaluation of process and outcome through flexible management*” (Resilience Alliance 2002b). When a diverse group (local resource users, research scientists, government representatives) shares management of extractive resources several options exists for testing policies, better inform decision-making (Miller et al. 2010).

Proponents of adaptive co-management argue that it contributes to more rapid knowledge acquisitions; information flows and ensures understanding of complex problems (Miller et al. 2010). Encouraging widespread participation is also expected to establish trust between different institutions and create more accountable authorities that can distribute costs and benefits of participation (Boyd and Folke 2012). The collaboration structures might be well equipped to handle the complex issue of petroleum management and the challenges associated with extracting extractive resources that are owned by the Tanzanian society as a whole. Underdal (2010) argues that the adaptive governance model implies a need to understand how complex systems can respond to change, and that diversity in governance arrangements may increase the range of response options. The response actions may take the form of public hearing consultative committees, submissions or other community engagement mechanisms.

## 2.2 Vulnerability Approach

Whereas resilience describes SES in general, vulnerability describes the response of specific system variables in the context of known current conditions, as well as expected changes (Chapin et al. 2009; Nelson et al. 2010). Different research traditions have used the concept of vulnerability as a theory to explain perturbations that impact upon a system (Blaikie et al. 1994; Agder 2006; Turner et al. 2003; Wisner et al. 2004; Smit and Wandel 2006). According to Agder (2006:270), being vulnerable is defined as “*the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt*”. In other words, the vulnerability approach helps to evaluate hazards in a SES holistically, and put emphasis on the ability of a system to deal with a stress or perturbation, and oil spill or chemical pollution (Berkes 2007). A stress or a perturbation may be a result of historical processes, political economy and power relations (Blaikie et al. 1994).

Vulnerability rises as stresses begin to overwhelm an institution or region’s robustness (capacity to cope with stress without adapting) and resilience (its capacity to deal with stress through adjustments that stop short of transformative change) (Young 2009). Thus, vulnerability is a concept of the “*sensitivity to disturbances, threats or stresses of one sort or another*”, which places a region on a trajectory of greater risk (Young 2009:379). SESs experience both internal and exogenous stressors such as changes in national laws and regulations, as well as biophysical changes. Different stressors might be directly related, but there are often certain linkages between them that may result in cumulative and chronic impacts over the course of time. When changes or shocks occur due to stressors, people with insufficient income and wealth are likely to be especially vulnerable and experience a breakdown in previous held endowments (Agder 2006). The challenge is how to better access the perspectives of the most vulnerable that lack resources and political influence. Thus, by applying a vulnerability approach one may be able to address issues of power, social change, access, and equity critical to SES management and governance (Miller et al. 2010).

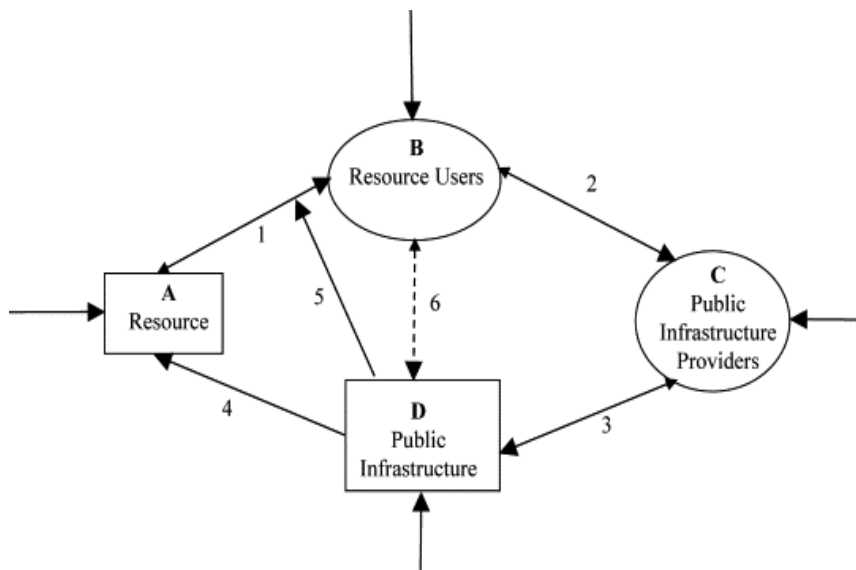
The extent to which vulnerabilities are realized depends on the social and ecological context and changes in the context over time. When countries develop extractive industries a system may experience new forms of stressors. Some parts of the system may be able to tackle these stresses, while other parts find it hard to adapt. Larger export markets may for instance undermine coastal- and marine systems at local scales; for example by transforming a mangrove

forest into reception facilities for gas and oil because it is argued as a stepping-stone towards industrial development. Moreover, managing a few variables for short-term gain might be profitable, however, over time there are greater chances of unwanted regime shifts (Walker and Salt 2006). According to Walker and Salt (2006:150) “*optimizing and controlling components of a system in isolation of the broader system results in a decline in resilience, a reduction in options, and shrinkage of the space in which we can operate safely*”.

## 2.3 Robustness Framework

In line with resilience and thinking, some scientists (Anderies et.al. 2004; Nelson et al. 2010) have developed frameworks that acknowledge SES as never fully designed and controllable. Anderies et.al. (2004) emphasizes that rather than exploring how we should manage and control ecological resources, one should ask what makes social - ecological systems robust. Robustness can be used to link resilience ideas about transformation and nature of complex systems to performance measures and decision-making frameworks (Anderies et al. 2012). Pursuant to Anderies et al. (2012:12) “*ideas from robust control is sufficient to understand a given system’s capacity to cope with disturbances and inherent fragilities*”. And in turn, design robust policies and trade-offs associated with governance structures seeking to reduce the sensitivity to a given system output.

The framework applied by Anderies et al. (2004) focus on attributes of institutions and the dependence on the underlying ecological system. Thus, it identifies a broad set of variables within an institutional perspective, and focus on identifying what attributes of the institutions that are more likely to lead to the creation of a robust SES. Robustness can be defined as “*the maintenance of some desired system characteristics despite fluctuations in the behaviour of its component parts or its environment*” (Carlson and Doyle 2002 in Anderies et al. 2004). In order to detect rules devised to constrain actions, institutional attributes and interactions, Anderies et al. (2004) proposes a model of a social- ecological system:



**Figure 1: A conceptual model of a social-ecological system**

(Source: Anderies et al. 2004).

This model combines the resource users, the governance and the infrastructure and views them as a coupled system (Fargerheim 2010). Anderies et.al. (2004) use examples of water source and fisheries, but the framework can also be applied to exploitation of other natural resources including petroleum resources. The model pictures a resource (A) that is used by a multiple of resource users (B) and the public infrastructure providers (C). The diversity of actors may have conflicting goals and attributes. The public infrastructure (D) combines two forms of human-made capital, both physical and social. External disturbances (8) impose threats or changes to both resource users and public infrastructure providers, while internal disturbances (7) impact the resource and the public infrastructure. All the links between these entities can fail, and thereby reduce the robustness of the system (Anderies et al. 2004).

**Table 1: Overview and explanation of linkages** (Source: Anderies et al. 2004).

Entities/links	Processes/vulnerabilities
Resource	Increase of uncertainty in the water flow Level decrease
Resource users	Collective action problems
Public infrastructure providers	Increase complexity
Public infrastructure	Increase infrastructures
Social capital	Ineffective boundaries rules Lack of robust govern system
Between resource and resource users (link 1)	Decrease of the volume flow Not enough water to continue with the traditional agriculture Increase of recovery periods
Between users and public infrastructure providers (link 2)	Increase economic investment to create and maintain infrastructures Collective action problems (e.g. infrastructure maintenance)
Between public infrastructure providers and public infrastructure (link 3)	Increase economic investment to create and maintain infrastructures Collective action problems (e.g. infrastructure creation and maintenance)
Between public infrastructure and resource (link 4)	Resource level decrease Decrease resilience of the resource Increase resource price
Between public infrastructure and resource dynamics (link 5)	Not enough water to continue with the traditional agriculture Decrease efficiency of infrastructures
Between resource users and public infrastructure (link 6)	Collective action problems (e.g. infrastructure maintenance) Increase of users' debts Land abandonment
External forces on social actors (link 8)	Young people emigration
External forces on resource and infrastructure (link 9)	Decrease resilience of the resource

There is an important difference between the collapse or undesirable transformation of a resource and the collapse or loss of robustness of the entire system. Anderies et al. (2004) suggests that a SES is robust if it “*prevents the ecological system upon which it relies from moving into a new domain of attraction that cannot support a human population or that will induce a transition that causes long – term human suffering*”. Thus, a robustness analysis can help reveal different types of challenges that face the Tanzanian petroleum sector and create a better understanding of how to deal with them (Anderies et al. 2012). For instance strategic, profit maximizing, interactions might affect chosen management strategies. Government officials are not always responsible resource stewards, especially when resource extraction can increase the budgets of government agencies (Anderies et al. 2004). Nelson et al. (2010) argue “*choices made about infrastructures often involve benefits in the short and medium terms, like greater productivity and potential to support greater population densities. However, with these benefits comes trade-offs among different scales*”.

## 2.4 Resilience, Vulnerability and Robustness; Ways of Governing Complex Regimes

In terms *resilience thinking* the view on coastal systems has changed. Management approaches increasingly swear to a holistic understanding of complex systems to better inform decisions, and better react to unknown change and find innovative mechanisms for transformative change (Anderies et al. 2012). This thesis applies resilience thinking as an overall framework in which the SES operates by looking at how certain social institutions may provide mechanism for managing stress and multi-level change (through forms of *adaptive management*). In addition, both a *robustness* and a *vulnerability* approach are applied to detect a number of stressors and interactions between units in the SES. It may be important to understand that the governance systems humans create to steer human-environment relations often are as complex as the SESs they are created to steer (Young 2009). Hence, it is relevant to ask questions about the resilience, vulnerability and robustness of regimes responses in face of system changes to detect some of these complexities. All approaches are broad, but together they allow for perspectives of diverse actors and institutions to be captured (Miller et al. 2010).



## 3.0 METHODOLOGY

### 3.1 Data Collection

The fieldwork was carried out in Dar es Salaam and Bagamoyo in the period between 11<sup>th</sup> of March 2012 and 17<sup>th</sup> of March 2012. The intention of the fieldwork was to have unstructured interviews with representatives from some selected Tanzanian institutions involved in petroleum sector management; governmental institutions (NEMC, TCMP), the national oil company (TPDC), research institutes at the University of Dar es Salaam (IRA and IMS), and a non-state actor (WIOMSA). In addition, I held a meeting with Statoil, a Norwegian petroleum company and the Norwegian Embassy in Dar es Salaam. My supervisor did accompany me in most of the meetings.

On the first day of fieldwork I met with Dr Julius Francis, the Executive Secretary of the WIOMSA. WIOMSA is a central actor in promoting scientific and educational development in all aspects of marine sciences in the western Indian Ocean region, and, is thus involved in matters on coastal resource management. Francis argued about the need for the government to apply a holistic perspective on the petroleum issue.

The meeting with NEMC was in their department building in Dar es Salaam. Ruzika N. Muheto, the Director for Environmental Planning and Research welcomed me in his office, where Rose Sallema Mtui also attended the meeting. As we were a small group of people, the meeting turned out to be more like a focus group arrangement. Together, we discussed challenges NEMC is facing and which activities they perform on the gas and oil issue. Muheto argued that the gas and oil issue is high on NEMC's agenda, and that collaboration with Norwegian institutions and the WB are considered important for future development.

A delegation from the UDSM had also planned a meeting with TCMP, so I was lucky to travel together with them by car to TCMP's office in Bagamoyo, about 30 km north of Dar es Salaam. Before we went off to Bagamoyo I was introduced to the then Director of the IRA institute, Professor Pius Yanda. He showed interest in my work on gas and oil development in Tanzania, and emphasized the role the IRA could have in capacity building. When arriving at the TCMP's office, Jerimiah Daffa, the unit leader, and the other employees welcomed us all in the doorway. We were further led into a meeting room, where we opened the meeting with a more detailed presentation of each person. After the presentation some people left the room, while four TCMP employees stayed. Similar to the NEMC meeting, this session was similar to a focus group discussion. The dialogue stimulated to an interesting discussion about

TCMP, and the challenges with gas and oil development, and related possible effects on the coastal and marine environment. Great concerns were especially attributed to seismic surveys, oil spills and the lack of coordination between the central government and the local levels. I also showed them the coastal map with all licenced blocks offshore, which they found very useful.

The day after the visit in TCMP's office, I went together with my supervisor to the UDSM, where I was introduced to different research departments, including the Department of Aquatic Science and Fisheries (DASF). Dr Narriman Jiddawi, senior lecturer at the IMS (in Zanzibar) was fortunately in Dar es Salaam for a visit, and met us at campus for a brief discussion on the issue. She was especially interested in how the coastal fisheries might be affected by an expansion of the petroleum industry in coastal waters, and stated that the IMS will contribute to more future research around the issue. Later that day, we visited Dr Rose Mwaipopo's office in the Department of Sociology and Anthropology. She has carried out research on the social dimensions of marine protected areas and utilization of coastal resources.

Because foreign gas and oil companies are central actors in the business, I was interested in the industry's perspective on current status and future activities. I contacted Sigurd Juel Kinn, environmental advisor in Statoil Tanzania, and he invited my supervisor and me to Statoil's country office in Dar es Salaam. At their office we were also introduced to Grace-Fisha Urassa, administrative consultant at Statoil. Kinn gave an informative presentation about Statoil's operation in Tanzania, and the company's actions on environmental protection in their operations. The meeting gave a valuable understanding of the challenges the companies are facing in their first phases of petroleum operation in Tanzania.

The last day of fieldwork two meetings were planned, one with Anna-Maria Simon, Safety and Environmental Officer in TPDC, and one with Geir Hermansen, senior advisor in NORAD working at the Norwegian Embassy. Unfortunately, Simon was busy with work at that time and was not able to meet us. However, she agreed to communicate by emails, through which she has been most helpful. On the other hand, the meeting with G. Hermansen at the Norwegian Embassy was held as planned. Present at the meeting were also Inger Næss, senior advisor on environmental affairs in NORAD, and my supervisor. Hermansen gave an introduction of the Norwegian Oil for Development Program in Tanzania and their cooperation with Tanzanian institutions.

A number of useful meetings were also held in Oslo, at the 3<sup>rd</sup> of May and the 8<sup>th</sup> of March 2012. I met up twice with Jon Opem, senior advisor, in the Norwegian Ministry of the Environment. Johnny Auestad, from the Climate and Pollution Agency also attended one meeting. Opem and Auestad shared some experience from their meetings with Tanzanian institutions in relation to the OfD programme, and their collaboration with Tanzanian institutions.

### ***Sampling***

Snowball sampling was the sampling strategy used to select participants. The strategy was a good way to locate subjects and institutions with relevant attributes or characteristics necessary for the study (Berg 2004). After the meetings, the participants sometimes suggested names on other persons that could be relevant for me to contact. For instance the MoE did suggest some names on people working in Tanzanian institutions and the Norwegian Embassy, which they had corresponded with through the OfD program. All the institutions that I met during the fieldwork in Dar es Salaam and Oslo were selected on the basis of my study objectives, but also depended on which institutions I was able to establish contact with. My supervisor was an important key person, as he used his contact network to arrange several of the meetings at short-time notice.

## **3.2 Data Collection Methods**

Qualitative research seeks to answer research questions by examining various social settings and the individuals who inhabit these settings (Berg 2004). Researchers using qualitative research strategies are often interested in obtaining an in – depth understanding of a complex issue. In this setting, the interest was to explore the nature of the petroleum situation in Tanzania. Face to face interactions are usual in qualitative research, and opens for unquantifiable facts about people (Bryman 2008). In this way, researchers may be able to share perceptions and understandings of others. Thus, in social science, qualitative research methods are emphasized when researchers are interested in the life-world of their study units, and to give detailed descriptions on particular contexts (Berg 2004).

### ***Unstructured Interviews***

The method that was used when meeting up with the Tanzanian institutions, Statoil and the Norwegian institutions were what Bryman (2008) name unstructured interviews. This interview method is useful when the intention is to develop an understanding of an as-not-yet fully understood issue (Cohen and Crabtree 2006). While the petroleum sector is under development, more knowledge and capacity will probably be built on the issue. Instead of providing detailed technical questions, I was more interested in letting the participants express freely on the gas and oil issue, rather than keeping strict with a structured interview guide. According to Bryman (2008) during unstructured interviews there might only be a single question that is asked so that the participant can respond freely. Hence, this type of interviews is considered similar in character to conversations. The meetings with NEMC, TCMP, Statoil, WIOMSA were all characterised by dialogue, which made my role an integral part of the research instrument (Cohen and Crabtree 2006). My supervisor also joined several interviews. Even though all the participants spoke English, his cultural and linguistic attributes were valuable and might increased the legitimacy of the study.

### ***Documents***

In the study of petroleum in Tanzania, secondary sources have been important sources to attain information on Tanzanian institutions, Norwegian institutions, and more generally on gas and oil activity in Africa. The documents that were used were valuable sources combined with my own experience from the unstructured interviews (Grønmo 2004). Relevant documents derived from quasi official-, private-, and public sources. Documents such as the “OfD Norway-Tanzania, draft on the institutional cooperation (OfD) between Norway and Tanzania (2012 – 2014)” and the summary paper from OfD meetings in Tanzania, were still unofficial papers that were provided to me by the MoE. The contacts I established in the NEMC and the WIOMSA also provided me with research reports on the coastal- and marine environment. Other literature material, such as annual reports, research articles and newspaper articles, were downloaded from the Internet. The literature search bases used were Google Scholar, Google News, JSTOR, Eldis, Economic Intelligence Unit (EIU) and UNDP. In addition, the library search base Bibsys Ask was a major contributor to finding relevant articles or books.

Bryman (2008) argues that independent of whether documents are produced by the state, private sources, or the media, they are always produced by people who wish to put forward a particular point of view, and are not “objective”. Therefore, before being selected as

thesis materials, all documents were evaluated in terms of their credibility and recognition in international research communities. For instance, online published material was collected from the African Development Bank (ADB), Amnesty International, and the International Union for Conservation of Nature (IUCN), the International Finance Corporation (IFC), Chantam House, the World Bank (WB), United Nations Environmental Programme (UNEP), the Norwegian Agency for Development Corporation (NORAD), the TPDC, the UDSM, and the WIOMSA. The News-articles accessed were mainly written in online Tanzanian or African Newspapers; The Citizen, In 2 East Africa, Tanzania Daily News, IPP Media, Trademark Southern Africa, Afribiz, East Africa newspost and Afrique en ligne, as well as some international news bases; Geotimes, the Oil and Gas Journal and Reuters.

### 3.3 Methodological and Ethical Considerations

#### *Limitations*

The fieldwork had short time duration as it lasted for one week. This week was booked with several meetings with persons involved in managing the gas and oil sector. More time would have abled me to exert more than one interview with each institution, and thereby given me more in-debt data material to work with. However, due to the far distance between Norway and Tanzania, I continued corresponding with several institutions by email. This way of corresponding was highly efficient as it saved both time and travel costs (Bryman 2008).

Since the development of an oil industry in Tanzania is in its initial stages, there is still little research-based published material found on the issue. No scientific articles have been published. Instead, over the last month's news articles on gas and oil in East Africa have had major coverage in online African newspapers (The Citizen, In 2 East Africa, Tanzania Daily News, IPP Media, Trademark Southern Africa, Afribiz, East Africa newspost and Afrique en ligne). Citing news articles may lack scientific rigour and credibility. The authorship of such articles is often unclear, and, hence, it is difficult to know whether these are written by someone well informed on the issue. However, the issue's novelty makes it necessary to incorporate news articles in order to be updated on new information regarding the gas and oil sector.

The commercial sensitivity around petroleum exploration is another challenge. The competition between international petroleum companies might be a reason for petroleum

companies, in this case Statoil, to hold back relevant information. Information may also be held back to secure better pricing on future blocks.

Lastly, the study has used examples from Nigeria and Norway to illustrate how petroleum resources can result in a blessing or a curse. There might be difficulties with comparing countries, due to contextual characteristics such as history, size of population and government system. However, the main intention with using examples from other countries is to illustrate how petroleum management can take quite different directions.

### ***Trustworthiness***

Qualitative research is often criticized for being too subjective and difficult to replicate, but according to Bryman (2008) any such generalizations are problematic. To increase the trustworthiness of the study I was during the whole period of the study conscious about my role as a researcher and the importance of keeping complete records of the collected information. However, recognizing that the SES is always changing, ensuring complete records in all phases of the research process is impossible. LeCompte and Goetz (1982) confer that “*conducting a true replication of a study is almost impossible*”.

The selections of interview - participants were based on suggestions from the MoE, the Norwegian Embassy in Tanzania and my supervisor. Beardsworth and Kiel (1992 in Bryman 2008) makes clear that such snowball techniques “*cannot possibly claim to produce a statistically representative sample, since they rely upon the social contacts between individuals to trace additional respondents*”. Despite the lack of a statistically representative sample, the participants were rather chosen and adapted to the objectives of my problem statement. I am aware that when data is not randomly selected, the research may be claimed to have low external validity. The intention was to give a qualitative description of the petroleum development in Tanzania, and not to generalize beyond the research context or applied to other areas.

### ***Ethical Considerations***

The problems with ethical considerations are their lack of objectivity. As a researcher it is not enough to learn about ethical principles in qualitative research, but in addition how to implement the knowledge and capacities of “good practice” into field practice. According to Plato (Kvale and Brinkmann 2009) there are no rules or principles that work in their own right

or interpret themselves - the rules must always be understood contextually. Therefore, to increase my moral integrity as a researcher, I was concerned with the fact that my own values did influence my perception of the data collected (Bryman 2008). When unstructured interviews were conducted, my presence and behaviour may likewise have influenced the perceptions and behaviour of the other participants. Hence, obtaining total objectivity is never possible in human interactions, and findings are dependent on this particular research context.

All participants were informed about the intention of the study, and given the option to participate. They were also given the choice of having their name kept confidential. Since the given information was not considered too sensitive, all participants allowed me to have their names published. According to Berg (2004) the total sum of participant's potential benefits and the gained knowledge should be more important than the risk of hurting the participant. Being aware of this, I double-checked with all the participants if I could cite them, before the thesis was to be published. In addition, all participants were promised a copy of the final thesis.

## 4.0 COUNTRY DESCRIPTION

Tanzania is the largest country in East Africa, and it includes the Zanzibar Islands (Pemba and Unguja) and Mafia Island. It shares borders with Zambia, Malawi, Mozambique, Kenya, the Democratic Republic of Congo, Rwanda, Burundi and Uganda (Executive Summary Report URT 2011). The population in Tanzania has reached 46,2 million people according to an 2011 estimate (EIU 2012).

The country is divided into 26 regions (5 in Zanzibar), which are subdivided into 117 districts (UNDP). It is endowed with grasslands, mountains and a diversity of lowlands (Executive Summary Report URT 2011). Most of the country is part of central African plateau at between 1000 and 3000 m above sea level, except for the coastal belt that stretches out 1,424 km (WIOMSA and UNEP 2009). The northward flowing East-African coastal current sweeps the coastline throughout the year. The current is most powerful during southeast Monsoon (April – October), and reduced by northeast winds during the northeast Monsoon (December – March) (Ngusaru et al. 2000). Climate varies from tropical along the coast to temperate in highlands (CIA World Fact Book 2012). The semi tropical climate on the coast creates habitat to a diverse range of ecosystems that include major estuaries, mangrove forests, coral reefs, sandy beaches, cliffs, sea grass beds and muddy tidal flats (Francis and Bryceson 2001). Coastal waters, lagoons, estuaries and continental shelves provide important fishing grounds, food security, employment and income (WIOMSA and UNEP 2009). Several valuable minerals are also found along the coast, including kaolin, black sand, rock salt, heavy minerals, limestone and natural gas.

### 4.1 Political Economy

Mainland Tanzania gained independence from Britain in 1961 after over forty years under British rule (ICMM 2007). The German and British colonial rule lasted for seventy-six years and destroyed the pre-existing systems of the societies by leaving a weak economy, limited social services and few professionals in key sectors behind (Executive Summary Report URT 2011). In 1962 Julius Nyerere was declared the first Tanzanian President after independence. He implemented a one party system with the Tanganyika African National Union (TANU) (later named Chama cha Mapinduzi (CCM)). Based on the socialist ideology of “ujamaa” (familyhood), Nyerere and his political party launched a path towards building an egalitarian society where everybody was supposed to participate productively and benefit



equally from the state. A centralized economy was invented, that nationalized all major industries in Tanzania. In 1967 the Arusha Declaration was adopted with the aim of placing the ownership of the major means of production under control of the people (Executive Summary Report URT 2011). During this nationalization process, the private sector was constrained by the use of regulations and licenses, and foreign trade was tightly controlled. The rural population was resettled into Ujamaa villages, modelled loosely on the Chinese commune system (ICMM 2007). However, the structure turned out to fuel wide spread corruption and decrease in agricultural production. This worsened in the 1970s and 1980s, and cumulated into a succession of economic crisis where inflation grew, budget deficit rose and exports stagnated (ICMM 2007). Despite the failed strategy of displacing people into Ujamaa villages, Nyerere established a high level of stability during his presidency (1962 – 1985), which ensured a peaceful succession to the subsequent presidents (ICMM 2007).

Several macroeconomic policy reforms and structural reforms, by WB and IMF, intensified in the 1990s and gave root to higher growth rates. Tanzanian authorities began a cautious liberalization and allowed for more private sector engagement (ICMM 2007). When Benjamin Mkapa became President between 1995 and 2005, he introduced tighter fiscal controls and structural reforms of institutions. The opening of new reforms attracted more FDIs, and the GDP improved. According to GoT (2011) foreign exchange reserves have increased more than 2000 per cent in the last 15 years. Tourism, mining and construction were among the sectors that grew most rapidly (Havnevik and Isinika 2010). Nevertheless, economic reforms created expectations, but delivered little in terms of addressing poverty problems. Lack of poverty reduction is partly due to the growing sectors that create few employment opportunities and have few linkages to the rest of the economy (Havnevik and Isinika 2010). In general, poor people are still deprived of rights to increase capabilities and are dis-empowered to participate in political processes. Even though the ruling party, Chama cha Mapinduzi (CCM) with President Jakaya Kikwete in front, has developed structures for democratic decision-making, the party remains a strong central authority with personal networks (Havnevik and Isinika 2010). Currently there are 18 registered political parties, where 5 are represented in the Parliament.

## 4.2 The Mining Sector

Gold and other goods “fuelled” Indian Ocean trade over a thousand years ago (ICMM 2007). However, it was not before the 19<sup>th</sup> century when gold was discovered in the Lake Victoria area, and the first large-scale mining began. Under the German colonial rule several mines began to produce gold, but a “downturn” came in the late 1960s and 1970s, when gold mines became exhausted (ICMM 2007). At that time, diamonds remained the most significant mineral. Forest, petroleum and minerals were quite under exploited until the late 1990s following the liberalization and privatization of the economy (SID 2009). Nevertheless, from 1992 and onwards, the government has actively sought to rejuvenate the mining industry (ICMM 2007). Since 2001 annual gold production has grown rapidly, and Tanzania is now the third largest gold producer in Africa after Ghana and South Africa (SID 2009). Diamonds and Tanzanite are among other valuable mining resources being exploited.

Despite the contribution to GDP, many Tanzanians have raised concerns over how little the country is benefiting from the large-scale mining (Lange 2008). Inequalities in society seem to have been exacerbated by the large-scale mining operations (ICMM 2007). Lack of horizontal and vertical linkages between the local economies and the large mining activities have hindered creation of mutual trust and cooperation between the parties. In the Bomani Report 2008 (in SID 2009) the government was accused for giving away big portions of land to multinational companies leaving indigenous people displaced. Thus, corruption is still a problem and mining companies have in several instances manipulated the government without consulting affected communities (SID 2009). In addition, in terms of revenue, companies pay three percent royalties and no corporate taxes until they have recouped their initial investment, according to Lange (2008). The government has also been blamed for not keeping track of the exact amount of mineral exploration and how to determine the expected tax royalties (SID 2009). Even though Tanzania is still aid - dependent, foreign mining companies seem to operate with reduced tax and large royalty revenues. Due to the highly mechanized and automatized large-scale mining sector the industry have contributed little to Tanzanian employment (ICMM 2007).

### 4.3 Coastal and Marine Resources and Ecosystems

Along the coastline there are five administrative regions; Tanga, Dar es Salaam, Pwani, Lindi and Mtwara, which is home to about 25 per cent of the population (Francis and Bryceson 2001). Most of the coastal population lives in Dar es Salaam region. The coastal population is in general poor and dependent on coastal resources for their survival. The resources derive from rivers, mangroves, coral reefs, seagrass beds, and beaches (Payet and Obura 2004). During the period 1980 – 1994 coastal and marine resources contributed to about one third of gross national product (Francis and Bryceson 2001). Economic activities range from artisanal and industrial fisheries, urban-development, human settlement, marine conservation areas, tourism to trading and natural gas exploitation (Payet and Obura 2004).



**Figure 2: The Tanzanian coastline** (Source: Google Earth 2012).

### ***Major Rivers***

Several seasonal rivers flow into the Indian Ocean and affect the coastal environment through the creation of estuaries and brackish water and maintenance of deltas. Freshwater drainage in the low-lying tropical coastline also supports mangrove systems and seagrass beds with sediments (Ngusaru et al. 2000). The largest river basin in Tanzania is the Rufiji basin, with its three sub-basins; the Great Ruaha, the Little Ruaha and the Kilombero. The Rufiji basin covers an area over 53 000 ha, and is home to the largest expanse of mangrove forest in Tanzania (Mwalyosi 2002).

### ***Mangroves***

Mangrove forests occur along the whole coast and islands offshore, but are mainly found in Rufiji, Tanga, Kilwa, and Pangani (WIOMSA and UNEP 2009). The term mangrove refers to plant communities and shrub species found in saline environments and intertidal zones (Osborne 2009). Mangroves flourish in anaerobic, salty and acidic soils, and in areas where seawater mixes with freshwater (Francis and Bryceson 2001). Despite mangroves adaptive capacity to low oxygen and poor nutrient availability, the process of photosynthesis is the cornerstone in life for mangroves. Factors that limit photosynthesis or delay recycling of nutrients or limit their uptake impact productivity (Ngusaru et al. 2000). Thus, petroleum prospecting, oil pollution, and industrial chemical pollution may have direct negative effects on productivity (Ngusaru et al. 2000).

Mangrove forests serve as nursery and feeding ground for fishes and invertebrates, and are homes to oysters and crabs (Francis and Bryceson 2001). The high sediment load and reduced salinity make valuable life conditions for shrimps that feed on organic detritus (Osborne 2009). Flooded vegetation also works as shelter and protection against beach erosion (Mwalyosi 2002). In addition, mangrove ecosystems export nutrients and organic matters to adjacent ecosystem, such as coral reefs. Local communities also benefit from the trees and shrubs. Mangroves work as building materials, firewood and charcoal, while poles and timber have been traded since ancient times for house and boat building (Mwalyoski 2002). In some areas, like the Rufiji delta, people also clear land for saltpans and rice farming. It is estimated that 150 000 people in Tanzania earn their living directly from mangrove resources (TCMP 2001 in WIOMSA and UNEP 2009).



**Figure 3: Mangrove roots in Kawe District, Dar es Salaam.**

Mangroves, estuaries and salt marches are especially vulnerable to small amounts of oil pollution and discharges from offshore installations. When oil washes ashore and accumulates in sediments of shallow water zones, contaminated particles are deposited at the bottom, and this result in an accumulation of pollution (Kloff and Wicks 2004). Mortality of mangroves may cumulate further into sediment erosion, and deposited to nearby ecosystems such as coral reefs, which leads to loss of wetlands and loss of fish catches. According to Bryceson (1981) tropical communities experience smaller fluctuations than temperate communities’, thus; their ability to tolerate pollution and unnatural stresses is lower.

### ***Coral Reefs***

Coral reefs cover an area of 3,580 km<sup>2</sup> (WIOMSA and UNEP 2009). These ecosystems are home to a diverse range of coral species (314 coral species are recognized). The reefs are predominant along the whole coast, except in the river mouths (Bryceson 1981). River mouths have high sediment loads and anaerobe environments, whereas coral reefs need waters that are warm, clear, saline and oxygenated. Fringing reefs are found along the mainland, and outside Pemba, Zanzibar and Mafia islands. The Mafia Island has extensive reefs in the southern part of the Island, about 400 fish species and 48 genera of scleratinian corals are recorded (Mwaipopo 2008). In reference to WIOMSA and UNEP (2009:34) “*the south Equatorial current meets with the east African coast in Southern Tanzania, rendering its reefs the most bio-diverse in East – Africa*”.

Thousands of species, animals and plants are dependent upon the reefs for survival. The reefs function as food and shelter for animals, net sinks for carbon in the form of calcium

carbonate, areas for fish breeding and shelter, and as natural barriers that protect the shoreline (Francis and Bryceson 2001). Subsequently, they provide a range of “properties” and are a valuable resource to adjacent coastal communities. However, Payet and Obura (2004) have emphasised that coral reefs experiences threats from several holds; the coral reef bleaching event in 1998, destructive fishing methods like dynamite fishing and coral mining.

### ***Sea grass-beds and beaches***

Sea grass-beds are evident in all bays with shallow waters, and widespread around Songo Songo and Mafia Islands. The distribution of sea grass-beds varies from high intertidal to shallow sub-tidal areas (Francis and Bryceson 2001). Sea grass-beds are common in vicinity of coral reefs, where the sea grass works as protectors and sediment reducers (Osborne 2009). Like mangroves, they serve as breeding-, nursery-, and feeding ground for fishes (Francis and Bryceson 2001). Herbivores, invertebrates, fish, dugongs and green turtles also feed on the grass.

Sea grass-beds and beaches protect coastal communities from erosion, storms, and hurricanes. Beaches are found along the whole Tanzanian coast, and are important sites for nesting among turtles and birds, and provide buffer against wave action and nesting sites. Tourism and coastal communities use beaches for recreational spaces and relaxation (Honey 2008). Currently, beach erosion seems to be an expanding problem in Tanzania due to building constructions and territorial uplift.

### ***Fishing activities***

Even though many coastal people engage in agriculture or other businesses, fishing related activities are the most lucrative source of sustenance (Mwaiopo 2008). It is estimated that 1,3 million of the rural population is directly employed in the fisheries sector, and many more earn their living from fisheries-related activities (Mwaiopo 2008). Of these are approximately 58 000 artisanal fishers operate along the coast (WIOMSA and UNEP 2009). Clearly, fishery products are important sources for the people of Tanzania (Jiddawi and Ohman 2002). The artisanal fishers operate usually within territorial waters where fishing activities are concentrated in the shallow waters of coral reefs or sea grass-beds (FAO 2007). The fishers use small boats or canoes when fishing, and use mostly gill nets or shark nets to catch finfish and shrimps (FAO 2007).





**Figure 4: Artisanal fish boat in the Kawe District, Dar es Salaam.**

Marine fisheries are important sources of government revenue, animal protein, employment and income. Fish related activities also include boat building, repair and marketing. The demand for fishery resources has increased with an increase in population and tourism development. This has resulted in more fishing pressure and more use of destructive techniques (Jiddawi and Ohman 2002).

In industrial fishing, trawlers travel both in the territorial zone and in the Exclusive Economic Zone (EEZ). The main targets are shellfish, cephalopods, crabs (TZ) and tuna, marlin, sword - fish and sharks (FAO 2007). Biodiversity catches are high in the EEZ compared to global standards (Francis and Bryceson 2001). A demand for fisheries resources has also increased with the tourism development and growth in coastal population (Francis and Bryceson 2001) The demand has caused pressure on the fisheries and accelerated the use of destructive gears.

### ***Marine Parks and Reserves***

The proposal to establish marine parks in Tanzania was first made in the 1960's after Tanzania's independence from Britain. The establishment of exclusion zones were considered but were unlikely due to coastal communities' high dependence on marine resources. According to the Marine Parks and Reserves Authority (2012) "*the intention with marine parks is to conserve the coastal and marine resources for sustainable development, and involve communities in the management of these resources*". These are usually established in forms of reserves, sanctuaries and parks (Thorkildsen 2006). Thus, marine protected areas may balance development and conservationist interests, by avoiding large-scale economic development in certain areas. In Tanzania two areas are declared marine parks, and two areas

marine reserves; Mnazi Bay – Ruvuma Estuary Marine Park, Mafia Island, Maziwi Island and Dar es Salaam Marine Reserves System (Marine Parks 2012<sup>2</sup>).

*Mnazi Bay – Ruvuma Estuary Marine Park* covers 650 sq km and is located south of Mtwara town, including the 45 km coastline of the Ruvuma River. About 11 villages with approx. 30 000 people are living inside the park (Marine Parks 2012). The park represents diverse fisheries, and all of the marine habitats found along the Eastern African coast. The area has lately shown good promise for reserves of gas and oil. However, human activities, such as overfishing, coral mining, and cutting of mangroves, already bear the mark of anthropogenic use (MarineParks 2012).

*Mafia Island* and its chain of small islands lie 120 km south of Dar es Salaam, and 20 km offshore from the eastern extent of the Rufiji delta. The marine park covers an area of 822 km<sup>2</sup>, and is the biggest marine park in the Indian Ocean (Benjaminsen and Bryceson 2012). All the coastal ecosystems are found in the area, ranging from sea grass beds, mangroves, coral reefs and intertidal flats. The park is a critical environment for biodiversity, and its waters are some of the less contaminated in Tanzania. Around half of the 18000 residents are heavily dependent upon marine resources as the park currently covers some of the most lucrative traditional fishing grounds of local people (Mwaipopo 2008). However, after it was declared as a marine park, fisher folk and inhabitants were restricted to access resources (Benjaminsen and Bryceson 2012).

*Maziwi Island* is located in the Indian Ocean at a distance of about 15 nautical miles from Pangani Town. The area serves as a fishing camping for a number of fishermen from different areas. It is well known for its ecological diversity; around 200 species of fish and 35 genera of corals are estimated (MarineParks 2012).

*Dar es Salaam Marine Reserves System* include Bongoyo Island Marine Reserve, Mbudya Island Marine Reserve, Pangavini Island Marine Resources and Funguyasini Marine Reserve (MarineParks 2012).

### ***Tourism***

Tourism became a significant part of Tanzania's economy by the mid-1990s (Honey 2008). The combination of a more conducive investment environment in infrastructure by government- and donors underpinned the tourism boom of the 1990's. The WB, international conservation organizations, and various private investors including South Africans invested in

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<sup>2</sup> <http://www.marineparks.go.tz/>



up-grading of hotels and lodges and created the country's first marine park. Tourism earnings increased from US\$ 164,9 million in 1985 to US\$ 1159, 82 million in 2010 (Executive Summary Report URT 2011). In the coastal areas, exceptional marine assets such as coral reefs and sandy beaches are spectacular sites for tourism (Honey 2008). Activities such as bird watching, deep-sea fishing and scuba diving are also tourist attractions. At the local level, some people have become involved in the industry. Nevertheless, tourism facilities have settled on the most attractive part of the shorelines, and admission to these property areas are often strictly regulated against neighbouring villages (Benjaminsen and Bryceson 2012).

Ecotourism, with the aim of finding a balance between exploitation and conservation, has become a major national strategy increasingly promoted in governmental policy documents. This differs from the conventional notion of tourism as it focuses on the enhancement of natural systems through tourism (Thorkildsen 2006). By focusing on the conservation of species and habitats and provision of fair benefits to the local people within the areas of tourism activity, ecotourism seems to be "*responsible tourism*". However, as Thorkildsen (2006) found in her study of Chumbe Island Marine Coral Park, the application is sometimes misused by the industry and does not always meet the criteria. Some communities experience exclusion from fishing zones and beaches that were originally common land. Other argues that coastal ecotourism can contribute to the survival of MPA's and reduce the pressure of other activities, for instance petroleum exploration activities (Buckley 2003 in Thorkildsen 2006)

### ***Pressure on coastal ecosystems***

The productive ecosystems of coral reefs, sea grass beds, mangroves and other marine life and animal habitats are highly productive, but they experience both physical and climatic stresses. Population growth in coastal areas, industrial development, tourism and other commercial activities have added stresses (Akwilapo 2011). Social disturbances have included direct physical destruction, pollution and over – exploitation of resources (Francis and Bryceson 2001). Large scale commercial finds of gas and oil may lead to infrastructure development or pollution that could impact local residents and the natural environment of the coastal region (OfD Norway-Tanzania, draft 2012).

## 5.0 HISTORY OF PETROLEUM IN TANZANIA

### 5.1 Timeline

Activities in search for petroleum in Tanzania have existed for almost sixty years. British Petroleum (BP) and the Dutch Company Shell were awarded concessions offshore in the 1950's. Tanzania Petroleum Development Corporation (TPDC) (2012) gives a brief history of petroleum exploration in four phases<sup>3</sup>:

#### **Phase I (1952 – 64):**

In the first phase, BP and Shell were awarded concessions along the coast, including the islands of Mafia, Zanzibar and Pemba. More than 100 boreholes, gravity, aeromagnetic surveys were carried out. All together four wildcats were drilled. However, the wells did not encounter significant petroleum shows, but presence of seal, reservoir and source rocks.

#### **Phase II (1969 – 79):**

In 1969 TPDC was established, and the first Petroleum Sharing Agreement (PSA) was signed with AGIP (a former BP / Shell concession). Large surveys were conducted in this ten-year period. Later, the company Amoco joined and drilled five wells, including a significant gas discovery at Songo Songo.

#### **Phase III (1980 – 91):**

In 1980, Tanzania adopted the 'Petroleum (exploration and production) Act', and oil prices were high. As a result, exploration activity increased, and a lot of drilling was done in this period. AGIP made large gas discoveries at *Songo Songo* and *Mnazi Bay* (1982). TPDC participated in the development of the Songo Songo gas field. Both AGIP and Shell drilled wells in the Rukwa Rift basin and Mafia Channel.

#### **Phase IV (1992 – 99):**

In this period there was little exploration activity and no active concessions were made. However, in the beginning of 1995, a number of international companies acquired exploration licences in the coastal basin.

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<sup>3</sup> [http://www.tpdc-tz.com/tpdc/directorate/exploration/Exploration\\_History.php](http://www.tpdc-tz.com/tpdc/directorate/exploration/Exploration_History.php)

### ***Gas Fields in Production***

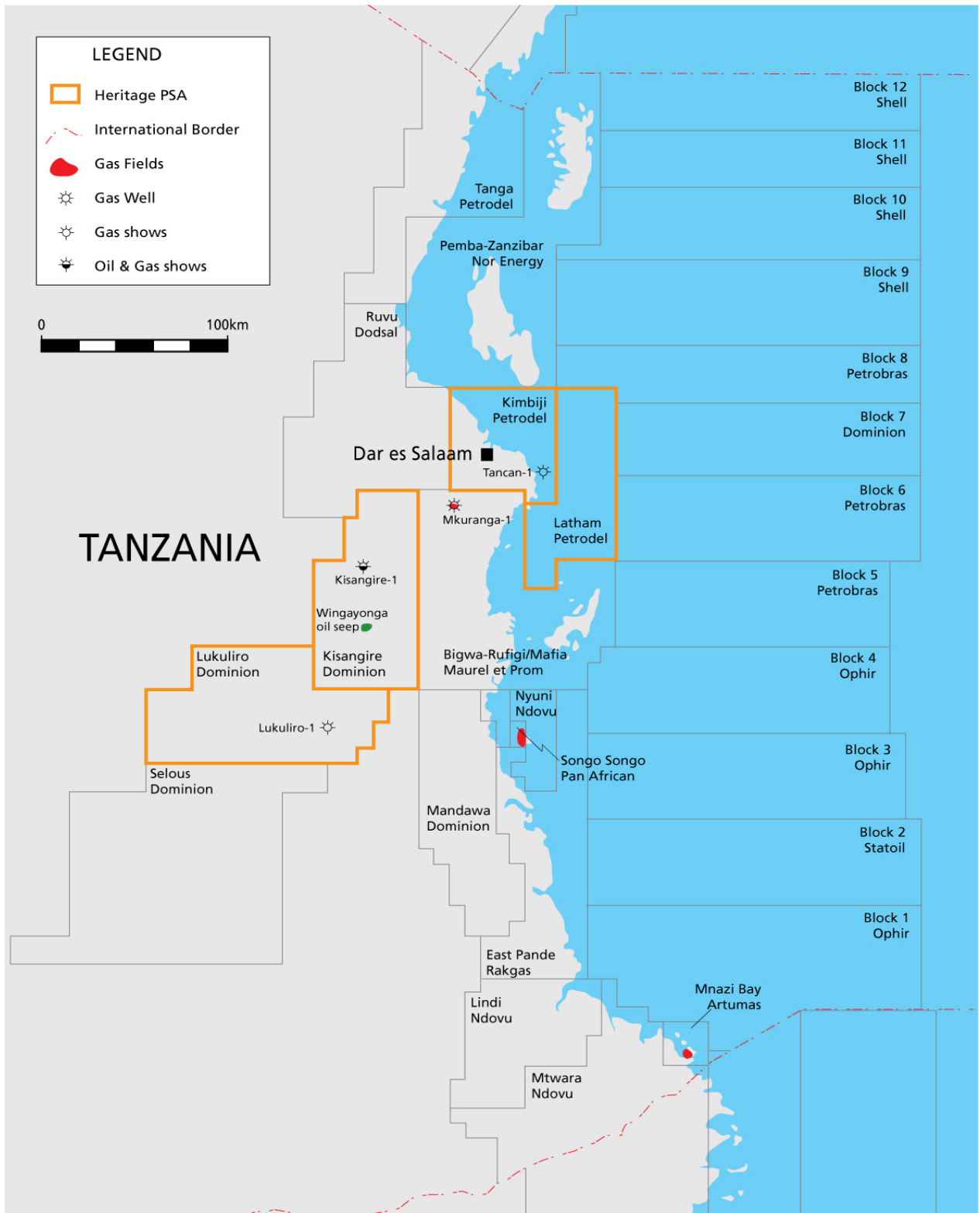
Five gas fields have been discovered onshore in Tanzania; Songo Songo, Mnazi Bay, Mkuranga, Kiliwani and off-shore in deep sea blocks (MEM 2011). However, the biggest gas discoveries have been the Songo Songo and Mnazi Bay fields, which are currently the areas, where gas production is carried out (SID 2009). The plan is according to MEM (2011) to expand the three latter areas by constructing new pipelines and processing plants.

*The Songo Songo gas field:* The Songo Songo gas field is estimated to contain 1,6 trillion cubic feet of natural gas (OfD Norway-Tanzania, draft 2012). The gas is mainly used for power generation and as a fuel to cement manufacturing kilns (WIOMSA and UNEP 2009). Approximately 36 industries in Dar es Salaam are connected to the gas pipeline from Songo Songo. The supply of gas enables the industries to use gas as a fuel for boilers and furnaces (OfD Norway-Tanzania, draft 2012). Recently, compressed natural gas has also been used in vehicles and households.

*Mnazi Bay;* The confirmed recoverable gas reserves in the Bay are estimated to be 242 bcf (OfD Norway-Tanzania, draft 2012). However there is still limited infrastructural and production capacities in the region to utilize all the reserves.

### **From 1999 and to this date:**

During the first three rounds of the offshore licensing rounds, between 2001 and 2004, eight deep-sea blocks were licenced offshore (Killagane 2012). As a result, international companies from UK, Australia, Canada, Norway, Brazil, Holland, France and the United Arab Emirates were granted exclusive rights to explore for and produce petroleum (Source: TPDC 2012; SID 2009). Currently (August 2012) there are 26 active Production Sharing Agreements being operated by 18 companies (TPDC 2012); Pan African Energy, Maurel & Prom, Mdovu / Aminex, Petrodel, Afren plc, BG International, Statoil, Petrobras, Dominion, Ophir East Africa Ventures Limited, Beach Petroleum, Total E & P Activities Petrolieres, Dodsai, Heritage Rukwa & Heritage Kyela, Swala Energy, Motherland Homes, and Open (TPDC 2012). The companies operate in the offshore areas (blocks) located in tourist zones, protected areas, breeding zones for fish and natural environment for coral reefs, sea-grass beds, mangroves and lagoons.



**Figure 5: Map over licensed blocks. (Source: Derrick Petroleum Services 2012)**

Statoil and Exxon Mobil operate in Block 2, which is 11,099 sq. km with water depths from 400 to 3000 m. This is a frontier area as no wells have been drilled so far from the coast. Statoil pronounced in February a discovery of 5 trillion cubic feet (tcf) gas, 891 million barrels of oil equivalent, in proven reserves (Nairobi 2012). In mid-June 2012, Statoil announced another 3 tcf gas discovery in their Lavani well, which is located about 16 km south of the Zafarani discovery (TPDC 2012). Block 1, 3 and 4 belongs to the British companies BG Group and Ophir. The blocks cover an area of 34, 760 sq km in the Mafia deep Offshore Basin and northern portion of the Ruvuma Basin. Six discoveries have so far been announced (August 2012); Chaza- 1 in Block 1, the Chewa- 1 and Pweza- 1 in Block 4, Jodari- 1 in Block 1 (4,5 tcf) and Mwsia- 1 in Block 1 (about 23 km north of Jodari- 1 well). The next Tanzanian offshore licensing round is planned to take place the 13<sup>th</sup> – 14<sup>th</sup> of September 2012 (Bids will be opened May 2013 in Dar es Salaam) (TPDC 2012). Eight new deep-sea water blocks will then be offered. All the blocks are located in the South - Eastern part of Tanzania's offshore area (Killagane 2012).



Figure 6: The gas and oil development represented in an East African newspaper

The discoveries could indicate a huge potential for large gas reserves. Thus, the Tanzanian Government has started to prepare the economy for major investments in the natural gas sector (Mutarubukwa 2012). Because the petroleum industry is still in its initial stages, construction of infrastructure will also be required before production can be expected (Statoil

2012). Mnazi Bay gas field, in Mtwara region, is considered as an important port for future petroleum activity and industry. Consequently, the Government in collaboration with operators has upgraded the Mtwara port as a gas and oil supply / logistics base (Killagane 2012). Mtwara is planned to operationalize as a free port because several operations offshore, such as Statoil and Ophir are dependent on the port for logistical reasons. The port can now handle all importations of seismic and drilling equipment.

The GoT and the government of China recently agreed on constructing a 36 inches gas pipeline from Mtwara to Dar es Salaam. The pipeline will enable the transportation of natural gas from the southern areas to the central areas, where Dar es Salaam is located to meet the needs of the domestic market (Killagane 2012). It is estimated that the construction of the line will be finished in two years' time. When finished, electricity generation will be available to industries in Dar es Salaam and local communities near the construction line (MEM 2011). A spur line is also planned between Songo Songo Island and Somango Fungo. Future development will require LNG plants to process the natural gas after extracted.

## 5.2. Policy Frameworks for Managing Petroleum Resources

The Tanzanian regulatory system is an essential component of an effective and just petroleum management. Regulations comprehending the social and the natural environment are found under a variety of national laws. The legal structure is complex and demanding to understand if one is not a lawyer. Therefore, this section highlights some relevant laws and policies that will be central in petroleum management. However, the legal and institutional framework may undergo developments that bring changes in the roles, responsibilities and influence of the different institutions in the sector. For instance has ESCAP (2011) pointed out in their project that current frameworks need to be modernized in the expansion of the gas sector (into deep offshore and LNG support).

### ***The National Environmental Policy 1997 & The Environmental Management Act of 2004.***

According to the National Environmental Policy 1997 of Tanzania “ *it is recognized that for the effectiveness, environmental law must be understood and appreciated by the people to whom it is aimed*”(par. 71). The policy stress that public education and public awareness on legal rights are essential policy instruments. Nevertheless, the main objective of

the National Environmental Policy 1997 is “*sound management of the impacts of energy development and use in order to minimize environmental degradation*” (NEP 1997). The policy shall; (1) ensure sustainability, security and equitable use of resources, (2) prevent degradation of land, water, vegetation and air, and (3) conserve Tanzania’s natural and man-made heritage, including the biodiversity of the unique ecosystems (DNFH 2009). According to paragraph 62 it is the government’s task to ensure that “*the exploitation of natural resources, the direction of investments and the orientation of technological development are all in harmony and enhance both the current and future potential to satisfy human needs and aspirations* (NEP 1997)”. This directs attention to environmental objectives and economic growth objectives that are mutually supportive. The Environmental Management Act of 2004 likewise include an objective to promote, protect the environment, handle waste management, implement risk assessment and prevent and control pollution. The act also empowers NEMC to cooperate with local government authorities to formulate strategies to deal with coastal and marine management.

### ***The Petroleum (Exploration and Production) Act 1980***

The Petroleum (Exploration and Production) Act 1980 vests title to all natural gas and oil deposits (in the upstream sector) within Tanzania and its territorial waters, and is applicable in the territorial and exclusive economic zone (Mndolwa et al. 2012). Under the Act TPDC is the only body mandated to license, monitor and supervise exploration and production on the entire territory (offshore, onshore or deep sea). It further assigns petroleum resources to the state and authorizes the Minister to enter into agreements with oil companies (Killagane 2009). A production license is required in order to prevent pollution of any water, well stream, river, estuary or any area of the sea (Francis 1998). The intention is “*to make provisions with respect to exploring for and producing petroleum*” (PA 1980). Thus, the Act creates a legal environment for exploration by gas and oil companies (Mndolwa et al. 2012) Section 58.1.b of the Act demands all petroleum companies to “*take all reasonable steps to secure the safety, health and welfare of persons engaged in those operations in or about the exploration or development area* (PA 1980). Thus, the law places certain responsibilities on petroleum companies.

Considering natural gas, The Petroleum Act governs the exploration, development and production licenses and permits the holder of a development license to sell natural gas (Mndolwa et al. 2012). However, the act does not explicitly mention gas (Mutarubukwa 2012). Thus, a Gas Policy and Natural Gas Utilization Master Plan to guide and coordinate

the development of the gas industry in Tanzania is under way (Killagane 2012). According to the Director of TPDC, Killagane (2012) “*The gas policy and gas utilization master plan are currently drafted and subsequently the plans will be brought to the public for stakeholder discussion before being adopted*”. The Attorney General’s Chambers, the MEM and TPDC work on the gas utilization master plan with technical assistance from Trinidad and Tobago (Daily News 2012). The plan will include regulations on how much gas that identify policy options to maximize the environmental, monetary and social value of natural gas (TEITI 2010). Killagane has expressed that both the gas master plan and the policy need to be backed up by a Gas Act, as there is no specific law to govern revenue streams from petroleum resources (Kabwe 2012).

While the Petroleum Act is involved in the upstream industry, the Energy Water Utilities Regulatory Authority Act 2003 (the EWURA Act) is prescribing for regulatory duties and functions of the downstream industry.

### ***The Production Sharing Agreement on Environment***

Production sharing agreements mean that petroleum production is entered between MEM, TPDC and oil exploration companies for the rights to explore and produce oil and gas (ESCAP 2011). Ownership of the petroleum remains with the state and most of the costs remain with the investor (Baumüller et al. 2011). To date there has been six editions of the Production Sharing Agreement on Environment in Tanzania, whereas the last edition was released in 2008. Article 23 in the Agreement is central as it obliges all firms to “*take necessary and adequate steps to conduct its operations in a manner that will protect natural resources, including living resources of the land, sea, lakes and the environment*” (DNFH 2009:86). The agreement also includes;

- That percentage shares between the parties (companies and the GoT) are negotiated. TPDC negotiate on behalf of the GoT.
- An obligation of any contractor to inform TPDC of a discovery, and make a commercial viability assessment
- Crude oil is valued by competitive international market prices.
- A requirement that any contractor shall spend a minimum of money for training of TPDC and government employees.

Semboja and Kabwe (2012) have criticized the Product Sharing Agreement for being silent on whether the indigenous population or natives have legal right of ownership of their land



and petroleum resources explored, exploited, and they are also further silent on whether the natives have rights of the sharing revenues derived from the sales of resources after the extraction of those resources.

### 5.2.1 International Conventions

International conventions are binding on signatory parties, national governments. As a party, the GoT is obliged to implement the binding arrangement through national legislation. GoT has signed three global conventions that are especially relevant for petroleum operations offshore;

- I) ***The International Convention on Oil Pollution, Preparedness, Response and Cooperation 1990*** (OPRC 90) Date of entry into force: 16 August 2006.

The OPRC 90 convention recognizes the serious threat that is posed to the marine environment in case of oil pollution incidents, involving offshore units, seaports and oil handling facilities. It underlines the necessity of taking precautionary measures to avoid oil pollution, and recognizes further the importance of mutual assistance and international cooperation (exchange of information and the preparation of oil pollution contingency plans) The “polluters pays” principle stays as a general principle in the convention. It states explicit that one need to take into account the special needs of developing countries (Fauchald and Tuseth 2010).

- II) ***The Convention on the International Regulations for Preventing Collisions at Sea 1972*** (COLREG 72). Date of entry into force; 16 May 2006.

- III) ***The International Convention for the Prevention of Pollution at Sea*** (MARPOL 73/ 78). Date of entry into force; 23 October 2008.

MARPOL 73/ 78 desires to achieve the complete elimination of intentional pollution of the marine environment by oil or other harmful substances and the minimization of accidental discharges of such substances (Fauchald and Tuseth 2010).

Several other conventions are also of high relevance to petroleum management. Some of these are listed below (Source; Daffa 2010).

<b>CONVENTION</b>	<b>DATE SIGNED</b>	<b>DATE OF RATIFICATION / ACCESSION</b>
African Nature 1968 / 2003	15. 09. 1968	07.09.1974
1982 United Convention on the Law of the Sea (UNCLOS)	1982	30.09.1985
1985 Nairobi Convention	22.06.1985	01.03.1996
1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel)	Not signed	07.04.1993
1992 Convention on Biodiversity (CBD)	12.06.1992	08.03.1996
1992 United National Framework Convention for Climate Change (UNFCCC)	12.06.1992	17.04.1996
1998 Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC Convention)	11.09.1998	26.08.2002
2001 Stockholm Convention on Persistent Organic Pollutants (POPs)	23.05.2001	30.04.2004

## 6.0 THE RESOURCE CURSE

Africa remains the poorest continent in the world despite its rich endowment of natural resources (AFD 2009). Revenue mismanagement in the petroleum sector has often been associated with natural resource extraction in Africa; abject poverty, unequal distribution and access to resources, lack of opportunities for participation of affected populations and failure to integrate local economies, weak democratic institutions and lack of transparency and insufficient corporate social responsibility (Eins 2007). The National Democratic Institute for International Affairs (NDI) of USA (2007) report that the African economies dependent on petroleum resources, often have encouraged authoritarian rather than democratic forms of governance, particularly in the countries with weak legal or regulatory frameworks. The negative trend has been named the “resource curse” or the “paradox of plenty”.

Over the years scholars (Sachs and Warner 2001; Gytason 2001; Bulte et al. 2005) in political science and development economics have devoted attention to the resource curse to discuss negative social, environmental and economic costs of oil and gas development (Duruigbo 2004). According to the curse, countries dependent on petroleum-wealth are argued to grow slower and suffer from weak institutions, poor social capital and increased likelihood for conflict (AFD 2009). Mitigating the resource curse has therefore been fronted as a governance challenge. However, what causes the curse has been given many explanations, including the “Dutch disease”, corruption (patronage and rent seeking) and lack of strong institutions.

Early research focused on the Dutch disease explanation of the resource curse (Kolstad and Wiig 2010). The disease assumes that profits may not necessarily stimulate to development of business environments or infrastructure developments. In some countries an increase in exports coming from petroleum resources, and a decline in the manufacturing sector can lead to a situation where prices of other exports become too high for other countries to purchase. Oil prices are also prone to changes in world market prices. Thus, when the petrodollar is low on the world market, a government only dependent on oil will suffer. On the other hand, when petrodollar is high it can lead to ambitious spending which results in inflation.

Recent work has focused on how petroleum resources are misallocated due to different types of corruption, and has in this sense identified institutions as a key determine variable (Kolstad and Wiig 2010). From this perspective, institutional capacities determine levels of

economic growth. Barma et al. (2012:43) state “*poor governance and weak institutional capacity expose African states to a heightened vulnerability to the resource curse*”. The argument is that those countries that are growth losers suffer from a deficit in institutions (Duruigbo 2004). Lack of accountable and transparent institutions is a hindrance to sound management. On the other hand, if the right institutions are put in place, oil and gas resources may constitute a blessing. According to Kolstad et al. (2008b), the resource curse is most evident in resource rich countries with high public and private consumption and low or inefficient investments.

## 6.1 An Alternative to the Curse

Recent research by McNeish and Logan (2012) argues that the resource curse is a great simplification of the relationship between natural resource abundance and development. They claim that the curse shifts the focus away from impacts of imperialism and foreign intervention to inefficiencies in state planning and state institutions. Instead they argue that a more important explanation is the conflicting interests that all have a certain legal provision. Thus, they warn about the impression that problems can be solved from outside (McNeish and Logan 2012). Ostrom (2008) likewise supports a more nuanced approach by using a multidimensional perspective that take into account historical particularities, state functions in a variety of forms and the need to grasp the problematic context of resource management in a holistic perspective. According to Ostrom and Cox (2010:451) one need to move beyond simple panaceas and map the several factors that influence interactions; “*to enable a holistic understanding of the management problem at hand*”.

## 6.2 Lessons from other Countries

### 6.2.1. Nigeria

According to Amnesty (2008) Nigeria is the world’s starkest example of the resource curse. Fifty years of petroleum industry has made Nigeria the largest oil producer in Africa; however, its citizens are among the poorest in the world (NDI 2007). Oil was at first discovered by the sole concessionaires, Shell-BP, in 1956, in the Niger delta (NDI 2007). Later, several other companies joined the search for petroleum resources. In 2007, 24

international petroleum companies were registered (Alba 2010). 90 per cent of proven gas and oil reserves in the country is found in the Niger delta, while the remaining 10 per cent is extracted offshore. Although, the companies have been successful in finding large oil and gas reserves, the Delta is a well-known example on how region has experienced little blessing from those reserves, and instead paid high price in form of environmental destruction, pollution, and marginalization of the delta's indigenous people (the *Ogoni-people*) (SDN 2012; Obi 2005 in Solli 2011).

### ***I) Resource Control***

Nigeria has experienced five military coups, one civil war and poor economic development. Military regimes have ruled for almost thirty of its fifty years of independence (NORAD 2010). The decades with successive (top- down) military dictatorships plundered oil wealth, and crashing oil prices did in the 1980's spark further political and economic crisis (NDI 2007). In addition, the succession of military rulers made the situation worse. Centralized revenue allocation undermined fiscal control at the state level. After two decades of corrupt and brutal military rule, the rule came to an end in 1998 with the death of Sani Abacha (NDI 2007). Since then, three presidential and parliamentary elections have been held in the country.

The power to govern the petroleum industry has been in the hands of the presidency, the Ministry of Petroleum, the Department of Petroleum, the Department of Petroleum Resources (DPR) and the Nigerian Petroleum Corporation (NNPC) (Alba 2010). The president, which often serve as the minister of petroleum, and his advisors on petroleum matters along with the top leadership of the NNPC forms the inner circle of oil sector decision-making (Gillies 2009 in Alba 2010). The Ministry of Petroleum typically oversees both DPR and NNPC. The DPR function as the official individual regulator and supervises all oil companies, both international and the NNPC. However, disorganization has characterized the Nigerian petroleum industry (WB 2012). For instance has the DPR existed as a unit within the NNPC until 1988, which made confusion about the regulatory and commercial roles ascribed to each institution. The Nigerian EITI (NEITI) has especially raised concerns to the abilities of DPR and the NNPC to execute their administration and management functions. As the initiative has stated (NEITI 2012) "*Nigeria has suffered from weak DPR capacity, NNPC intrusion into regulations and policy making functions, lack of NNPC oversight and accountability*". Few legislators have technical knowledge to carry out oversight activities, and staff members in

NNPC lack technical knowledge and skills to provide policy analysis and recommendations (NDI 2007).

The National Petroleum Investment Management Service (NAPIMS) has acted as the upstream arm of NNPC, and been responsible for entering into contracts with companies on behalf of the Nigerian government. Amundsen (2010) argues that the lack of transparency in contract allocations have gained people with vested interests. During the military rule upstream licences were awarded on a discretionary basis. The Nigerian Petroleum Act gave the Ministry of Petroleum full authority over the allocation of licenses for the exploration of oil (Amundsen 2010). Sala – I – Martin and Subramanian (2003:5) argue that Nigeria’s problem has been “*stunted institutional development*”, and express that waste and corruption rather than Dutch disease has been responsible for Nigeria’s poor performance. Politicians and civil servants involved in capturing oil rents has been a primary driver for political- and social unrest, and a key factor in Nigeria’s underdevelopment (Eleri 2007).

### ***Corruption***

Corruption pervades all levels of government. It is estimated that Nigerian leaders stole more than USD 89,5 billion from the national purse between 1970 and 2008 (NORAD 2010). Oil rents and taxes from foreign companies have provided revenues for the government, and thus, created disincentives to levy taxes (Duruigbo 2004). Especially, during the decades of authoritarian rule, the ruling elite captured the oil income for power purposes and personal enrichment (NORAD 2010). As a result, the size of government in economic activities did increase (Sala -i-Martin and Subramanian 2003; Okoh 2005), while the Nigerian government failed to utilize the revenue generated through oil production for the good of the people (SDN 2012).

### ***Dutch Disease***

Nigeria went from being an agro-based economy to a mono-resource petroleum based economy (Alba 2010). While increase in exports came from petroleum resources, the manufacturing and agricultural sectors declined which led to a situation where the country was more vulnerable to changes in international oil prices. The fall in the price of oil caused Nigeria not to provoke a trade deficit, and the country began foreign borrowing that resulted, in 1989, in the largest public debt of any sub-Saharan state (Amundsen 2010). The subsidization of domestic petroleum prices also became a huge cost to the national economy, especially with the raising share of imports in petroleum products.

## ***II) Environmental Impacts***

Whereas the national economy has received minimal benefits, the local communities and their dependence on fishing and farming, have fared even worse (Duruigbo 2004). Oil leakages have led to destruction of crops and artificial fishponds. Companies have also logged areas of forestland to manage their operations, which has led to loss of biodiversity in the mangrove swamps and as a result destroyed nurseries and fishing grounds for fish and crustaceans (Okoh 2005). In addition, deforestation has led to acceleration of erosion and flooding in the coastal areas of the delta. Amnesty (2008) reports how local people in the delta have seen their economic activities, agriculture and fisheries, being destructed by oil-related pollution and environmental damage. If not worse, the affected people have seen non- or inadequate compensation for their polluted land and water resources. The Land Use Act of 1978 explicitly limits the community member's level of compensation they receive when oil is discovered on their lands, because it's hard to calculate the loss of fishes or agricultural crops (Duruigbo 2004). In general, laws that protect the environment and prevent pollution have not been enforced, and local communities seem to have no legal rights to gas and oil reserves in their territory. Poverty is, thus, a result of for instance displacement and loss of livelihood arising from pollution of farmland and fishing activities (Okoh 2005). In other words, despite the fact that the oil industry operates in an area with high levels of poverty and vulnerability, there has been an absence of adequate monitoring of the human impacts on oil – related pollution. The environmental impacts have eliminated sources of income, which has forced people to move to other areas (Baumüller et al. 2011).

## ***III) Social Mobilization and Effects***

Lack of jobs and economic opportunities in the Delta has created conflicts and frustration. People from other parts of Nigeria have accelerated the migration trend to the delta and its oil producing areas in hope for job opportunities. Especially, poor people from rural areas come with great expectation of finding a job in the industry. However, the oil industry is a capital intensive and technological- dependent industry and hires only a few professionalized people. Due to petroleum operations in the delta, destruction of traditional economies, fishing and farming, has led to high rates of unemployment (Duruigbo 2004). This, in addition to higher migration rates, has cumulated into conflicts, and even intra – community battles.

In other words, The Niger Delta is an example on how a government lacks accountability to its people, and likewise multinational companies lack of responsibilities. Property rights have been deprived from the people when oil is located on their land, in addition to infringement of civil and political rights (Duruigbo 2004). Corrupt governance and widespread poverty have further intensified the vulnerability of the region (Eleri 2007). Despite the undesirable effects in the Niger delta, a gas and oil resource boom can, under the right circumstances, be an important catalyst for growth and development as seen from the “Norwegian experience”.

### 6.2.2. Norway

Norway is noticeable as an oil-producer that is at the top of the international ranking tables for governance and economic performance (Frankel 2010). Thus, the Norwegian oil policy has appeared as an example of a country that has successfully been able to secure control of oil activities and ensure distribution of revenues to the majority of the population. (Ryggvik 2010). It has also been in the forefront in the areas of technology and environmental protection. Through its forty years of operation, the industry has created values for over NOK 8000 billion (OED 2010).

In the 1960’s international negotiations debated ownership over ocean areas, resulting in coastal states’, like Norway, getting exclusive jurisdiction over large sea- and shelf areas (Arbo and Hersoug 2010). In the same period, the field Ekofisk was discovered in 1969 and the Norwegian oil adventure started. Production from the field started two years later, and large discoveries were made in the following years (MPE and NPD 2012). At that time, Norway had already long experience with coastal industries from fishing industry, shipping, and not to mention hydropower generation. Norwegian ship-owners were big in the oil shipping business, and Norway had engineering communities with experience in hydropower development, roads and bridges (Arbo and Hersoug 2010). When oil exploration started, there was a focus on developing the Norwegian transport, service and refining industry further.

#### ***I) Resource Control***

*Strategic ownership;* In the beginning of Norway’s oil history, foreign companies dominated the exploration activities. The first round of concessions was large, and the final



allocation compromised 81 blocks. Norwegian companies were only represented in 21 blocks, and these were modest minority shares. Luckily for Norway, the majority of oil deposits were found north of this area, which was advertised in the first round (Ryggvik 2010). Later, Norway changed its strategy, and allowed only a limited number of blocks to be announced in each concession round (OED 2010). The government wanted the oil-activities to happen under national control, and made it a goal to create a new Norwegian business (Arbo and Hersoug 2010). A taxation system to tax the operating companies were decided to set up so the state could national secure revenues from the petroleum resources. This was followed by the Norwegian Petroleum Act of 29 November 1996 which confirmed that the property right to the petroleum deposits on the Norwegian shelf was vested in the state (MPE and NPD 2012).

#### *Awarding of Contracts (licenses) by law*

Norway based the development on industry concessions on previous experience from the hydropower sector (Arbo and Hersoug 2010). In 1963 a law was enforced that secured the state land ownership and the king (government) a position to distribute licenses to exploration and production activities (OED 2010). In addition, the state – owned company, Statoil, was established in 1972, followed by a rule that gave the state 50% share in every extraction activity (MPE and NPD 2012). Later, the same rule gave the parliament right to assess the share in each exploration case, and Statoil was always favoured in concession rounds (OED 2010; Arbo and Hersoug 2010). For foreign companies to become a beneficiary in the concession rounds they had to invest in Norwegian- research and technology communities by contracting with Norwegian firms and research institutes for petroleum research. The companies were also obliged to buy Norwegian goods and services. These concession laws became the primary instruments for the Norwegian state in determining which companies should be granted permission to operate (Engen 2007). Similarly, the tax system also promoted R&D expenditure, which eventually gave the research sector a boost. The laws were legally binding on all parties and clarified the relationship between the companies and the state. Even though the companies were assigned rights, the laws expressed the sovereignty of the state. While the international companies preferred little involvement of Norwegian subcontractors, the authorities also insisted on a design that implied high participation from the Norwegian industry.

The foundations of the Norwegian industry were created in the seventies with the establishment of Statoil, NPD and MoE (Engen 2007). Simultaneously, the state did put a

brake on the concession of new licenses and instead focused on how to build Norwegian competence in the petroleum sector. The policy (ministry), regulations (government approved and statutory bodies; NPD, Petroleum Safety Authority, State Pollution Authority) and operations (national oil companies) were separated into different entities with delegated rights and responsibilities (Lahn et al. 2007). Statoil became the main instrument for developing Norwegian petroleum competence (Engen 2007). It took the role as an intermediary in negotiations with foreign companies about transfer of knowledge and technical competence. The Petroleum Directorate was created as a neutral instrument and an institutional counterweight to Statoil's dominance as a source of expertise. Thus, the directorate contributed to a socially appropriate extraction of oil revenues. Statoil was also controlled by the Ministry of Petroleum and Energy and parliamentary debates (Ryggvik 2010). On issues linked to oil emergency planning and potential environmental emissions, the state's Pollution Agency (SFT, now KLIF) reported directly to the Ministry of Environmental Protection on issues linked to (Ryggvik 2010).

## ***II) Environmental Impacts***

During Norway's national debate over the exploitation of the country's oil resources, farmers, fishermen and environmental activists were among the groups who expressed concerns over the possible risks of becoming an oil-dependent economy (NDI 2007). Their concerns were taken into account in the recommendations made by the Norwegian Parliament in 1974 favouring moderation and long-term planning in oil sector development (NDI 2007). For instance, management plans are a fundamental precondition for all petroleum activities. The intention of the plans is to establish framework conditions that can balance the interests of the oil industry and other users of the land and sea areas, while ensure consideration for the environment (MPE and NPD 2012).

Environmental and climate considerations have always been an integral part of the Norwegian Petroleum Act. For instance, the Act stipulates strict restrictions on flaring and has introduced a CO<sub>2</sub> tax. Norwegian authorities and the industry have also worked together to reach the goal of zero emission to the sea (MPE and NPD 2012). All operators need to report emissions in a joint database established by KLIF and the Norwegian Oil Industry Association. Companies operating in Norwegian waters also need to apply for "a discharge permit in order to discharge chemicals to the sea" (MPE and NPD 2012). For oil spill preparedness, the Pollution Act requires operators, municipalities and the state to establish emergency preparedness in case of accidental pollution.

### ***III) Social Mobilization and Effects***

#### ***Civil Society***

At the end of the 1960's youth protest and new social movements demonstrated with slogans about national sovereignty and control. A significant conflict was present, and secured society' own power vis a vis the big companies (Ryggvik 2010). Work unions in Norway were also strong and ensured that the workers' wages were seen in relation to the shareholders income (McNeish and Logan 2012). This made it easier for the authorities to impose stricter requirements for oil companies (Arbo and Hersoug 2010).

#### ***Revenue Allocation***

Throughout the 1970s, Norway built up welfare services based on future oil income. The following two decades oil money pumped into public budgets (Ryggvik 2010). People agreed that the oil resources was common property and should be shared thereafter (Arbo and Hersoug 2010). Hence, egalitarian distribution of wealth was seen as a social norm. The people were guaranteed rights to equal growth and basic necessities. The population in Norway was small which might have made the distribution of oil revenues easier, and the oil revenues gained per inhabitant more evident. Of same importance, the government kept openness and popular oversight of political priorities and technical choices (Ryggvik 2010).

When oil income exceeded the need for welfare services, the state created a fund in 1990, which was meant to serve as a buffer between changing oil-revenues and yearly state-budgets (Ryggvik 2010; Arbo and Hersoug 2010). If Norway instead had used money at the same rate as it flowed in, the negative consequences would probably have been serious. It is estimated that the petroleum activities has added more than NOK 9000 billion to the country's GDP (MPE and NPD 2012).

While, Nigeria often has been characterized by a lack of division between political representation, business activity of a state oil company and state bureaucracy, the Norwegian case is a more transparent version (Ryggvik 2010). When the international companies established in Norway, they met a country with well-developed institutions and both liberal and democratic traditions where politicians, government institutions, oil companies, suppliers and labour unions constituted complex networks (Arbo and Hersoug 2010).

## 7.0 RESULTS

In the SES a hierarchy of institutions exists. They represent different levels where decisions on utilization of infrastructure development, resource extraction, labour, and revenue spending are taken (North 1990). Government agencies at different levels are involved in managing ecosystem, and in regulating access to ecosystem services. They may also receive income from specific ecosystem services (Hein et. al. 2005).

In this section concerns are raised about the roles and responsibilities of institutions and organizations, in order to raise understanding of the complexities in Tanzanian petroleum sector development. A role defines access and rights to enforce or exclude regulations, while a responsibility can be considered as management task or the duties of different institutions (Thorkildsen 2006). Pursuant to the UNEP (1997) it's vital that the institutions, in the first stages of petroleum activity, have roles and responsibilities that are clearly defined and communicated as their actions impact the outcomes of environmental policies and management strategies. Clear institutional mandates (*roles and responsibilities*) might ensure better coordination in management. However, weak institutional capacity, lack of technical knowledge, lack of information and confidence to influence might limit or challenge Tanzanian institutions in fulfilling their roles and responsibilities.

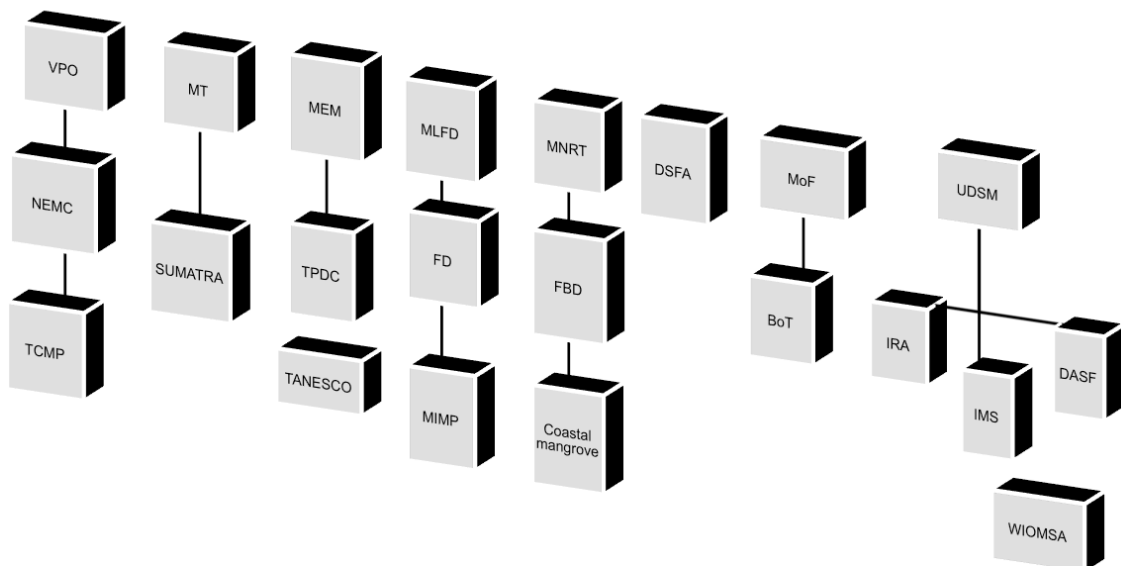
### 7.1 Tanzanian Institutions

Many governmental institutions deal with petroleum issues, with different aspects of environmental protection. At the Ministerial level (in Mainland Tanzania) involved ministries are; Vice Presidents Office (VPO), Ministry of Trade (MT), Ministry of Finance (MoF), Ministry of Energy and Minerals (MEM), Ministry of Natural Resources and Tourism (MNRT), Ministry of Livestock and Fisheries Development (MLFD) and Deep Sea Fishing Authority (DSFA). The ministries carry out their own functions on environmental policy according to the Environmental Management Act (2004) (Daffa 2010).

The MEM is the ministry responsible for energy and mining development policies and their implementation; urban and rural electrification programs and renewable and non – renewable resources (such as petroleum resources). The Tanzania Petroleum Development Corporation (TPDC) is the subordinate body of MEM responsible for exploration, promotion and development of petroleum resources in Tanzania and the entity through which MEM

implements its petroleum exploration and development policies (Mndolwa et al. 2012). Tanzania Electrical Supply Corporation (TANESCO) is also subordinated MEM, and responsible for electricity generation and electricity distribution in the country.

The VPO through the Division of Environment is mandated to have the overall coordination of environmental management in the country, and is the focal point for all international environmental conventions (Daffa 2010; MD 2012). The National Environmental Council (NEMC) is the subordinate agency of the VPO, and is responsible for enforcement of environmental laws, technical support and reviewing of Environmental Impact Assessments (EIA's). The Tanzanian Coastal Management Programme (TCMP) is involved in NEMC's coastal and marine affairs.



**Figure 7: An organizational map of the Tanzanian institutions.**

(VPO = Vice Presidents Office, NEMC = National Environmental Council, TCMP = Tanzanian Coastal Management Program, MT = Ministry of Trade, SUMATRA = Surface and Marine Transport Authority, MEM = Ministry of Energy and Minerals, TPDC = Tanzanian Petroleum Development Corporation, TANESCO = Tanzania Electrical Supply Corporation, MLFD = Ministry of Livestock and Fisheries Development, FD = Fisheries Division, MIMP = Mafia Island Marine Park, MNRT = Ministry of Natural Resources and Tourism, FBD = Forestry and Beekeeping Division, DSFA = Deep Sea Fishing Authority, MoF = Ministry of Finance, BoT = Bank of Tanzania, UDSM = University of Dar es Salaam,

**IRA** = Institute of Resource Assessment, **IMS** = Institute of Marine Science, **DASF** = Department of Aquaculture Science and Fisheries, **WIOMSA** = Western Indian Ocean Marine Association).

At the local level, environmental officers are designated at the city, municipal, council, townships, ward, village and the street levels, whose mandate is to ensure the enforcement of regulations and policies (UNEP 2010; Daffa 2012). Local authorities are supposed to be the principal executive agencies of environmental regulations and policies (UNEP 2010). Civil society organizations and the private sector also work on environmental issues, for instance the World Wildlife Fund (WWF) and the Western Indian Ocean Marine Association (WIOMSA). In addition research institutions, like the UDSM, with the Institute of Marine Science (IMS) and Institute of Research Assessments (IRA), gives support and advice on environmental issues from a scientific point of view.

Petroleum sector management requires integration of all institutions in the field, and the empowerment of local authorities to manage and conserve the environment and natural resources (UNEP 2010). In this section, governmental institutions that are administratively subordinates of the ministries, petroleum companies (both national and international), research institutions, a regional non- governmental institution, and a bilateral – and a multilateral assistance program are represented. How are their responsibilities and roles defined in the context of petroleum management in Tanzania?

### ***National Environmental Management Council (NEMC)***

The National Environmental Management Council (NEMC) is under Vice President Office (VPO). The Council was established in 1983, and became operational in 1986 (Francis, 1998). NEMC is a regulatory body with respect to all environmental issues. It has an advisory role and is a supervisory authority that is responsible for policy formulation, coordination and evaluation of policies and legalization related to the environment (NEMC 2012). NEMC do research and review impact assessments, and share information with policy makers. Overall, the council is responsible for coordination and supervision on any matter concerning the environment, enforce compliance of environmental standards, review EIA's, conduct environmental monitoring, prepare procedure to prevent accidents and enhance public education on environmental matters (NEMC 2012).

During the meeting with NEMC in Dar es Salaam, the Council remarked that workloads on the gas and oil issues are increasing taking into account the current oil and gas exploration and extraction processes. This has recently raised public concerns, and received high public awareness in the country. NEMC is actively involved in preparing environmental regulations and contingency plans in the petroleum sector. According to Rose Sallemu Mtui, senior environmental officer in NEMC, NEMC is a focal point for several regional ICM projects including the Western Indian Ocean Maritime Highway Development and Coastal and Marine Contamination Prevention Project (WIOMHP). The project objective is to reduce the risk of oil spills from groundings, illegal discharges of ballast, oil and gas exploration and extraction activities, and bilge waters from ships. Therefore the Council has coordinated the project activities and invested efforts in the development of a National oil spill response contingency plan (NOSRCP), hazardous and noxious substance contingency plan (HNSCP) and a national policy on use of dispersant, The NOSRCP and the HNS plans are in the approval process while the policy on use of dispersant is still a draft.

A national 'Gas and Oil Committee' is also established to enable discussion on environmental issues that are relevant for the sector. However, it was mentioned that the committee seldom meets up due to lack of resources. Currently NEMC has three zone offices and there is a plan to open other zone offices in different districts to better coordinate regional environmental monitoring with the central office in Dar es Salaam. The next office to be declared opened will be in Mtwara where oil and gas extraction and exploration process is going on. The numbers of foreign business operators in the region are likely to expand because large amounts of gas are discovered offshore.

The expansion of companies exploring for petroleum resources have increased the need to undertake EIA's. The issuing of an exploration permit or license is subject to provision of environmental approval by NEMC (UNEP 2010). According to the National Environmental Policy of 1997, paragraph 100, NEMC "...shall enforce pollution control and perform the technical arbitration role in the undertaking of Environmental Impact Assessment". Thus, the act gives NEMC a responsibility to overlook environmental activities by undertaking EIA's. The National Environmental Policy Act of 1997 describes (in paragraph 65) further "*EIA as a planning tool shall be used to integrate environmental considerations in the decision making process, in order to ensure that unnecessary damage to the environment is avoided*" (NEP 1997). Government departments responsible for the sector under which a proposed project falls are also obliged to offer input in the EIA process through a Technical Review Committee (UNEP 2010). Experts from research institutions, such as IRA may also be invited to the

process. Ruzika N. Muheto, Director for Environmental Planning and Research in NEMC, said the council is giving EIA's a high priority, and that last year the council reviewed 46 EIA's only on gas and oil. However, deficiency in personnel hinders the Council to review all the EIA's they receive every week. An earlier NEMC employee, argued, "*What NEMC need is support, information sharing and capacity building. It needs to look up to institutions that are advanced in the sector*". The main challenge is the lack of resources; hence, planned activities cannot be accomplished. Increased workload and deficiencies in personnel also imposes restrictions on the Council's ability to complete their responsibilities. Despite its limitations, NEMC is according to UNEP (2010) currently the only institution with the potential to manage the EIA processes.

NEMC is now working on a Strategic Environmental Assessments (SEA). The assessment is a comprehensive analysis that captures both the upstream-, onshore- and offshore environment. While EIA's are carried out for a specific development activity, SEA's look more broadly on both the individual impacts and the cumulative impacts. SEA's are recommended by the WB, the EU and the EITI (Kloff and Wicks 2004). This is a demanding task that spends over a long time period. Thus, one respondent stated that it is worrying that SEA comes in at such a late stage in the process. Lack of resources and deficiencies in personnel complicates the task to accomplish a comprehensive assessment.

NEMC collaborates receives funding from the WB through the ESCAP, and assistance from the OfD program which both seek to strengthen NEMC on environmental management information system, oil spill contingency plan, SEIA, community based warning / response system, monitor programs for venting and gas flaring.

### ***Tanzania Coastal Management Programme (TCMP)***

The Tanzanian Coastal Management Programme (TCMP) is a sub-branch of NEMC responsible for coastal and marine issues. The Program intends to safeguard natural resources, the protection of mangroves, sea – turtles, endangered animals and sensitive areas, and collaborates with those who work, live or recreate in the coastal areas to improve their quality of life. The head of TCMP, Jerimiah Daffa, told that TCMP's practice is guided by the National Integrated Coastal Environmental Strategy (NICEMS) (TCMP 2012). The NICEMS provides a framework under the environmental policy that links government sectors at many levels and creates participation among them and resource users in order to move towards sustainable development (Akwilapo 2011). Changes are believed to lie in strong networks or



partnerships that engage local communities and all other stakeholders to raise a voice in decisions that affect them.

With consideration of the petroleum sector, TCMP acknowledged that the big issues of concern now is Tanzania's capacity to get the gas legislation in place and monitor the sector in a sustainable manner. J. Daffa remarked "*how can Tanzania manage such a big issue when current capacity on this issue is s limited?*"

So far TCMP has been engaged in the development of an Oil Spill Marine Contingency Plan. In addition, they are part of the review teams for EIA and EIS in any project that has to do with oil or gas. These projects include, monitoring of coastal- and marine related activities to hinder pollution or destruction of the environment. In general, J. Daffa argued that there is too little knowledge about the consequences and institutional capacities in case of oil spill scenario. He asked; "*are the Tanzanian institutions ready to deal with an oil spill?*" What several of the TCMP employees emphasized was the need for oil spill response actions to be put in a system and coordinated because of the current lack of local and central government coordination. A challenge may be how to sustain and prepare the local level for the coming changes and possible future scenarios. Permit authorities sometimes lack an understanding of the local level, making national laws and regulations not always easily adapted in practice.

In executing its responsibilities, TCMP collaborates with several institutions like District Councils, Ministry of Energy and Minerals, SUMATRA, Tanzania Port Authority and TPDC.

### ***The University of Dar es Salaam (UDSM)***

The Institute of Resource Assessment (IRA) and The Institute of Marine Science (IMS) are concentrated with scientific research on the coastal- and marine environment, and both institutes have long traditions with providing advice to policy makers and educating people in these fields. Hence, the IRA and the IMS are central institutions in resource management and environmental affairs.

The IRA is an institute with multidisciplinary expertise related to climate, environmental- and resource management, and offers courses in EIA. Additionally, it prepares SEA's (both human and natural resources) and gives advice on behalf of the government (IRA 2012). The Institute is represented in Technical Advisory Committees related to review EIA's in collaboration with NEMC (OfD Norway-Tanzania, draft 2012). It also develops EIA's on demand from the industry. The institute is mainly responsible for establishing

cooperation with the government, public authorities and relevant organizations. By organizing conferences and seminars on resource- and land use issues, the institute creates an open dialogue between different stakeholders. The previous head of the institute, Professor Pius Z. Yanda, expressed a great interest in the gas and oil development and the importance of including the IRA in the process. Accordingly, Yanda had met up with Norwegian representatives for the OfD program in February. The meeting suggested IRA as a possible institution for arranging and taking part in future OfD activities in Tanzania. The institute is also considering the option of developing an educational program on Petroleum related-issues (OfD Norway-Tanzania, draft 2012).

The IMS was established in 1979, and is located on Zanzibar Island. The institute undertakes research in all aspects of marine science and provides advisory and consultancy services in marine affairs (Francis 1998). By offering research and consultancy services, the IMS provides scientific advice to management solutions (IMS 2012). Narriman S. Jiddawi, senior lecturer at the IMS, was concerned about the discoveries of gas offshore, and was interested in how business related activities in the future would affect the coastal communities and the marine environment. She expected an increased interest among researchers on the effects and preconditions gas and oil activities. IMS will confront regional collaboration and networking on the issue, with a focus on the inclusion of communities in coastal areas, and the protection of the coastal- and marine environment (IMS 2012).

### ***Western Indian Ocean Marine Association (WIOMSA)***

The association was officially introduced in 1991 as a non – governmental and non – profit organization. It promotes the scientific, educational and technological development of all aspects of marine science in the region. WIOMSA has broad experience in designing and implementing projects and extensive networks, and provides a platform for dialogue between scientists and institutions (Francis 1998). In addition to providing for a linkage between science and management, WIOMSA’s main tasks are capacity development and research collaboration with Universities. It seeks to advance regional cooperation in all aspects of marine science.

The institution has two working programs operating; the Marine and Coastal Science for Management Program (MASMA) and The Marine Research Grant Program (MARG). MASMA provides “*funding and technical support for coastal and marine research*”. The intention is to strengthen interdisciplinary research on both the natural and social science aspects of coastal environmental issues for the purpose of advancing knowledge that is

directly relevant to society and resource management (WIOMSA 2012). The MARG program has focus on “*improving capacity to conduct research and increase peoples understanding on various aspects of marine sciences*” (WIOMSA 2012). Research results are therefore represented at different regional and international forum.

Dr. Julius Francis, the Executive Secretary of WIOMSA, argued that the central question for WIOMSA is “*whether a broad view will be picked up by the governments*”? For instance, with recent gas discoveries of gas reservoirs, in a few years’ time, infrastructure to handle the petroleum resources will need to be built, which may lead to the alteration or destruction of the environment and/ or displacement of fisheries and coastal communities. Acknowledging that there could be significant costs associated with conservation of coastal and marine environment and displacement of people dependent on coastal and marine environment, a precautionary approach will need to be taken from early stages of the process, pursuant to Francis. Thus, in their new five-year program, which starts in July 2012, funds have been set aside to organize workshops that will bring together different actors to discuss topical issues such as impacts of large-scale infrastructure developments for the petroleum industry like building of ports and the possible impacts on coastal and marine ecosystems. Dr. Francis expressed “*the workshops could provide an important platform for different actors in the gas and oil sector to discuss issues of common interest*”. Those that participate in the workshops have different expertise that is relevant for the petroleum sector, which could be important sources for information sharing between public authorities, scientists and companies.

### ***Tanzanian Petroleum Development Corporation (TPDC)***

TPDC is the Tanzanian State Corporation through which the Ministry of Energy and Minerals implements its petroleum exploration and development policies. According to Anna-Maria Simon, Safety and Environmental Officer in TPDC, the corporation has manpower strength of about 200 and is organized into five directorates; Exploration, Production and Technical services, Finance and Administration, Managing Director, Internal Auditing, Marketing and Investment. TPDC was established under the Public Corporations Act No.17 through the Government Notice No.140 of 30th May 1969, and began active operations in 1973. The role of the corporation is to participate and engage in exploration, development, production and distribution of gas and oil related services (TPDC 2012). On the other hand, the corporation is responsible for developing safety- and quality standards, and research in the field. As stated by the TPDC (2012) their mission is to “*participate and engage in the*

*exploration, development, production and distribution of gas and oil and related services; facilitate a fair trading environment; safeguard the national supply of petroleum products; at the same time developing quality and safety standard to protect people, property and the environment”.*

When a gas and oil operator submits his business plan to TPDC, the corporation provides guidance for conducting EIA. Further, Anna-Maria Simon explained that TPDC, in collaboration with NEMC, is supposed to provide contacts to petroleum companies of NEMC registered and credible Environmental firms, that are well experienced in gas and oil exploration in all major activities such as seismic surveys, exploration drilling and pipeline constructions. In addition, TPDC has a guideline manual which contains a number of “best practices” that TPDC advises gas and oil operators to pay attention to during operations in coastal and marine waters. The guidelines include the preparation of a comprehensive ‘Company Specific Oil Contingency Plan’. The plan elaborates arrangements of external resources to be in place prior to drilling, in case of a major oil or fuel spill during drilling. Companies are also advised to avoid disturbance to sensitive ecology (for more information see Appendix C. Anna Maria stated that the corporation’s main challenge in the future would be to prepare and manage large accidental oil spills and gas blowouts.

TPDC works with other institutions, besides NEMC, to facilitate issuance of specific environmental clearance for gas and oil exploration activities in areas like marine parks, water sources or game reserves. Among close allies are the Ministry of Fisheries and Livestock Development, Ministry of Tourism and Natural Resources, and Ministry of Water.

### ***Surface and Marine Transport Regulatory Authority (SUMATRA)***

Unfortunately SUMATRA was not able to meet me when I was in Dar es Salaam, and correspondence by email has proved difficult. However, considering the important role of SUMATRA in environmental management, the institution is included in this section. SUMATRA is responsible for emergency response in case of offshore pollution and operates a monitoring and emergency centre, as well as follow-up of the OPRC convention and the national plans for oil emergency planning. Hence, the authority is the custodian of the NOSRCp in which NEMC cooperates. In case of an oil spill, SUMATRA’s responsibility stops onshore, where the responsibility lies with the VPO. However, as long as the oil is in marine waters, SUMATRA has the coordinating responsibility. The summary from OfD meetings in Tanzania 5<sup>th</sup> – 10<sup>th</sup> of February 2012 gives some update on SUMATRA in relation to the gas and oil development; When OfD representatives met SUMATRA, the

Director of Maritime Safety and Security, Capt. King K. N. Chiragi, expressed a need to establish a national “response team” and training of employees in the emergency centre. Like NEMC, SUMTRA is involved in the WIOMHp. SUMATRA received capacity learning by IMO in 2003 on MARPOL issues.

**Table 2: The visions, roles and responsibilities of the different Tanzanian institutions**  
(Sources: the respective institutions’ website, see Appendix A)

Institutions	Vision	Roles	Responsibilities
<b>TPDC</b>	“To become a leading integrated National gas and oil Company competing nationally, regionally and globally in an environmentally responsible manner to the benefit of all stakeholders.”	“To participate and engage in the exploration, development, production and distribution of gas and oil and related services; facilitate a fair trading environment; safeguard the national supply of petroleum products; at the same time developing quality and safety standard to protect people, property and the environment.”	<ul style="list-style-type: none"> <li>* To promote and monitor the exploration for gas and oil</li> <li>* To develop and produce gas and oil</li> <li>* To conduct research and development of the gas and oil industry in the country</li> <li>* To manage the exploration and production data</li> <li>* To advise the Government on petroleum related issues</li> <li>* To market and sell natural gas under PSA arrangement</li> <li>* To undertake the management of strategic fuel reserves and</li> <li>* To undertake trading in petroleum products</li> </ul>
<b>NEMC</b>	“NEMC envisions in excelling sound environmental management in order to assist the nation fulfil its aspiration for sustainable development.”	Compliance and enforcement Impact Assessment Information, communication and outreach Research and planning.	<ul style="list-style-type: none"> <li>* Responsible for the coordination and general supervision on all matters concerning environmental management.</li> <li>* Enforce and ensure compliance of the national environmental quality standards.</li> <li>* Review EISs and conduct environmental monitoring and auditing of projects and facilities.</li> <li>* Coordinate research, investigation and surveys in the field of environment.</li> <li>* Give advice and technical support to environmental management.</li> <li>* Initiate and evolve procedures for the prevention of accidents that may cause environmental degradation.</li> </ul> <p>Enhance environmental education and public awareness (+ undertake coastal zone management)</p>
<b>TCMP</b>	“Both the problems and the solutions are looked at holistically as part of a bigger system instead of as stand-alone issues and fixes there is a focus on Integration across sectors and scales, involve the participation of all stakeholders and	“The Tanzania Coastal Management Partnership (TCMP) is a small and agile group of professionals committed to creating healthy coastal environments for the country and region. The organization works for effective and sustainable changes that both safeguard valuable natural resource assets	<p>“The TCMP, works hand-in-hand with the people, institutions, and partners of the place—seeks healthier, more vibrant, resilient, and economically productive coasts and coastal communities”.</p> <ol style="list-style-type: none"> <li>1. Coastal issues</li> <li>2. Marine Issues</li> <li>3. Human Dimension (livelihood issues, climate issues).</li> </ol>

	Respect the people and culture of the place.”	and at the same time improve the quality of life for those who live, work, and recreate along the coast.”	
<b>SUMATRA</b>	“To be the leading surface and marine transport regulatory authority in the East and Central African Region.”	“Regulate the surface and marine transport sub sectors for efficient, safe and environmentally friendly transportation services.”	*A National Oil Spill Contingency Plan * Offshore pollution, and operates a national monitoring and emergency centre. Follow-up of the OPEC convention
<b>WIOMSA</b>	“Promote the educational, scientific and technological development of all aspects of marine sciences throughout the region of Western Indian Ocean, with a view toward sustaining the use and conservation of its marine resources and coastal livelihoods.”	Capacity development – promote exchange of knowledge. Collaborate with Universities Provide the linkage between science and management.	* “Marine and Coastal Science for Management Program (MASMA) provide funding and technical support for coastal and marine research. It seeks to strengthen applied and interdisciplinary research on both the natural and social science aspects of coastal environmental issues for the purpose of advancing knowledge that is directly relevant to society and resource management.”  * “The Marine Research Grant (MARG) Programme seeks to enhance capacity to conduct research and increase our understanding on various aspects of marine sciences and offer opportunities for the presentation of results of the research work in different regional and international fora.”
<b>IMS</b>	“Become a centre of excellence in the advancement of knowledge in marine science.”	Conducts research, training and consultancy in all aspects of marine sciences.	* Enhance socio-economic development of communities in the coastal areas and around large water bodies in the region. * Enhance the protection and sustainable development of the coastal and marine environment in the region. * Promote and enhance excellence in marine sciences and technology; Enhance regional collaboration and networking in marine sciences research and development, technology and training. * Provide scientific and management solutions and advice in marine sciences and technology.
<b>IRA</b>		“Support the Government of Tanzania in planning and assessment of both human and natural resources.”	* Co-operate with Government, public authorities and other organisations on special questions. * Furnish advice upon the request of Government, public organisations or other organisations. * Organise conferences, seminars or postgraduate courses on resources and land use planning.

## 7.2 Petroleum Companies

### ***Corporate Social Responsibility (CSR)***

Petroleum companies operate in the petroleum business to achieve financial benefits, and operate in accordance with contractual obligations, national and international law.

*“Binding objectives (for drilling, development) is often laid down in the negotiation of the contract or licensing terms”* (Lahn et al. 2007:18).) What petroleum companies chose to do beyond their legal and contractual obligations falls under the field of corporate social responsibility. Requirements for CSR strategies include coordinate projects with community recipients and the relevant levels of government that are of common interest (Lahn et al. 2007).

Over the past 10 – 15 years, increased attention has been attributed to the environmental and social aspects of petroleum operations (Stephens 2008). International media have raised attention to the negative side of the petroleum sector; oil spills and pollution, adverse social impacts on local communities and inequitable economic growth. Hence, it has been acknowledged that petroleum companies, which often control budgets larger than those of the states in which they operate, have responsibility with regard to protection the social and environmental system. Minimizing environmental impacts can be assisted by companies’ adoption of good environmental practice and technology (Lahn et al. 2007). As a result, the CSR relationship between governments and oil companies are growing in complexity. CSR often involve environmental and social issues along with business ethics, for instance employment and human resource development, EIA and management, environmental reporting, technology transfer, monetary flows to the public sector, respect for human rights, SEA and community engagement (Stephens 2008). The companies CSR programs may complement the Tanzanian government programs and services, and help to ensure that all enjoys the benefits of the petroleum sector. Overall, the CSR puts a requirement on the profit-maximizing petroleum business to apply a long – term perspective to its business strategies. This might involve treating communities as active decision makers, monitoring and evaluation of programs, third- party auditing, run capacity building programs, and linking of expectation management, environment and community engagement (Stephens 2008). Petroleum companies may collaborate with local and central government authorities to participate and contribute to any form of social economic development program, such as investing in communities nearby “petroleum facilities” (DNFH 2009). Lahn et al. (2007) in

the report “Good Governance of the National Petroleum Sector” argues that it is important that companies take into account the political and development environment, and carries out careful assessment of the potential impact of the CSR project. In Tanzania, the companies’ investments in social development is registered by MEM, and incorporated into the calculations of the total revenue contributions of the sector as “donations” (SID 2009).

### ***Statoil***

Statoil is an international energy company with operations in 35 countries (Statoil 2012). The Norwegian government owns 67 per cent of the company. Statoil has operated in Tanzania since 2007, and has a country office in Dar es Salaam from where it coordinates its actions in Tanzania (Statoil 2012). In 2007 the company signed a production sharing agreement with TPDC for Block 2. Exxon Mobil holds a 35% share of the Block, while Statoil is the operator with a 65% share. TPDC has the right to 10% of the license in case commercial volumes are found.

When the fieldwork went on in Dar es Salaam (mid- March 2012), Statoil had drilled its first well, - Zafarani and were drilling a side – track to that well. In the first well they did a gas discovery equivalent to 5 tcf (trillion cubic feet), and 1 tcf in a side- track. In mid-June 2012, Statoil announced again another 3 tcf gas discovery in their Lavani well, which is located about 16 km south of the Zafarani discovery. Hence, these discoveries are a lot larger than the Norwegian gas-field “Snøhvit” (5,6 tcf). Pursuant to a Sigurd Juel Kinn, environmental advisor at Statoil’s country office in Tanzania, “*this looks promising for the business*”. Block 2 is 11,099 sq. km with water depths from 400 to 3000 m. This is a frontier area as no wells have been drilled so far from the coast. The next step is how one should handle the resources. Discovered gas is currently 2582 m beneath the ocean surface; thus, to build a gas pipeline to shore could imply a technical challenge. For further processing and production one will need a harbour, a gas receiving facility, a gas power plant, a LNG plant and a harbour jetty. Statoil has started to look into the possibility to develop these gas resources into LNG and considering both offshore and onshore solutions. Together with other international operators Statoil is engaged in upgrading the harbour facilities in Mtwara to encompass a modern offshore support base (Statoil 2012). According to Petro (2012), the company has signed an appendix in addition to the production sharing agreement, which states the commercial conditions for a possible infrastructural development in the area. Such infrastructure projects will require people to move, and mangroves to be cut. Thus, a lot of



EIA work will take place in the years to come. However, Sigurd Juel Kinn claimed that there is a lack of environmental standards and insufficient capacity within the environmental authorities in Tanzania. Due to the fact that the oil and gas industry is quite new to the country, there is also a lack of basic understanding of this industry and hence a significant need for capacity building.

Before Statoil developed an oil spill response plan (OSRP), the company developed an environmental risk assessment (ERA) and an oil spill response analysis (OSRA). During the ERA analysis the risk of acute oil spills at sea were evaluated (Boye and March 2012). This evaluating required a sensitivity atlas of the entire coastline, thus, Statoil developed an atlas in cooperation with local environmental consultancy, the UDSM and other consultants. Mafia Island, Rufiji and Songo Songo were attributed special attention (Boye and March 2012). In the OSRA study, the goal was to identify what emergency preparation systems that were required to combat a potential oil spill. The study found that the shortest time needed for oil to reach the shoreline in case on a spill in the Zafarani well was estimated to be 36 – 48 hours. Based on the results from these studies, an OSRP was according to Boye and March (2012), a Statoil consultant, “*established before drilling commenced*”.

Statoil also worked on a sensitivity index that identified the marine life in the Zafarani area. In addition, several water samples had been collected for analysis. The overall goal was to take 80 samples of the entire block, to get a holistic impression on the marine life and benthic organisms. All findings will be reported and shared with government authorities, if to believe Statoil. The development of a wildlife plan is likewise on the agenda. In accordance with Statoil’s (2012) environmental policy goals, the protection of biodiversity is of central concern in their operations.

Statoil has made some proactive steps in terms of its corporate standards in addition to the mechanical response measures. Since the Tanzanian national authorities are in a process of establishing their first national marine oil spill response plan (NMOSRCP), Statoil has arranged open meetings and workshops to share knowledge and experience with oil response plans and general information of how things works on a rig including a visit to the rig and course in basic understanding of drilling technology. NEMC, TPDC and SUMATRA have all participated in the meetings. Statoil is also informing SUMATRA on marine issues, and they are now collaborating on an Incident Command System (ICS<sup>4</sup>) as the preferred management response system. S. J. Kinn emphasized that Statoil also considers collaborating with the

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<sup>4</sup> Incident Command System = A tool used for the control, command and coordination of emergency response.

University of Dar es Salaam regarding the results from the seabed surveys, which includes unique videos/photos from ultra deep waters.

While there is still no formal approval process in Tanzania for oil spill plans, Statoil has arranged meetings in Dar es Salaam, Mafia Island and Kilwa to represent their preparedness and OSRP (Boye and March 2012). Because Mafia Island has been identified as the most vulnerable spot, Statoil has given special attention to training and exercise of employees from the national park. Oil response preparedness equipment was stationed on the Island earlier this year (2012). However, if no oil is found in the Statoil's blocks, some of the equipment will, according to Kinn, be shipped back to Norway. Training and exercise have also been carried out at the Mtwara base.

Statoil has also stationed a dispersal aircraft on 24/ 7 duty in Dar es Salaam, for rapid response in any case of an oil spill. Currently, there are no approved dispersants or guidelines for use of dispersants available for the petroleum companies. Statoil has made therefore issued a document (prepared by ORSL) to the Tanzanian authorities with background information on dispersal use, which includes a proposal for which dispersants that could be used in Tanzania. (Boye and March 2012).

## 7.3 Petroleum Related Assistance Programs and Investors

### *The Oil for Development Program (OfD)*

Norway has provided petroleum related aid since the early 1980's (Kolstad et al. 2008b). In 2005, the Norwegian government launched the Oil for Development (OfD) program to extend this effort. The new program was based on decades of experience with petroleum management in Norway, and acknowledged Norwegian competence as an export item that could assist countries in how to build capacity within government institutions (Engen 2007; NORAD 2010). What did characterise the Norwegian experience and led to its success was the clear division of roles and responsibilities among the institutions (see table 3 below).

**Table 3: The roles and responsibilities of the Norwegian institutions** (Sources: The respective institutions' website and the Norad Report "Oil for Development 2007 – 2008"), see Appendix B)

<b>Institutions</b>	<b>Role</b>	<b>Responsibilities in OfD</b>
<b>NORAD</b>	Ensure that Norwegian assistance is efficient, and reach the planned goals. Gives professional advice to those who provides the assistance. Ensure that the quality of the assistance is assured and evaluated.	The OfD secretariat is in NORAD.  NORAD coordinates the OfD program
<b>The Royal Norwegian Embassy</b>	Responsible for extensive development corporation	Request for OfD assistance is normally channelled through the Embassy.  The Embassy holds valuable local- and regional knowledge and has network relations with government agencies, industry, civil society and international organizations.
<b>The Ministry of Foreign Affairs (MFA)</b>	Organize, coordinates and implement Norwegian foreign policy  Responsible for a number of government institutions, e.g. NORAD	Heads the steering committee for the OfD program.  The committee is involved in inter alia decisions regarding assistance in new partner countries.
<b>The Norwegian Ministry of Petroleum and Energy (MPE)</b>	Overall responsibility for petroleum administration and management of petroleum resources on	A member of the steering committee in the OfD program

	<p>the Norwegian continental shelf.</p> <p>Develops legal, regulative and institutional frameworks, prepares and implement policies, opens new acreage and licencing, handles EIA's and develop industry policy</p>	
<b>The Norwegian Ministry of Environment (MoE)</b>	<p>Overall responsibility for environmental policy in Norway. Coordinates the Government's environmental policy objectives, and ensures follow – up and monitor results of environmental policies.</p>	<p>Member of the steering committee for OfD program, and is directly involved in cooperation projects on environmental issues. The Ministry also coordinates the involvement of subordinate agencies.</p>
<b>The Norwegian Ministry of Finance (MoF)</b>	<p>Plans and implements economic policy, coordinates preparation of the fiscal budget, and give guidelines on monetary policy.</p>	<p>Member of the steering committee.</p> <p>Some OfD countries have asked for assistance to design and implement a petroleum fund, or other projects on economic policy.</p>
<b>The Norwegian Petroleum Directorate (NPD)</b>	<p>Administrative subordinate to MPE.</p> <p>Shall contribute to create the greatest possible values for the society from gas and oil activities by management based on safety, emergency, preparing and safeguarding the natural environment.</p>	<p>Assist NORAD and MFA on planning, and implements petroleum support to authorities in selected countries and regional organizations under OfD.</p>
<b>Petrad</b>	<p>A non – profit governmental organization that facilitates transfers of knowledge and experience within petroleum management, administration and technology in countries in Africa, Asia, Latin – America and countries in former Soviet-Union.</p>	<p>Organize tailor-made courses and seminars on oil.</p> <p>Facilitates advisory and consulting services in institutional development throughout all phases of petroleum sector development.</p>
<b>The Norwegian Climate and Pollution Agency (Klif)</b>	<p>Subordinate agency of MoE.</p> <p>Promotes sustainable development (in the areas of climate change, effects of energy consumption, harmful chemicals, and</p>	<p>One of the main contributors in the environmental pillar.</p> <p>Gives advise and long-term support, including evaluations of EIA's, discharges, emissions, waste management, contingency, environmental monitoring.</p>

	environmental problems in built-up areas.	
<b>The Norwegian Directorate for Natural Management (DN)</b>	The national executive and advisory management authority concerning the conservation and sustainable use of biological diversity.  Regulatory and management responsibility for Norwegian legislations related to EIA's, land use issues, national parks.	Contribute to clarification of the environmental impacts in the early stages for the development, particular regarding selection of areas, mapping of environmental values and vulnerability and threat assessments.
<b>The Petroleum Safety Authority Norway (PSA)</b>	Regulatory responsibility for safety, emergency, preparedness, and the working environment in Norwegian offshore and certain onshore petroleum operations.  Important role in combating oil spills. Pays attention to how management plays a key role for major accident risk.	
<b>The Norwegian Coastal Authority (NCA)</b>	Deals with national preparedness against acute oil pollution.	Personnel from the Department for Emergency Responses are used as special advisors.

‘Good governance’ in the OfD program is understood as correspondence between the roles of the state institutions that manage the gas and oil, and the possibility these institutions have to perform their responsibilities (Solli 2011). NORAD has the task of coordinating the whole OfD program, while MPE is responsible for resource management, MoE for environmental management, and MoF for revenue management. Whereas, the institutions responsible for implementing the program are the Petroleum Directorate, the Petroleum Authority, Directorate for Nature Management, The Climate and Pollution Agency and Petrad (NORAD 2010). In addition, the Norwegian Embassies have the responsible mandates to follow up the program. Recent years, OfD has developed stronger partnership with multilateral institutions/ organizations as IMF and the World Bank, and involved NGO’s as Revenue Watch Institute and WWF. Thus, the “Norwegian model” now implies collaboration between various government institutions, civil society organizations and multilateral partners.

(NORAD 2012). It seeks to enhance the capacity of governments and civil service staff, and reflect available supply of Norwegian competence (Kolstad et al. 2008b).

The competence is made more available to developing countries through capacity- and institution building in three branches; financial management, resource management and environmental management (NORAD 2010). Within these branches of management attention is attributed to creating legal and regulatory systems in the petroleum sector, and to build up and strengthen local ministries and directorates of energy (NOARD 2008). Pursuant to NORAD (2012), the vision is based on a holistic approach towards an “*economically, environmentally and socially responsible management of petroleum resources, which safeguards the needs of future generations*”. This vision is grounded in good governance, transparency and anti – corruption, with the aim to help developing countries utilize gas and oil resources in a manner that reduces poverty and improves living conditions (in an environmentally friendly manner) (NORAD 2008). In order to assist a country to manage its own petroleum resources, solutions and policies have to be chosen and tailor made. 20 countries are currently (June 2012) involved in the OfD program.

Due to recent gas discoveries in Tanzania, Norway will continue to give assistance to Tanzania through an OfD program that is planned for the period 2012 – 2014 with a budget on NOK 23,500,000. However, the program agreement has the status “work progress”, and the budget for environmental management projects is still “to be discussed” (OfD Norway-Tanzania, draft 2012). The Norwegian institutions that are mainly involved in the Tanzanian OfD program are MoE, NPD, PSA, DN, Klif, NCA and Petrad (OfD 2011). On the Tanzanian side, the main cooperating institutions are MEM, TPDC and NEMC. The programme will be governed by a country agreement that has been signed by the Norwegian Embassy in Dar es Salaam and the Tanzanian MEM (OfD Norway-Tanzania, draft 2012). The MEM will assign the implementation of the institutional agreement to the NPD, who will work closely with MoE on the implementation of the environmental pillar. According to Geir Hermansen in NORAD, Tanzania is one of the OfD-countries where environmental issues have contributed great attention at an early stage in the process due to its outstanding resource-rich and bio-diverse ecosystems.

Competence building and advice will be provided for in collaboration with Tanzanian government agencies, and to some extent civil social organizations and parliamentary committees. Planned activities for the period 2012 – 2014 include among others: training people in relevant institutions and industry by arranging workshops/ seminars, and strengthening the lower level technical education system (OfD Norway-Tanzania, draft,

2012). Technical support may derive from Norwegian institutions; NPD, MPE, MoE, PSA, Petrad and Norwegian Universities. The Programme description also underlines more specifically issues in the environmental pillar that will be addressed (OfD Norway-Tanzania, draft 2012): Capacity building on SEA/ EIA handling, regular monitoring and assessment of the marine coastal system, training of in-house environmental professionals in practical field training, operationalize the oil & gas advisory committee and implementation of its activities, support the activities of the Coral Reef Task Force on gathering information of critical ecosystems and finalize the NOSCP.

Other program goals on resource management are:

- Update the Petroleum Law from 1980 to address the challenges facing the petroleum upstream sub sector.
- Make PSA contracts more comprehensive, as these currently contain too many regulatory issues.
- Replace TPDC by an institutional arrangement that separates regulator roles from commercial roles.
- Support NEMC with building a communication strategy that includes environmental mapping and a GIS.

### **The Energy Sector Capacity Assistance Project (ESCAP)**

As stated in the 'Preparation Mission Aide Memoire for Tanzania' (2011), the ESCAP mission, under the auspices of the WB, was agreed with the GoT in July 2011. The proposed project is defined as a "Technical Assistance Loan", and will assist the GoT to strengthen its capacity i) to manage development of its natural gas resources in an efficient, transparent, accountable and sustainable manner, and ii) to enhance the capacity to implement large power generation projects. 90 per cent of the assistance is specified to support infrastructure services for private sector development (WB 2012). The percentage shares in budget priorities are divided between: Oil and gas (70%), renewable energy (20%) and general energy sector (10%). The implementing agencies of the project are MEM, TANESCO, TPDC and EWURA (WB 2012).

The components of the PART 1 - Gas Sector Capacity Assistance are:

- *Component 1: Environmental Management* support of NEMC will include: a) Environmental Information management system, b) Oil Spill Contingency Plan, c) Strategic Environmental Impact Assessment, d) Advisory Services and e) Community-based early warning / response system.
- *Component 2: Sector Governance:* \* Strengthen the knowledge in all Government organizations that have a relation to the natural gas sector about how the gas and oil industry functions, how risks are managed, what provision of local services are required. \* Support agencies in the natural gas sector in strengthening their communication at the central level, and the community level on how stakeholders will be impacted by developments.
- *Component 3: Training and transfer of knowledge* that is needed to manage and regulate the petroleum sector. Develop and structure training programs. Create access to education for Tanzanians so that they can be able to fill the majority of the job positions created in the gas sector.

The duration of project time is from 2012/13 to 2015/16.

### ***The International Finance Corporation (IFC)***

IFC is an international financial institution, and member of the WB Group, that offers investments to encourage private sector development in developing countries (IFC 2012). The institution helps to generate jobs and deliver essential services to the poor and vulnerable to reduce poverty. The goal is to create opportunities for people, and realize sustainable economic benefits from natural resources to escape poverty (IFC 2012). Since Tanzania became a member of IFC in 1962, IFC has mobilized over \$185 million in investments for the country's economy and offered a broad range of advisory services to support the private sector. IFC's strategy in Tanzania focuses on supporting micro, small and medium enterprises through financial intermediaries, developing infrastructure by providing long term finance for large projects, and investing in agribusiness, tourism and other key economic sectors. IFC's value in the extractive industries lies in creating sustainable projects that bring long-term benefits to local communities, even after oil fields are exhausted and close down.



The IFC support industries that are planning to develop gas and oil infrastructure. When companies receive IFC's support, they are obliged to follow the IFC standards. These standards are social- and environmental standards that might serve as substitutes for the lack of specific country regulations and standards. According to the 'IFC Policy on Environmental and Social Responsibility (2012)' "*when a host country regulations differ from the levels and measures presented in these guidelines, projects are expected to achieve whichever is more stringent*". Central to the IFC's development mission is efforts to carry out advisory and investment activities with the intent to not harm people and the environment, and to enhance sustainability in private sector operations. IFC is further committed to ensure that the costs of economic development not fall "*disproportionately on those who are poor and vulnerable, that the environment is not degraded in the process, and that renewable natural resources are managed sustainably*" (IFC 2012). Companies bound to IFC standards are obliged to follow IFC's mission and its Environmental, Human, and Safety Guidelines, it is required to implement risk assessments and analysis of new and major projects.

## 8.0 DISCUSSION

### 8.1 Vulnerability and Resilience

How can the Tanzania state ensure that the revenues from the petroleum resources benefit the Tanzanian people? Certain measures enhance the possibility to strengthen the resilience or increase the vulnerability of the SES. Identifying these factors at an early stage in the gas and oil development may decrease vulnerability at a later stage. Wealth disparity and inequality, corruption, disregard for people's rights, and lack of regulations may contribute to negative development tracks if not debated at an early stage. On the other hand, cooperation and coordination, transparency, capacity building, and environmental justice are factors that can support a healthy extractive environment in a long-term perspective. Nelson et al (2010) suggests that the best solutions manage for increased general resilience, and minimize susceptibility to selected vulnerabilities.

#### 8.1.1 Factors that Increase Vulnerability

##### ***Wealth Disparity and Economic Inequality***

*Between countries:* An equal share of benefits does not always imply an increase in national revenues from the extraction of petroleum resources. Oil rich states in Africa, like Nigeria, are examples of countries that tend to have stratified social classes with a tiny minority earning millions while a vast portion of the population are in abject poverty. The Human Development Indicator (HDI) is a good measure of the average achievement in a long and healthy life, knowledge and decent standard of living (UNDP 2011). On the HDI country-ranking list, petroleum rich Norway has maintained its top ranking. Thus, the country is frequently nominated as the best place in the world to live according to certain measured indicators. When oil was discovered in Norwegian waters, the resource was looked up on as a common property that should be shared thereafter. Resource rents were invested in inclusive welfare programs, based on a vision of equal rights and support to social services. In contrast to Norway, Nigeria is ranked as number 156 and Tanzania as number 152. The fact that Nigeria still has such a low ranking after over sixty years of oil extraction is surprising. However, it gives an indication on the “curse” that has traversed the Nigerian society and the increase in poverty levels. Revenues from the petroleum industry have disappeared in the

hands of a few rather than being invested in health services, education and other infrastructural services (SDN 2012). Tanzania's rank is above Nigeria, which is a good preliminary sign. Since the petroleum industry is still in its initial stages, there are hopes that Tanzania can climb up the scale. For this to happen, laws and regulations could potentially secure sharing of revenues and benefits from the sector. Based on the HDI index, sharing of revenues could be manifested in terms of investments in public services that will increase the welfare of the population. What the HDI scale also tells, is that the increase in extraction of other natural resources (gold, diamonds and tanzanite) seem to have contribute little to any significant reduction in poverty levels in the country. Tanzania is still one of the poorest countries in the world, with a per capita income estimated to be US \$ 1500 in 2011 (CIA World Factbook 2012).

*Between people within a country:* The Gini coefficient measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfect equal distribution (100 is absolute inequality and 0 the absence of inequality.) In 2011 the GNI coefficient for Tanzania was 37,6 (UNDP 2011). The GNI for Nigeria the same year was not available, instead the most recent measure available was from 2003 when the coefficient was 43,70. By contrast, Norway had an income GNI on 25,8 (UNDP 2011). This indicates that Nigeria has a greater rate of inequality than the two other countries. Huge disparity in expenditures can cause problems such as lack of legitimacy, social strife and weakening of social cohesion. The conflicts and social tensions that are present in the Niger delta has been fuelled by a sharp polarization of the society (Amundsen 2011).

*Between regions within Tanzania:* The population in Tanzania has reached 46,2 million people according to a 2011 estimate (EIU 2012). Approximately 74 % of the population is settled in rural areas, while the remaining 26 % lives in urban areas (UNDP 2010). According to UNDP (2012) poverty is highest in rural areas where the population is dependent on agriculture. Productivity in these areas is low, population growth high and infrastructure poor, which hampers development. There seems to be a huge challenge for the government to deliver equitable and efficient power generation, health- and education services for the poor. Between 2001 – 2007 agriculture grew only 4,5% which was not high enough to raise poor above the poverty line given high population growth in rural areas (UNDP 2010). The challenge is that poverty is mainly rural, and three quarters of the population are located in

rural areas where they depend on mainly agriculture. In general, public- and private investments in agriculture have been small, and the sector has been the slowest growing sector in the economy (UNDP 2010). Lindi and Mwanza, Pwani and Ruvuma are among the poorest regions, while Dar es Salaam, Mbeya and Tabora have less income poverty. However, Lindi and the coastal regions are in general ranked as the poorest (Francis and Bryceson 2001). One reason is that industries, such as textiles, cement, plastic, breweries, food products, and chemicals are mainly established in the urban areas around Dar es Salaam.

### ***Corruption***

Wealth disparity can be associated with corrupt governments. Large inflows of revenues from the petroleum industry may serve as great temptations for those in power. Especially, in the absence of transparency and other controls, ruling cliques often use resource profits to enrich themselves and consolidate power through corruption (NDI 2007). Kolstad et al. (2008a) argue that in countries where resource rents are high and institutional quality low, a number of entrepreneurs will choose to become rent – seekers. If the number of rent – seekers is high it will eventually affect the national economy. Politicians in power usually have easier access to the resource rents, and may use the rents strategically to keep their position in power. Two options exist; they may consume the rents or provide public sector employers for his / her support (Kolstad et al. 2008a). As a result, the resource rents may not be used for investments in public services, but instead spent in a non – productive way. Some “oil states” are well known for their authoritarian regimes and unstable political climate (Arbo and Hersoug 2010). For instance in Nigeria public infrastructure providers have shown an incentive to engage in rent seeking; top – down military dictatorship have plundered oil wealth by enriching themselves through confidential contractual agreements and bribes of public funds (Okoh 2005).

Corruption seems to be a prominent feature in the Tanzanian public sectors (SID 2009). According to the Transparency International Corruption Index (2012), Tanzania is number 100 out of 180 countries. Even though President Mkapa started out with an anti – corruption stand in 1995, corruption has increased during and after Mkapa’s presidential periods (Havnevik and Isnika 2010). From 50 corruption cases in 2005, the number had increased to 578 cases in 2009 according to Havnevik and Isnika (2010). Clientistic relationships and weak financial control mechanisms have led top bureaucrats to bribe public institutions, such as the power company TANESCO (Makoye 2012). In 1999 the government adopted a

National Anti – Corruption Strategy and Action Plan to, among other things, strengthen the competence and attitudes in the public sector. In addition, a Public Corruption Bureau was established in the President’s office to investigate and report on corrupt practices. However, the Bureau has been criticized for lacking independence, resources and for its operation in an already corrupt legal system (Havnevik and Isnika 2010).

### *Revenue Management*

In April (2012) one could read in Bistandsaktuelt that control and audit papers in Tanzania declared a great number of briberies of public funds in governmental organizations during the financial year 2010/ 2011 (Makoye 2012). Several ministers were suspected for corruption that has led to huge financial losses for the country. For instance, the finance minister has been accused of making budget allocations for the amount of 1,3 billion Tanzanian shilling (Makoye 2012). Future petroleum rents may further fuel corruption if such problems of mismanagement are not dealt with (OfD Norway-Tanzania, draft 2012).

A move has been made by the Tanzanian Parliament accusing the government for limited efforts against evasion of public funds. The committee Chairman in the Parliament has argued that Tanzania may need to adopt a new law that forces the donors to canalize their aid through the parliament, so that people can continually be updated on what the money is used for (Makoye 2012). Whether aid agencies or other assistance projects can support changes in the balance between executive power and accountability remains to be seen (Cooksey in Havnevik and Isnika 2010). The OfD program has for instance affirmed to a strategy where only a minimum share is dispersed through the recipient system. The rest is channelled through program specific projects.

### *Contractual Agreements*

Havnevik and Isnika (2010) found in their study on corruption in Tanzania that the Tanzanian government and its supporters claim that anti – corruption efforts have been successful and that it is “*winning the war against corruption*”, but that the view is contested by the public, who see corruption as widespread. Experience from the mining industries in Tanzania has shown that the government has often negotiated with mining companies without consulting local communities (Lange 2008). Similarly, the government has been accused of giving away big portions of land to multinational mining companies, leaving indigenous people displaced (Bomani Commission Report 2008 in SID 2009). This may suggest that when the contracting terms are decided, revenues gained from petroleum gives no guarantee

for increased prosperity for the broader population. With a sound legal framework and transparency in the petroleum sector, there might be a reduced use of confidential and unfair contracts to manage the sector.

### ***Disregard for people's rights***

Impact resulting from socio-economic and environmental changes is often unevenly distributed (Chapin et al. 2009). The petroleum industry is a capital intensive industry often dominated by large corporations and centralized government. When the industry expands its drilling and pipeline projects, local people are sometimes abused, ignored and assaulted (EJOLT 2012). In addition, contamination of agricultural land and water supplies from defect industry facilities may pose threats to human survival. Toxins from oil spills can be passed to the food chain leading to a decline in fish supply and catch. In Nigeria most of the spills are first reported by fisher folk which are the ones living closest to the coastal resources (EJOLT 2012). Oil spills from pipelines have polluted swamps and ponds causing trees, shrubs and other plants to die off. According to Friends of the Earth Nigeria (FEN) (2012) the petroleum companies, which cause the spills, have not responded with proper clean-up strategies, and the government's lack of presence in the Delta has contributed to an escalation of problems (FEN 2012).

Cases with violations of human rights in relation to resource management have also been evident in Tanzania. Beymer-Farris and Basset (2012) have argued how activities unfolding in anticipation of REDD+, the climate change mitigation initiative, is redolent with environmental injustices and disregard for peoples' rights. Farmers have cultivated rice paddies in the Rufiji delta for centuries and adapted to changes in the environment over time. However, funded by the REDD+ initiative, WWF and the Tanzanian state have been trying to replace the community conservation of mangrove forest at the Rufiji delta "in favour of fortress conservation by the state" (Beymer-Farris and Basset 2012). The GoT ordered communities in the delta to stop activities in the mangrove forest, and commanded them to stop rice cultivation and reduce their fishing practices. Concerning disregards for people's rights, the study Beymer-Farris and Basset (2012) has showed how an initiative supported by overseas finances (the Norwegian government) are trying to redefine socio-natural relations in a way that threaten local people's access to control and management of natural resources (Beymer-Farris and Basset 2012). The people of Rufiji have a long history of struggling for their rights, and the outcome of this current threat to their livelihoods is still unresolved (Beymer-Farris and Basset 2012).

Local communities and indigenous people have been pitted against their own government, WB and agendas of international organizations (Honey 2008). Benjaminsen and Bryceson (2012) show in a recent study of land rights in Tanzania that protection of coastal and marine areas have been established at the cost of livelihoods for a large number of fishers. In Mafia Island Marine Park (MIMP), conservation interests have forced through several restrictions on local people's access to resources, and park authorities with military backing have, on behalf of the GoT, confiscated fishing nets and traditional fishing boats in the park (Benjaminsen and Bryceson 2012). Instead, the tourism industry has been given rights to exploit the areas for industrial development.

The above studies are examples of how ignorance of human rights among government authorities, business interests or international initiatives from overseas governments tends to deprive local coastal communities of their life sustenance. Future constructions of industrial facilities, (pipelines, LNG plants and reception facilities) for petroleum production in Tanzania could possibly create similar challenges in respect to disturbance to people's livelihood spheres and their rights to land and resources.

### ***Lack of Regulations on Pollution; Gas flaring and Oil Spills***

Offshore exploitation and extraction in Tanzania may disturb the surrounding marine environment by for instance accidental pollution or gas flaring. If oil is discovered, oil spills will pose major direct risks to the environment and human health in coastal Tanzania. Impacts on coastal ecosystems from oil spills or gas flaring will depend on the size of oil activities, the nature and sensitivity of the surrounding environment, and the effects of pollution and mitigation activities.

Gas flaring, i.e. the burning of waste gas, continues to be common practice in some African countries. Emissions from gas flaring include carbon dioxide, methane, sulphur dioxide, nitrogen dioxides, carcinogenic, which contributes to global greenhouse emissions, acid rain and heat stress to nearby forests (Baumüller et al., 2011). When areas with petroleum industry activities lack pipelines and gas transportation infrastructure, vast amounts of gas are often flared as waste or unusable gas. In Nigeria, where few people have access to electricity, gas is burned due to lack of infrastructure (Okoh 2005). Thus, the people are instead experiencing aggravated air quality and waste of a resource that could have been of high economic value to them (SDN 2012). According to ESCAP (2011) The Tanzanian Energy Policy of 2003 seems to lack an update with respect to gas resources. No protocols for gas venting and gas flaring are yet available.

Even though the petroleum companies not yet have discovered oil deposits in the offshore basins, this might happened. The Kenyan and Ugandan discoveries of oil illustrate the potential for finding oil. Whenever the extraction of oil sparks off, there are risks that oil spills will occur. Oil spills is a source of stress that comes in addition to already existing impact from both anthropogenic and natural resources, and can thus lead to adverse effects in coastal systems (Kooyman 2010). The extent to which an oil spill influences an ecosystem varies from spill to spill dependent on the size of the spill, and its acute or chronic effects (Kloff and Wicks 2004). Direct consequences may be fish killed, payment for compensation to displaced communities, hectares of crops destroyed, while the non – quantifiable consequences could be associated with health hazards, loss of income by farmers, polluted drinking water, and loss of biodiversity due to use of dispersants (Okoh 2005). Thus, an oil spill may culminate in poverty, unemployment, conflicts over compensation issues, and decay of social values. According to Kloff and Wicks (2004), small oil spills usually comes from an oil tanker and offshore oil installations, while larger spills could be caused by the grounding of an oil tanker, collisions with other vessels, technical failures or other human errors. In the Niger Delta oil spillages by oil companies have devastated and impacted the Delta environment. Three million barrels of oil were lost to 6,817 oil spill incidents between 1976 and 2001, whereby over 70 per cent of the spilt oil was not recovered (UNDP 2006:181 in Opukri & Ibaba 2008).

While the Nigerian petroleum exploration and drilling are mostly located onshore in a delta environment, most of Tanzania's petroleum extraction is located offshore. An oil spill from a platform might therefore provide a bigger threat the coastal ecosystems and marine animals than directly affect communities on land. J. Daffa in TCMP argued that what Tanzania should worry about is the lack of knowledge about the consequences of institutional capacities in case of an oil spill. Anna-Maria Simon in TPDC likewise argued that the future challenges of the corporation are how to prepare and manage large accidental oil spills or gas blowouts. Increased collaboration efforts through dialogue between government, local communities, petroleum companies, non-governmental organizations and lending institutions might increase understanding of oil spills as a complex problem, and thus, contribute to new legal frameworks that can regulate this more strongly.



## 8.1.2 Factors that Increase Resilience

### *Coordination and Cooperation*

The type and number of institutions involved in the petroleum sector varies from country to country, but typically includes different ministries, public revenue management agencies like central banks and tax collection agencies, environmental agencies, research institutions, and non – governmental organizations (NDI 2007). The society delegate responsibility for policy-making to the government, which in turn delegate responsibilities to petroleum companies to carry out petroleum operations (Lahn et al. 2007). Thus, each of the institutions has a specific role, and together they form a complex network of relations. When the roles and responsibilities between these institutions are not clearly defined, there might be associated problems with holding public officials accountable. For instance, in some African countries, legislators tend to have a limited understanding of their roles and responsibilities, and how the institutions in which they serve are meant to function (NDI 2007). In the words of Lahn et al. (2007:9) “*lack of clarity can create conflicting agendas and policy paralysis*”. When authority is fragmented, an overlap between different departments may result in competition rather than coordination, thus, coordination and cooperation between institutions and other actors affect management outcomes (UNEP 2010).

The complex map of actors involved differs in terms of responsibilities, interests and proximity to hazards and resources. Thus, cooperation, coordination and awareness may improve management responses (MEA 2005). Part of the Norwegian success was the ability of the Norwegian government to establish clear guidelines and divisions of roles and responsibilities among ministries, other government agencies and oil companies with an emphasis on cooperation and coordination (Petrad 2012). For instance, emergency preparedness to acute pollution is clearly regulated. The Pollution Control Act requires companies, municipalities and the government to prepare emergency plans. According to MPE and NPD (2012) “The Ministry of Fisheries and Coastal Affairs is responsible for coordinating national oil spill preparedness and the State’s preparedness against acute pollution”. The MoE is further responsible for setting requirements for emergency preparedness, while KLIF approves emergency plans and verifies that the requirements are followed (MPE and NPD 2012). On the industry side, oil companies are responsible for handling acute oil incidents resulting from own activities. Regional plans are also developed along the whole coast of Norway, and personnel, equipment and vessels are stationed at four

bases in case of an accident (MPE and NPD 2012). In case of an oil spill, the designed roles and responsibilities are expected to be coordinated between the institutions.

#### *Regional cooperation*

Coastal ecosystems provide a diverse stream of ecosystem services from the whole East African coast, which calls for a coordination of management responses, scientific understanding and engagement of key stakeholders (MEA 2005). WIOMSA is a regional focal for coordination between east African countries, and organizes workshops to discuss regional topical issues such as impacts of large-scale investments in petroleum and port development. These workshops “*could provide an important platform for different actors in the gas and oil sector to discuss issues of common interest*” according to Julius Francis, the Executive Secretary of WIOMSA. Sumatra, NEMC and other Tanzanian institutions are also involved in the WIOMHp. The project is funded by GEF and is a coastal and marine contamination prevention project, which promotes regional collaboration between the eastern African countries on certain issues; development of coherent pollution prevention and contingency management plans, methods for valuing ecosystem benefits and preparations of a regional database of marine and coastal resources. Focus is especially attributed to capacity building for contamination and regional oil spill response.

#### *Coordination between assistance programs*

Tanzania may also gain from establishing peers and cooperation with other resource-rich countries that are experienced in the field through bilateral cooperation. The country is currently in progress of establishing an institutional cooperation program agreement with the Norwegian government (OfD), and a projected cooperation with the WB (ESCAP). The World Bank and NORAD have agreed to coordinate the OfD program and the Energy Assistance Capacity Project to maximize the benefits to the GoT. Whereas both programs have planned on capacity projects, coordination of the two programs has been set up to avoid duplication of activities. Comparatively, both OfD and ESCAP support Tanzanian institutions such as TPDC and NEMC, and initiatives such as the Tanzanian- EITI and PWYP.

In the OfD program agreement, an institutional agreement is planned between the Norwegian MPE and the Tanzanian MEM. This form of planned cooperation is called “twinning”, and is meant to increase competence sharing between similar institutions. In addition, cooperation between UDSM and the Norwegian Technical University is planned to share expertise on petroleum issues. The IRA also acknowledged interest in cooperation with

Norwegian institutions on future OfD activities in Tanzania, for instance plans of establishing an educational program on petroleum issues (OfD Meeting Report 2012).

### *Transparency*

In some countries, large resource rents create incentive for patronage, and political decision makers' use up public resources to shore up political projects instead of investing in public infrastructural services (Kolstad and Wiig 2010). The citizens in these countries often lack basic knowledge of the petroleum sector, and "information on industry operators' obligations to the state, government revenues from these sources and how those funds are allocated" (NDI 2007). This is often strengthened by a weak link between the government and its citizens. Hence, recent years there has been a growing interest to promote transparency in the management of petroleum resources. International initiatives, like EITI (established at the WSSD in Johannesburg 2002) and PWYP have been established to combat corruption, build trust and enable good decisions in the petroleum sector (Lahn et al. 2007). Both the EITI and the PWYP campaigns seek to reinforce transparency and accountability in Tanzanian extractive resource industries (SID 2009). In addition to promoting better governance, both initiatives works in joint collaboration of governments, petroleum companies, civil society groups, investors and international organizations. On a world basis, about 40 of the world's largest petroleum and mining companies support EITI (TEITI 2010).

Tanzania was accepted as an EITI candidate country on the 16th of February 2009 (EITI 2012). One year later, the 16th of April 2010, 21 Tanzanian institutions and three individuals formally declared the membership status of the PWYP-Tanzania Coalition (PWYP 2012). The Tanzanian EITI (TEITI) is steered by a multi-stakeholder group, which consists of 16 members drawn from the GoT, civil society organizations and extractive companies. The aim is to work for better transparency through requiring companies to publish their payments and GoT to disclosing their receipts from companies (TEITI 2010). Tanzania has agreed that transparency in the gas sector shall be strengthened by building natural gas expertise in the TEITI secretariat and multi-stakeholder group, with assistance from ESCAP (ESCAP 2011).

Companies need to publish to the general public what they earn from investments and pay to the GoT. In addition, the GoT is expected to publish what it earns, and how it distributes the revenues (SID 2009). As such, the initiative is a tool for the Tanzanian people to hold the government and the petroleum companies accountable, and to decrease the

possibilities for corruption. In Norway, openness and popular oversight of political priorities and technical choices was an important way for people to feel included, and a way for the government to create trust to its citizens. Information sharing may also have made it easier for the Norwegian people to raise their voices and push for stricter requirements for all oil companies.

### ***Capacity Building***

#### *OfD and ESCAP building capacity*

UNEP (2002) recognizes capacity building as the core of technical assistance and as a strategy that builds capacity to assess changing conditions and to respond to and mitigate changes. After the new discoveries of gas offshore it is likely that the industry will expand, and so the need for technical capacity to manage and regulate the petroleum resources. Hence, a number of institutions and other actors might be offered training and knowledge transfer from other with competence in the field (ESCAP 2011). According to the ESCAP (2011) there is need to strengthen the knowledge in all government organizations that have relations to the petroleum sector; on how petroleum industry functions, how risks are managed, what local services are required, the roles of various government organizations or institutions, how to find a balance between attracting investors and maximizing revenues for the country. Thus, capacity could be strengthened both at the central level and the community level. At the central level ESCAP intends to strengthen the communication and information dissemination efforts of parliamentarians, journalists, students, research groups, and general public. While at the community level ESCAP focus on how local people will be impacted by development in the petroleum sector (ESCAP 2011). In addition, the ESCAP states a demand from universities and other central institutions in Tanzania to develop and structure training modules and programs on petroleum-related issues. Capacity building support will be given to TPDC in the form of “call – off” contracts to provide specialized transaction support in the areas of LNG plants. (ESCAP 2011). TPDC has for instance developed initiatives with the Vocational Education and Training Authority for vocational training to the petroleum sector in the Mtwara Vocational Institute. In addition, ESCAP plans to establish a Postgraduate Program in Petroleum Engineering at the UDSM’s College of Engineering and Technology (CoET) (ESCAP 2011). The goal is that by access to education Tanzanians can fill the majority of jobs created in the sector.

Similarly to ESCAP, the OfD programme gives high priority to transfer of knowledge, and establishment of capacity building in Tanzanian institutions so that they in the long term can be self-reliant on expertise (NORAD 2012). OfD plans to arrange workshops and seminars with aim to strengthen the technical education system (OfD Norway-Tanzania, draft 2012). Furthermore, TPDC with the support of NORAD, has developed an initiative with the Geological Department of the University of Dar es Salaam and the Norwegian University for Science and Technology to strengthen the curriculum for Petroleum Geology. The non – profit Norwegian governmental organization Petrad, will also facilitate transfer of knowledge and experience within petroleum management through tailor- made courses on petroleum management, seminars and projects in cooperation with Tanzanian government institutions and TPDC. Experts and lecturers for the various activities come mainly from the Norwegian Petroleum Authorities, Norwegian and International Petroleum Industry, Universities and R&D Institutions. A summary of the goals for capacity building in the “OfD Program Agreement” (2012) lists:

- On-job training in Norwegian institutions.
- Training of professionals.
- Seminars, workshops, and short courses related to petroleum management (i.e. Petrad 8 weeks seminar). Using lecturers from the Norwegian petroleum industry.
- University/ College Cooperation between Tanzanian institutions and Norwegian institutions.
- Workshop on governance tools and on gas management issues related to a Gas Master Plan and Songo Songo re-development issues.
- Organize regional seminars on management, good governance and anti-corruption

#### *Corporate Social responsibility*

All companies that operate in Tanzania must apply to CSR standards. The exploration and production industry therefore also has a role in providing support through training and capacity building. STATOIL has long experience in the industry, and has a bundle of experts in the field of petroleum extraction. The company has already arranged open meetings and workshops for Tanzanian Institutions to share knowledge and experience on oil response plans and work on rigs. NEMC, TPDC and SUMATRA have all attended meetings with the company. Petrobras has likewise trained 100 welders in the Mtwara region, and employed 40 Tanzanian residents (Mutch 2012). While the petroleum industry is an industry with

competing interests, strategic partnerships between companies and government agencies are one way to open dialogue and build trust and collaboration between the parties.

### *Science and management*

WIOMSA's main task is capacity development in favour of integrated management approaches. The association works closely with Universities and policy makers – to provide a linkage between science and management. On a regular basis, WIOMSA organizes workshops, seminars and meetings that bring together different actors, with the intention to promote dialogue on key topics to build capacity of marine scientists and coastal management practitioners. The same are planned on petroleum issues. Similar to WIOMSA, are IRA and IMS important institutions concerning capacity building. Both institutes organize conferences and seminars on natural resource- and land use issues and confront the coastal – and marine environment through research and consultancy.

Insufficient participation and transparency in planning and decision-making could provide barriers to effective management responses (MEA 2005). Management of coastal systems could be constrained by a lack of knowledge among and information concerning different aspects of ecosystems, and fail to use adequate information that exists in support of management decisions. According to MEA (2005:62), while capacity building may come from abroad institutions, *“place-based traditional knowledge is also valuable for ecosystem management”*.

### ***Environmental Justice***

The Human Rights Watch, Amnesty International and Friends of the Earth have all been working for a more just environment for citizens all over the world that are treated unfair and not in accordance with universal human rights. Recent years there has been a rise in initiatives to protect people by defending rights to a healthy environment, ex. Friends of the Earth or Environmental Justice Organizations, liability and trade which is a project supported by the European Commission that will run from 2011 – 2015 (EJOLT). A common characteristic for all is the emphasis on human rights and the importance with consulting people in issues that affect them. According to EJOLT (2012); *“Ecological distribution conflicts refer to struggles over the burdens of pollution or over the sacrifices made to extract resources, and they arise from inequalities of income and power”*. Sometimes the local actors claim redistributions of revenues from petroleum resources, leading to conflicts. In this setting, the concept of

“environmental justice” is important as it not only refers to the distribution of costs and benefits but addresses participation and recognition claims (EJOLT 2012) In order to ensure that the petroleum industry does not become a curse rather than a blessing, principles of environmental justice could for instance be enshrined in the Tanzania’s national frameworks and regulations.

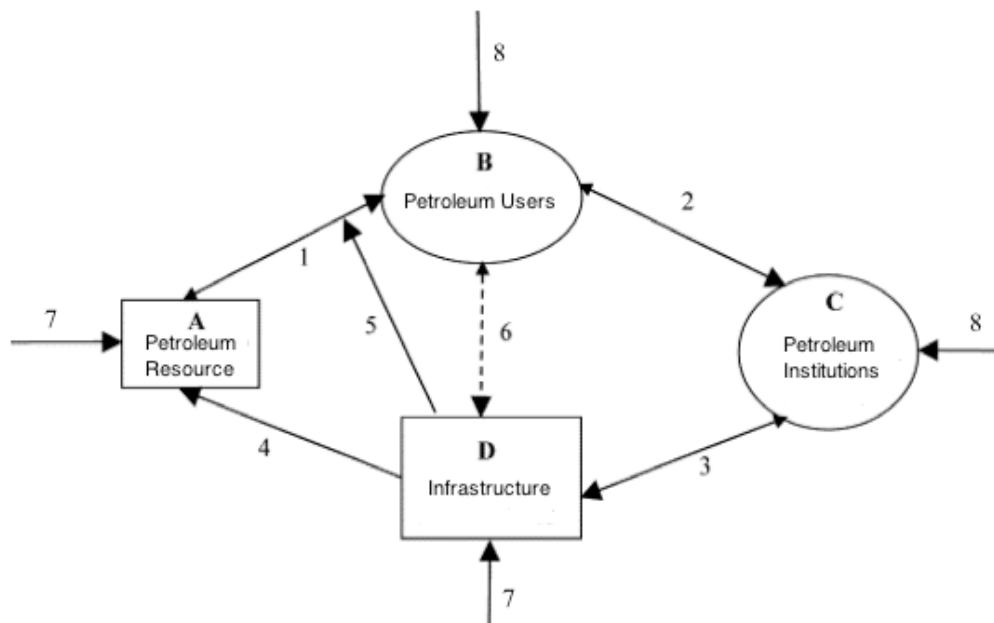
The petroleum industry in Norway is located offshore, and few struggles have been noticed between local communities and petroleum companies or the government. This differs from the story of the Niger delta where petroleum extractions are operating on already populated land. As a result, conflicts over land issues are common, and a continuing problem in the country. Will coastal communities in Tanzania experience justice concerning land rights? Will they be compensated for industrial pollution in their coastal environments?

Pursuant to Beymer-Farris and Bassett (2012) environmental justice is about letting control and management stay with local people and not shift to global actors. The CBD convention (paragraph 8.j in Fauchald and Tuseth 2010:1692), that Tanzania has signed, states that “*national legislation shall respect, preserve and maintain knowledge of indigneious and local communities embodying traditional lifestyles for conservation*”. For instance, the establishment of protected areas may be more efficient when local communities have “bought in” to the protected area and have alternative livelihoods opportunities or receive direct payments, so they are not harmed by the creation of the protected area (MEA 2005; Thorkildsen 2006; Benjaminsen and Bryceson 2012).

The different factors analysed above could all influence the petroleum sector management, and thus, enhance the possibility to strengthen the resilience or increase the vulnerability of the SES. To further reveal some of the possible challenges within an institutional perspective, a robustness framework might create a valuable framework to analyse attributes of institutions and the dependence on the underlying ecological system.

## 8.2 Robustness

The framework of Anderies et al. (2004) is applied to give a picture on the complex patterns of petroleum extraction in Tanzania. In the following analysis, potential interactions that revolve around institutions, rules and collective-choice processes are investigated with regard to the SESs robustness. The focus is on the strategic interactions within and between these entities, and how these interactions affect the likelihood of long-term robustness. Hence, instead of focusing on the resource users and problems of maintaining cooperation, a more comprehensive analysis is applied to address what factors that are likely to enhance or detract robustness from the key institutions previous analysed and their interactions (Anderies et al. 2004). Investigating the interactions between the entities might be useful because the collapse of the SES can have its roots in institutional dysfunctions (Chapin et al. 2009). Infrastructure is another critical element that influences the interactions in a SES as it enables communication and affects ecological processes.



**Figure 8: The conceptual model of a social-ecological system adapted to the context of the petroleum sector in Tanzania (Based on Anderies et al. 2004).**



The linkages are explained in the table below:

**Table 4: The Tanzanian petroleum resources in a social and ecological system of interactions** (Based on Anderies et al. 2004).

Entities	Examples	Potential Problems
<b>A. Petroleum Resources</b>	Gas and oil (petroleum resources)	Poor infrastructure
<b>B. Petroleum Users</b>	Petroleum companies	Lack of accountability and lack of corporate social responsibility
<b>C. Petroleum Institutions</b>	Institutions: TPDC, NEMC, TCMP, WIOMSA, IMS, IRA, SUMATRA	Lack of resources and capacity to carry out responsibilities
<b>D. Public Infrastructure</b>	Oil-rigs, gas pipes, reception facilities, regulations and acts that govern use, trust, reciprocity	Lack of enforcement and implementation capacity Lack of funding
<b>Link 1: Petroleum resources and petroleum users</b>	Increased exploration activity	Exploration and drilling place some burden on the surrounding environment. Addresses questions of vulnerability and sensitive areas.
<b>Link 2: Petroleum users and petroleum institutions</b>	Lack of human and financial resources.  Poor performance by institutions / lack of trust  Poor coordination – increase the vulnerability of government (corruption). (Decreased opportunity for social learning / adaptive management)	Mismatch between costs and benefits  Lack of participation / lack of information  Distrust and perceived corruption
<b>Link 3: Petroleum institutions and infrastructure</b>	Decades of underinvestment in physical infrastructure (people caught in a poverty trap).  Increase in infrastructure investments as a pre-requisite for developing the resource base. - Dependent on the relation between Tanzanian institutions and petroleum companies.  Better communication between companies and the public (to avoid escalation of illegal behaviour).  Research institutions play a role in developing national standards by preparing EIA's and SEA's.	Corruption  High costs  Infrastructure expansion needed
<b>Link 4: Infrastructure and</b>	Impact of infrastructure on the level of petroleum resources	Pollution from broken pipes.

<b>petroleum resources</b>	Influence of petroleum resources on the infrastructure, e.g. oil spill, gas flaring.	Inefficiency in oil spills preparedness.  Complex ecological- and social interactions require complex institutions and social structures.
<b>Link 5: Petroleum resources and petroleum institutions</b>	Lack of experts in the petroleum field  More workload	Profitable for corrupt participants  Missing capacities and knowledge
<b>Link 6: Petroleum and petroleum infrastructure</b>	Lack of infrastructure	Rent seeking, free riding,  Lack of public infrastructure,  Actors representing different interests (along the coastline); recreational, commercial, and conservationist.
<b>Link 7: External forces on petroleum resources and infrastructure</b>	International obligations to reduce greenhouse gas emissions.	Storms, climate change
<b>Link 8: External forces on petroleum institutions</b>	Disturbance due to changing market relations (determined by global prices)  New economic opportunities	Economic crisis and Dutch disease  Migration  OfD and the motives

The table gives an overview of potential interactions in the SES, and challenges that can be associated with interactions between petroleum resources, petroleum users, petroleum institutions and public infrastructure. The revised model of Anderies et al. (2006) represents in this context; A. Petroleum resources, referring to gas and oil, B. Petroleum Users which are petroleum companies (Statoil and others), C. Institutions, applying to the institutions and associations represented in the result section (TPDC, NEMC, TCMP, WIOMSA, IMS, IRA, SUMATRA) and lastly D. Infrastructure, representing both physical infrastructure such as Oil-rigs, gas pipes, reception facilities, and social infrastructure, national and international regulations and acts that govern use, trust, and reciprocity. The sections below start by refreshing who the petroleum companies (B. Petroleum Users) are, and challenges associated with their appearance in the SES, followed by representations of each linkage in the table.

## B: Petroleum Users

The users of petroleum resources in the early phases of exploration activity are petroleum companies that are licensing blocks offshore in Tanzanian coastal waters (ref. Figure 5). The national oil company, TPDC is responsible for maximum benefit for society. This responsibility differs from foreign petroleum companies whose contributions to society will come through adherence to legal regulations, tax systems and CSR initiatives. The foreign petroleum companies are; Pan African Energy, Maurel & Prom, Mdovu / Aminex, Petrodel, Afren plc, BG International, Statoil, Petrobras, Dominion, Ophir East Africa Ventures Limited, Beach Petroleum, Total E & P Activities Petrolieres, Dodsal, Heritage Rukwa & Heritage Kyela, Swala Energy, Motherland Homes, and Open (TPDC 2012).

The companies' actions will potentially affect other users of the Tanzanian coastal and marine system that depend on other resources, such as fish, mangrove forest and beaches, in terms of level of pollution from operation activities or infrastructural development. Therefore, companies are required to adhere to Tanzanian legal frameworks and regulations. Nevertheless, what may restrict companies to act in a corporate responsible manner could be lack of standards in national gas and oil frameworks. The GoT has for instance, not given any clear standards on the use of dispersants in case of an oil-spill offshore (Boye and March 2012). According to Rose Sallema in NEMC, the policy on use of dispersant is still a draft.

Despite this, every company have an inherent CSR when they operate in sensitive environments. Lack of responsibilities may create unwanted conditions. In Nigeria, companies' efforts to being responsible actors have historically seemed to fail in the sense that local communities have been deprived environmental justice and human rights. Instead, communities in the delta have suffered from oil pollution, gas flaring, involuntary displacement, and conflicts over ownership and compensation (Baumüller et al. 2011).

## Link 1: Petroleum Resources and Petroleum Users

### *Increased exploration activity in sensitive areas*

Will foreign petroleum companies be allowed to operate in offshore vulnerable and sensitive areas, or should particular vulnerable areas along the Tanzanian coastline be given special attention, for instance by detecting coastal resources and their importance for human use and biological resources? Sensitive environments may include ecosystems such as mangroves, tropics coastal waters, wetlands, coral reefs and acid areas. Dr. C. A. Muhando from IMS and Dr. I. Lysenko from UNEP- WCMC have compiled an Environmental Sensitivity Atlas of Tanzania's coastline. The map gives an overview over the whole coastline and its marine protected areas, locations for extractive industries and tourism, marine and coastal biodiversity, and fisheries resources. The map might be an important contribution to the current work on EIA's and a SEA. Mafia Islands and the Rufij delta are for instance mapped as protected areas that require special attention. Statoil, which operates in block 2 offshore (see Figure 5), expressed that the company is aware of the pristine and biodiverse marine environment in which it explores for gas and oil. When the company did an ERA analysis on the risk of acute oil spills at sea, a sensitivity atlas of the entire coastline were developed in cooperation with local environmental consultancy, the UDSM and other consultants. Mafia Island, Rufiji and Kilwa was in this analysis considered as especially vulnerable areas in case of an oil spill in block 2, and have these areas have therefore received special attention, according to Statoil (Boye and March 2012). Pursuant to TPDC's best practice guidelines for petroleum companies (see Appendix C), the companies are also advised to provide seabed images and hand this over to NEMC, thus, Statoil has worked on a sensitivity index that has identified the marine life in the Zafarani area (block 2). In addition, several water samples have been collected for analysis.

## Link 2: Petroleum Users and Petroleum Institutions

### *Relationship between TPDC and GoT*

The oversight role of governmental institutions may sometimes be challenged by a lack of financial resources to fulfil their institutional responsibilities (Stephens 2008). When the role and responsibility of each institution is blurred, it sometimes results in poor coordination between institutions. TPDC enjoys the role as both a commercial petroleum company and a

regulatory role, which may fade the distinction between business interests and interests in favour of the nation. The WB (in International Alert 2009) recommends that any national oil company involved in exploration, production and marketing of oil, like TPDC, should be distinct from the bodies performing regulatory functions, such as the Ministry of Energy and Minerals. The risk of not separating the roles might lead to a confusion of roles. Whether Got (MEM) will take over most of the social functions of TPDC so that TPDC instead can focus on optimizing the revenues from the petroleum industry are left to future uncertainties. In the ESCAP Program document (2011) emphasis is placed on a need to develop a legal framework for the establishment of a National Oil Corporation that looks after the state's interest in petroleum activities (ESCAP 2011). Hence, the program budgeted USD \$ 500 000 for studying the separation of TPDC. The OfD program likewise states it as a program goal to replace TPDC by an institutional arrangement that separates regulator roles from commercial roles. ESCAP and the OfD programs have therefore planned to coordinate their actions on this goal (ESCAP 2011).

#### ***Distribution of technical and financial capacities***

*“There is often a mismatch between where skilled people are concentrated and where they are also needed”*, according to Lahn et al. (2007). In initial phases of petroleum extraction, petroleum companies often have highly skilled personnel like petroleum engineers, while ministries and regulatory bodies sometimes lack sufficient capacities to manage the resources. In Tanzania, several agencies (NEMC, TPDC, TCMP) expressed their lack of such capacities to meet the roles and responsibilities assigned to them. NEMC, which has the overall responsibility for coordinating environmental policy, lack sufficient technical and financial capacity to carry out all its assigned responsibilities. Lack of technical expertise in TPDC might put the GoT at a disadvantage when negotiating with foreign companies or other investors over petroleum rights. Hence, NEMC and TPDC have highlighted a need for financial resources and capacity building support (knowledge, skills, experience) to exercise their responsibilities. The OfD program puts attention to assist GoT in the creation of a legal and regulatory system in the petroleum sector, and to build up and strengthen local ministries and directorates of energy, such as NEMC and TPDC (NORAD 2008). When the oil industry started in Norway, Norwegian institutions had also little expertise in exploration, production and refining of petroleum. Consequently, the country depended on international petroleum companies with capital and technology. As a strategy to secure the benefits, Norway decided

that for companies to become beneficiaries in concession rounds they were obliged to invest in Norwegian research communities (Ryggvik 2010).

### ***Coordination between petroleum companies and TPDC***

Performance targets can sometimes be embodied in the contracts signed between national petroleum companies and international petroleum companies to ensure that CPR policies on local content are aligned with the national development agenda (Lahn et al. 2007). In Tanzania, the common investment terms are enshrined in PSA's (TPDC 2012). Some sceptics to PSAs regulations on petroleum production argue that these types of contracts usually contain confidentiality clauses (Amundsen 2011). As an illustration, the Nigerian Petroleum Acts usually gives the Minister of Petroleum full authority over the allocation of licenses, and there are no legally processes or oversight mechanism for the allocation of blocks (Lahn et al. 2007).

According to the ESCAP (2011) lack of a coherent legalization on petroleum operations makes it even harder for TPDC to monitor and be a strong party in negotiations with companies. As a consequence companies may use these "loopholes" to add favourable conditions. As Jeremy Daffa, in TCMP, expressed, "*Tanzania need to build its capacity to negotiate with foreign gas and oil companies*". The report "The One Billion Dollar Question (2012)" have estimated that in total, Tanzania has in recent years been losing revenues to foreign investments ranging from \$ 847 million to \$ 1, 29 billion a year. The report suggests that incentives should be removed and individual agreements made public in a close following up on the EITI initiative. If the negotiations on PSA agreements are made public there might be better conditions for TPDC to secure the largest shares in PSA and national sovereignty over the petroleum resources.

### ***Inclusion on local communities***

History from the mining sector in Tanzania has shown a disconnection between large-scale mining companies and the local governance structures in the areas where mining is located (Lange 2008). This has in some areas resulted in distrust between the local communities and mining companies (Lange 2008). Instead, the locals might pay the price with increased population pressures and pressures on infrastructure (SID 2009). Hence, the

outcome of petroleum development may to some extent depend on how petroleum companies are made accountable for their practices in coastal areas. As an example, Norway has not experienced any comprehensive emissions in local coastal environments since 1977. This is partly a result of environmental- organizations and academic societies' abilities to claim stronger regulations of the industry (Arbo and Hersoug 2010). The presence of critical voices and external audits secured society its own power vis a vis the big companies (Ryggvik 2010). This made it easier for the Norwegian government authorities to impose stricter requirements on oil companies (Arbo and Hersoug 2010).

### Link 3: Petroleum Institutions and Infrastructure

Increased inflows of petroleum revenues into national budget may create possibilities for the GoT's to invest in infrastructure. However, in the initial phases of petroleum activities governments are often dependent on support from private sources as a pre-requisite for developing the resource base (Ryggvik 2010). The relationship between the petroleum institutions and infrastructure (Link 3) therefore somehow depend on the relation between Tanzanian institutions and petroleum companies (Link 2). If the sector can be supported by sufficient investments in infrastructure the petroleum resources could be turned into available energy and power. For instance, the Chinese government has invested in the planned pipeline from Mtwara to Dar es Salaam (OfD Norway-Tanzania, draft 2012). When finished, the pipeline is expected to connect several industries and thousands of rural homes. Since more infrastructure development is planned in Mtwara, NEMC acknowledged the importance of better coordination between local and central authorities. NEMC has three zone offices and the next office to be declared opened will be in Mtwara, which is the port closest to where Statoil and BG have made their large gas discoveries.

However, development of infrastructure, such as reception facilities and a gas receiving facility requires EIA work before plans can be put into action. Research institutions, such as IRA prepares SEA's and gives advice on behalf of the government, in addition to developing EIA's on demand from the industry (IRA 2012). The Institute is also represented in Technical Advisory Committees related to review EIA's in collaboration with NEMC (OfD Norway-Tanzania, draft 2012). Thus, researchers and scientists influence decisions on where infrastructure facilities should be located in the coastal zone.

## Link 4: Infrastructure and Petroleum Resources

### *Influence of petroleum on local infrastructure (Pollution)*

When an oil spill happens offshore or from onshore pipelines, the main impacts might fall on the marine environments close to the rigs or the coastal communities that live close to pipeline constructions. Especially mangroves, salt marches and sea grass beds are sensitive to oil spills and can use years to recover (Bryceson 1981). Likewise oil spills can also have long – lasting consequences for fisheries, by excluding fishers from their fishing grounds.

Possible impacts of oil spills on mangrove trees was shown in 1984 when an oil spill appeared at Kigamboni, south of Dar es Salaam. The oil did essentially no harm to the trees trunk and branches, and only temporarily covered the leaves, but the breathing roots, the "Achilles heel" of the mangroves, were hardly affected because the oil blocked the lenticles (breathing pores) on the pneumatophores (breathing roots), which suffocated the trees. This relatively minor oil spill killed an entire mangrove forest, and it does not seem to have recovered until today. Its demise has been followed by serious erosion of the shoreline behind where the mangroves had been protecting it from the waves. This case may illustrate the vulnerability of mangrove roots if affected by an oil spill, and raise consideration to what the consequences would be if a huge spill happened to hit the Rufiji basin, which is both home to the largest expanse of mangrove forest in Tanzania and many coastal communities (Mwalyosi 2002).





**Figure 9: Mangrove roots, showing the vulnerable pneumatophores (breathing roots) that have been clogged by the oil pollution at Kigamboni, south of Dar es Salaam harbour entrance in 1984 (Photo by: Ian Bryceson).**

Construction sites of land and sub – sea gas pipelines for transport of LNG could pose a threat to local fisher-folk in terms of land occupation and potential side effects such as leakages from pipelines prone to corrosion (Amnesty 2008). In Guarana bay, Brazil, it has been reported that oil installations, pipelines and related projects were suddenly taking up the best fishing ground for the local fishers (Bassey 2012). The vulnerability of the SES increased when an oil spill occurred in the area that destroyed the mangroves and took the livelihoods of over 300 families who relied on coastal resources. Thus, in short time artisanal fishers in the area were squeezed out of the business, as they could not go to the deep seas in small boats (Bassey 2012).

## Link 5: Petroleum Resources and Petroleum Institutions

### *Regulations*

Areas with high ecological, recreational, cultural values or areas that are critical for fisheries such as reproduction zones, could be protected from industrial interference (Kloff and Wicks 2004). In Norway buffer zones of 50 kilometres around the outer edge of fishing

areas have been established. Seismic surveys within these areas are only allowed when no fishing are taking place. In addition, fish migration routes are protected (Kloff and Wicks 2004). Seismic surveys may be better adapted to the fishers' requirements when enforced in periods with little fishing activity (Arbo and Hersoug 2011). However, the protection of seascape, natural values or marine life may be difficult to interpret in operational terms. Petroleum companies operating in Tanzania are given advice by TPDC to minimize possible negative effects on coastal – environments and livelihoods (See table in Appendix C). Companies shall for instance respect a defined distance between survey vessels and fishing areas, and avoid disturbance to sensitive ecology in offshore operations. However, the recommendations do not seem to explicitly mention anything about local communities. While these are recommendations, there exist national laws and regulations, which also put certain limitations on extraction activities. Article 23 in the Production Sharing Agreement on Environment obliges all companies to *“take necessary and adequate steps to conduct its operations in a manner that will protect natural resources, including living resources of the land, sea, lakes and the environment”* (DNFH 2009:86).

The National Environmental Policy Act of 1997 describes (in paragraph 65) further *“EIA as a planning tool shall be used to integrate environmental considerations in the decision makings process, in order to ensure that unnecessary damage to the environment is avoided”* (NEP 1997). Government departments responsible for the sector under which a proposed project falls are obliged to offer input in the EIA process through a Technical Review Committee (UNEP 2010). Experts from research institutions, such as IRA might also be invited to the process. Ruzika N. Muheto, Director for Environmental Planning and Research in NEMC, said the council is giving EIA's a high priority, and that last year the council reviewed 46 EIA's only on gas and oil. However, lack of resources hindered the council follow-up all the EIAs. When a gas and oil operator submits his business plan to TPDC, the corporation provides guidance for conducting EIA. Further, Anna-Maria Simon explained that TPDC, in collaboration with NEMC, is supposed to provide contacts to petroleum companies of NEMC registered and credible Environmental firms.

## Link 6: Petroleum Users and Infrastructure

### *Lack of physical infrastructure*

The petroleum industry is dependent on infrastructure for production and distribution of the petroleum resources. While the local fishers are able to operate under current infrastructure, the petroleum sector is a technology-driven industry that depends on infrastructural development. However, the needed physical infrastructure to subtract and process the gas is lacking, according to Statoil (2012). Current infrastructure in Tanzania lack facilities for companies to continue processing after the exploration and drilling activities. In terms of physical infrastructure, reception facilities, a gas receiving facility, a gas power plant, and a harbour jetty is prerequisites for the industry to expand (Sigurd Juel Kinn). In addition, roads, railways, airports, water and power infrastructure will be needed for logistical reasons. Roads are a vital for logistics and mobilization of resources. According to GoT (Five Year Development Plan 2012) an improved transportation sector is critical to open up the development of Tanzanias economy, promote trading and foreign investments. In Nigeria, the lack of a proper road network did lead to high costs of transportation, and as a result hindered the mobilization of gas-resources (Okoh 2005).

### *Funding*

The lack of physical infrastructure will at one point require intervention in the natural landscape and is a costly affair. As a digression, the development of Snøhvit (the largest industry development in the North of Norway) had a price tag on NOK 78 billion (Arbo and Hersoug 2010). In other words, significant capital investments are often needed to extract or develop the petroleum resources (NDI 2007). The gas discoveries made by Statoil and Ophir (and BG group) offshore the coast of Lindi and Mtwara are bringing the industry closer to further infrastructure development in Mtwara. Statoil, together with other international operators, is engaged in upgrading the harbour facilities in Mtwara to encompass a modern offshore support base (Statoil 2012). After another discovery in Block 2, these plans are closer to being realized. According to Petro (2012), Statoil has signed an appendix in addition to the PSA, which states the commercial conditions for a possible infrastructural development in the Mtwara. The race is currently between Statoil and BG to become the driver of the development in the area. However, any infrastructural development will require companies to apply for funding, as they cannot afford to take all the costs themselves, according to S. Juel in Statoil. A common option is to apply for IFC funding. The IFC support industries that are

planning to develop petroleum infrastructure. When companies receive support from IFC they are also obliged to follow the IFC standards. This may for instance imply that the costs of economic development not fall “*disproportionately on those who are poor and vulnerable, that the environment is not degraded in the process, and that renewable natural resources are managed sustainably*” (IFC 2012). Subsequently, IFC requires companies to incorporate principles of environmental justice into their operational activities.

### ***Acquisition or access to land areas for infrastructural development***

The coastline represents different interests, ranging from tourist operators, local fishers, local industries, conservational interest and large-scale industrial fishers. The result might be a competing climate between different resource users, and their access to land. Resettlement means that local coastal communities may be forced to move from their homes, or adjust to a new environment close to industry facilities. In the case of Nigeria and its Niger delta, the petroleum operations have raised several clauses of environmental justice and land grabbing. Government officials have been tempted to accept bribes from petroleum companies to enjoy economic gains (Amnesty 2008). In payment, the companies have required access to land. According to Arbo and Hersoug (2010), a lesson seen from Nigeria is that the greater a sector weights in the international economy, the greater are the chances that the government institutions make strategic decisions. Even though most of Tanzania’s petroleum activities are located offshore, local communities along the coast might be affected by infrastructure development and increased traffic in coastal areas. When the gas pipeline from Mtwara to Dar es Salaam was planned, affected communities were pursuant to TPDC (2012) informed about the plans and the GoT has started to pay compensation to those who will be affected by the construction of the pipeline.

## **Link 7: External forces on petroleum resources and infrastructure**

### ***International Obligations***

Under the section on international conventions, examples were given on conventions that the GoT has signed related to protection of environment and prevention of oil spills at sea. The UNFCCC convention, of which Tanzania is a party (Daffa 2010), was established with the objective of stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system (Art.2)

(Fauchald and Tuseth 2010). However, the responsibility to “stabilize” greenhouse gases was given developed countries. Later the Kyoto Protocol has specified these emission reduction commitments further, and given different options for how to reduce emissions. One mechanism is the clean development mechanism (CDM), which allows developed countries (Annex I Parties) to invest in project activities in developing countries that reduces greenhouse gas emissions (Birnie et al. 2009). CDM is based on the principle of common but differentiated responsibilities, implying that the country can lower their abatement costs in a developing country, and at the same time contribute with technology transfer and capacity building (Birnie et al. 2009). A paradox with this initiative is that countries like Norway, which operates as both a petroleum operator (Statoil) and offers petroleum assistance to Tanzanian institutions, might be more motivated to pay for carbon initiatives (e.g. REDD+) to avoid taking responsibility for their emissions at home.

### ***Climate Change***

Changes in weather patterns may affect infrastructure located in coastal areas. The Intergovernmental Panel on Climate Change (IPCC) (in O'Rourke and Connolly 2003) has depicted that these changes in climate, particularly due to burning of fossil fuels, will affect ecosystems and impact poor people around the world. When coastal ecosystems are affected, additional consequences are often placed on fisheries and tourism (Boko et al. 2007). Weak presence of infrastructure, lack of access to technology, alternative income resources and lack of information may create additional challenges with coping with changing weather patterns. Boko et al (2007: 439) states, in their working group to the Fourth Assessment Report of the IPCC, that “*Africa's social and economic development is constrained by climate change which threaten to undermine the integrity of the continent's rich, but fragile ecosystems*”. For instance, the report claims that coral reef bleaching in 1997/1998 resulted in a 30% loss of corals in the Western Indian Ocean region (Boko et al. 2007). This brings in the paradox of the “backside” with burning of fossil fuels. Overall, climate change may pose challenges to infrastructure facilities if weather patterns turns into more extreme events.

## Link 8: External Forces on Petroleum Institutions

Petroleum institutions may experience external forces in form of price fluctuations, migration or “hidden intentions” by petroleum-related assistance programs.

### *Global Price Fluctuations*

In reference to the Tanzanian Production Sharing Agreement on Environment crude oil is valued by competitive international market prices. Large fluctuations in global prices are common, thus, an economy that only depends on petroleum can experience crisis when the world price on petroleum falls (Kolstad and Wiig 2010). When the oil sector emerged in Nigeria, the country focused all attention on the oil sector, which resulted in an overvalued exchange rate that harmed both the agricultural and manufacturing sectors (Dutch disease) (International Alert 2009). Hence, when global prices on oil fell in the 1980's it caused a drastic decline in Nigeria's gross national product (Amunsen 2011). The fall in the price of oil caused Nigeria not to provoke a trade deficit, and the country began foreign borrowing that resulted in the largest public debt of any sub-Saharan state (Alba 2010). To secure itself from such price fluctuations, the Norwegian state created a fund in 1990 to serve as a buffer between changing oil-revenues and yearly state-budgets (Ryggvik 2010; Arbo and Hersoug 2010). Thus, a fund, such as the Petroleum Fund in Norway, could provide an effective check on rent – seeking activity and Dutch disease. President Jakaya Kikwete has expressed that Tanzania would look to other countries which have set aside revenues generated from petroleum resources for investments, often in infrastructure development (Agbroko 2012).

### *Migration*

People from other parts of the country might accelerate the migration trend to the coastal areas; poor people from rural areas that come with expectations of finding a job in the petroleum sector. However, the oil industry is a capital intensive and technological-dependent industry and hires only a few professionalized people. Migration pressures may increase inflation and high cost housing, and increase the competition of areas to settle down. Thus, coastal resources may in such cases have to be shared between more people. Sometimes this causes conflicts between groups, as has been seen in the Niger delta where lack of livelihoods have resulted in conflicts, and even intra – community battles (Duruigbo 2004). Nevertheless, while Nigeria has a long history of civil war and ethnical tensions between minority groups, the Tanzanians have had low levels of conflict (Havnevik and Isinika 2011).

## ***OfD***

By signing the programme agreement, Tanzania is committed to implement programme activities that improve governance of the petroleum sector (NORAD 2012). With ‘improving governance’, the OfD program means “*good governance*” which is at the heart of the program. Some (Shivji 2004; Solli 2011) scientists has criticised the term, and argued that international donors have limited capacity or wrong intentions when they seek to shape behaviour of policy measures in resource dependent countries (Barma et al. 2012). Shivji (2004:4-5), a professor in constitutional law at the UDSM, suggests, “*the governors are accountable to the donors and their consultants and advisors on “good governance”, rather than the people*”. His point is to ask on what political conditions do donor communities impose interventions on the Tanzanian government? Whose interest is at stake? Solli (2011:15) agrees with Shivji (2004) that “*good governance*” after all is a political concept in the way it affects the distribution of power within a country, and argues that: “*Oil for Development is not just a strategy to buy goodwill in countries where Statoil operates or seeks entry. The conditions for countries like Nigeria, Ghana and Angola is today totally different than in Norway during the 1970’s. The problem is that the story of either good or bad governance reduces underdevelopment to a question of capacity in state institutions, and thus, ignores the more important question of who has the power in the state apparatus and which interests a state represents*”. Thus, OfD and similar assistance programs have been blamed for furthering commercial ends, because the assistance agencies often are integrated in foreign ministries and oil industry in the country where the program exerts influence (Kolstad et al. 2008b). However, even though there appear to be no close connection between OfD assistance to and the commercial presence of the dominant Norwegian oil company Statoil, one cannot exclude the fact that commercial interests may play a part.

In other words, the robustness framework may help to illustrate the complexities with understanding the petroleum sector’s benefits and trade-offs, and might serve as a tool for management to take decisions that reduce the sensitivity to a given system output (Anderies et al. 2006).

## 8.3 Adaptive Governance

The above discussions in previous sections illustrate the complexity that is involved in petroleum management, and a need for not seeking detailed knowledge on different parts of a system, but instead improve the dynamics of the systems as a whole (Folke et al. 2005). Adaptive governance has evolved as valuable contribution to participatory management solutions, and its focus is on a long-term vision and learning from experience (Boyd and Folke 2012). It gives communities, policy makers and researchers an opportunity to work together to “*link monitoring at different scales to research and co-production of knowledge*” (Chapin et al. 2009). By actively linking a diverse set of knowledge systems one can learn from each other and avoid past mistakes.

Adaptive governance in the context of the Tanzanian petroleum sector could be used to address the inherent complexity of managing the coastal system. It calls attention to a holistic focus on the complexity in governance systems, and the need to match management actions to this complexity (Duit et al. 2010). In her research on local and global commons Ostrom (2008) has emphasised that resource management should put attention to cooperation between institutional arrangements that are induced from below rather than commanded from above. This requires the use of both scientific and local knowledge in natural resource management (Ostrom 2008). In his book “*Seeing like a State*” (1998), James Scott discusses how states fail to cope with social and ecological diversity when local knowledge is not included in bureaucratic planning. However, when all affected parties are represented in dialogues and decision-making procedures, participation and the possibility to speak for one’s own rights could mediate power asymmetries and problems of communication. Directives from central government institutions might fail when large amounts of money are invested to set up structures and service at the central level, instead of being delivered at the local level (Scott 1998).

### ***Oil Spill Preparedness Planning***

Emergency and preparedness planning is an important component of preparing a SES for increased petroleum activities. This often requires coordination between local communities, municipalities’, regional- and national institutions or organizations, and other international bodies (IPICEA 2006). If preparedness responses are coordinated, it might



become easier to raise awareness of oil spill response capacity and limitations. This requires a good dialogue between institutions and organizations at different levels to share information on the risks associated with the petroleum industry, and on how best to respond to pollution incidents.

Various management initiatives are undertaken at different levels to meet the challenges of potential future oil spill in the coastal environment. At an international level, Tanzania has signed several IMO conventions on oil spill preparedness, and SUMATRA has therefore received training by IMO in 2003 on MARPOL and issues related to preparedness planning (MD 2012). Under the budgets of both the OfD programme and the ESCAP, there is a focus on capacity building in NEMC regarding environmental information management systems, the development of an OSCP and on how to carry out a SEA. OfD has therefore supported NEMC in environmental mapping of the coastline, and now the finalization of the NOSCP. In addition, the WIOMPH, which is a WB-funded regional project that help to protect the sensitive and rich marine and coastal environment, has environmental sensitivity mapping as a central component in their programme. NEMC is the focal point of WIOMPH, and has therefore had a supervisory and coordinating role on the mapping of Tanzania's environmental sensitive areas (ESA). SUMTRA and NEMC have been coordinating this mapping; however the development of an ecosystem valuation methodology and ESA maps has primarily been developed under the work of local experts (Tambwe 2012).

The mapping of sensitive environments might be an important step towards the establishment of the NOSCP, which NEMC currently told they give a high priority. TCMP, which is responsible for the coastal and marine affairs under the umbrella of NEMC, has also participated in the development of a NOSRP, and collaborates closely with SUMATRA and the Tanzanian Port Authority. The programme is responsible for all assignments given to the plan including amendments, reviewing and coordination. The national oil company, TPDC, is likewise involved in the response planning, and is responsible for OSCP for all oil installations, and is therefore working closely with NEMC. According to Anna-Maria Simon, TPDC also works closely with key ministries which include the Ministry of Fisheries and Livestock Development, the Ministry of Natural Resources and Tourism and the Ministry of Water to facilitate issuance of specific environmental clearance for petroleum exploration activities in areas such as marine parks, water sources or game reserves.

### ***OSP by the industry***

Some international petroleum companies, like Statoil, have developed response plans. Statoil has initiated environmental and socio-economic sensitivity mapping of the entire coastline. The map has not yet included other major companies in the region. However, the company has decided to pay special attention to Mafia Island, which was identified as the most vulnerable spot in case any oil spill would happen in their Block 2 offshore (Boye and March 2012). Consequently, Statoil has arranged meetings with local authorities in Mafia and Kilwa on oil spill preparedness, and they have trained MIMP officials on how to respond in case of an oil spill with oil contingency equipment that they have deposited at MIMP's offices. The company has also arranged meetings and workshops where it has shared knowledge on OSRP with NEMC, SUMATRA and TPDC.



**Figure 10: Oil spill response equipment stationed in MIMP. (Photo by: Ian Bryceson).**

### ***Challenges with collaboration***

Even though there exist good intentions regarding the establishment of collaborative linkages between relevant institutions, companies and initiatives, there may be challenges in upholding a fair participation by all parties due to unequal access to resources. For instance, in the ESCAP and the OfD initiatives, TPDC, MEM, TANESCO and NEMC are the implementing institutions. As a result, these institutions have power to decide on how the funding shall be distributed (as both programs are demand-driven) (ESCAP 2011). This raises the question of central institutions ability to reflect what is needed on the local level. According to TCMP, there is a general perception that the central authorities often lack an understanding of the local level, making national laws and regulations that are not always adaptable in practice. Sceptics of the assistance initiatives have therefore argued that in both programmes there is a general perception that the Tanzanian authorities have the will and capacities to manage the petroleum revenues in a good way (Hansen 2006). The study from the REDD+ initiative in the Rufiji delta showed how for instance WWF gained power from aligning itself with the Forestry and Beekeeping division, while resist downwards accountability (Beymer-Farris and Bassett 2012). In line with Ostrom's (2008) studies on resource management, program implementation from above sometimes is redolent with environmental justice that threatens local livelihoods. Customary community ownership and informal rules may not be recognised by institutions or people coming with already fixed solutions from "outside" (Ostrom 2008).

### ***Bridging capacities with common platforms***

There are not only challenges associated with cross-scale collaboration and coordination, but there are also challenges with managing institutions that are dynamic (Folke et al. 2005). Information deficits and lack of transparency, thus, may create problems for effective decision-making processes, and could result in management structures that are unsuited to adjust to changes in the SES over time. The Millennium Ecosystem Assessment (MEA) (2005) recommends a focus on developing institutions that regulate interactions between markets and ecosystems, and promote shared platforms for dialogue and encourage vulnerability assessments that include a wide range of actors.

In this study of Tanzanian institutions, it became clear that WIOMSA focuses on creating platforms of dialogue and knowledge sharing between and across levels and scales. Julius Francis, the Executive Secretary of WIOMSA, expressed that "*the workshops could provide an important platform for different actors in the gas and oil sector to discuss issues of*

*common interest*”. Similarly, IMS works towards regional collaboration and networking with a focus on the inclusion of communities in coastal areas, and the protection of the coastal- and marine environment (IMS 2012). Platforms for collaboration may create opportunities for participation with people possessing different knowledge, which is relevant for the integration of a holistic approach on management. Many different issues may prevail under an oil spill situation, ranging from compensation issues for local communities to pollution mitigation, which raise questions as to who has the role or the responsibility when a spill occurs.

By building arenas or networks, collective action can be induced so that local communities take part in the development of policies, regulations and legislations on oil spill preparedness (Francis and Bryceson 2001; Underdal 2010). Local communities, fishers, scientists and conservationists, may all possess valuable information about the functioning and vulnerability of the Tanzanian coastal and marine ecosystem (Chapin et al. 2009). Their inputs into the response planning process might be critical in order to define the boundaries in which offshore oil development may take place without causing unacceptable damage to the environment and socio- economic activities in the region.

### ***Response actions?***

Jeremiah Daffa, Director of TCMP asked “*are Tanzanian institutions ready to deal with a spill?*” What the governance responses illustrate is that capacity building through collaboration and coordination efforts is now happening in different social networks. Oil spill response preparedness and the capacity to respond in case of an accident might be more likely to succeed, in terms of building resilience, if social networks and adaptive co-management associations are established (Folke et al. 2005). With the inclusion of “on the ground” knowledge local communities may respond more effectively in case of oil spill accidents or other changes in the marine environment. Olsson et al. (2005) argues that for this knowledge to be included, it requires institutional frameworks and social networks of information sharing (Olsson et al. 2005).

The adaptive governance addresses the link between the management system and the SES into which it is embedded, and applies sensitivity to ecosystems by perceiving their full complexity (Olsson et al. 2004; Janssen et al. 2007; Sandström and Rova 2010). Risks could be overcome if management responses enhance learning and adaptation of knowledge between actors. The ESA maps developed of Tanzania’s marine sensitive areas are an example on an outcome of coordinated and collaborative management across scales. What remains to be seen is how the local level could be more actively involved in the evaluations.

**Table 5: A summary of the response actions and addressed challenges to petroleum management in the Tanzanian institutions, Statoil, OfD and ESCAP.**

<b>Institutions</b>	<b>Interest at stake</b>	<b>Response and Planned activities</b>	<b>Limitations / Challenges</b>
<b>TPDC</b>	Increase gas and oil revenues.	Work on issuance of environmental clearance for petroleum activities in marine parks.  Organize an offshore licensing round the 13 <sup>th</sup> to 14 <sup>th</sup> of September 2012, where eight new water sea blocks will be offered.	Monitor Operators' environmental compliance in operation phase in Waste management (offshore operations)  Prepare and manage large accidental oil spills or gas blow outs
<b>NEMC</b>	Advise and supervise on environmental issues	Development of a National Oil Spill Response Contingency Plan (NOSRCp), a hazardous and noxious substance contingency plan (HNSCP) and a national policy on use of dispersants. The NOSRCp and HNSCP are forwarded to the minister for approval, while the policy on use of dispersants is still a draft.  A zone office will be opened in Mtwara since it is a focal point for petroleum activities.  The council has formulated the national gas and oil committee.  Work on strategic environmental impact assessment (upstream, offshore, onshore)  Collaborate with ESCAP on Collaborate with OfD on	Lack of resources hinders the operationalization of the advisory committee.  Lack of funding to accomplish their planned activities.  Limited capacity to undertake EIA's due to increased workload and deficiencies in personnel
<b>TCMP</b>	Protect mangroves, sea-turtles, endangered animals and support coastal communities	Work on an oil contingency plan EIA's	Lack of coordination  Authorities lack local knowledge
<b>SUMATRA</b>	Prepare a national response team in case of an oil spill (emergency centre)	Participated in training related to MARPOL under the auspices of IMO in 2003.	Need for a national response team + the training of employees in monitoring and emergency response centre.
<b>WIOMSA</b>	Provide a platform to bring different actors in the Gas/oil sector to discuss issues of common interest.  Provisional of technical support. Members represent different expertise relevant to Gas/oil sector, which could be sourced when needed to provide technical support. Some members have been involved in Gas/oil activities in their own capacities.	Organize workshops that will bring together different stakeholders to discuss topical issues such impacts of large-scale investments such as Gas/oil and port development on coastal and marine ecosystems.  The roundtable discussion in 2009 was organized jointly with WWF. WIOMSA will continue to work with WWF and other regional organizations in the organization of workshops to discuss topical issues.	Whether a holistic view on petroleum management will be picked up by the GoT.
<b>IRA</b>	Provide expertise on climate,	Offer courses in EIA's.	Need for capacity building

	environmental- and resource management	<p>- Prepares SEA's on behalf of National Authorities.</p> <p>- Prepares EIA's on behalf of the industry.</p> <p>Plans to develop an educational program on petroleum related issues.</p>	with other education programs on petroleum issues.
<b>IMS</b>	<p>Confront regional collaboration on marine science</p> <p>Inclusion of local communities in coastal areas</p> <p>Protect the marine environment</p>	Offer advisory of consultancy services on marine matters.	Experts on the marine and coastal environment in Tanzania should be included in decisions that will affect these ecosystems and resources.
<b>STATOIL</b>	Increased revenue, but with corporate responsibility	<p>Capacity building: Open meetings, workshops (on oil response plans), communicate how things work on a rig.</p> <p>Developed an OSRP and an ERA. Oil Response equipment on Mafia Island.</p> <p>Meetings in Dar es Salaam, Mafia and Kilwa on Statoil's preparedness and OSRP.</p> <p>Trained employees in Mafia Marine Park, and trained employees at the Mtwara base.</p> <p>A helicopter with dispersants stationed in Dar es Salaam, in case of an oil spill</p> <p>Developed a sensitivity map in cooperation with local environmental industries, UDSM and other consultant agencies.</p> <p>Carries out a sensitivity index to identify the marine life in Zafarani area.</p> <p>Plan on developing a wildlife plan.</p> <p>Together with other international operators engaged in upgrading the harbour facilities in Mtwara to encompass a modern offshore support base.</p>	<p>Technical challenges in Tanzania:</p> <p>Lack of standards on use of dispersants.</p> <p>Competent authorities on technical issues.</p>
<b>OfD</b>	Supply Tanzanian institutions with Norwegian competence on petroleum management	<p>Train people in relevant institutions and the industry by arranging workshop. According to MoE a workshop is planned in September.</p> <p>Give technical support from NPD, MPE, MoE, PSA, Petrad and Norwegian Universities.</p> <p>Assist on the finalization of NOSCP, operationalization of a petroleum advisory committee and gather information on critical ecosystems.</p>	<p>The experts hired in get too involved? Supposed to be a demand-driven program.</p> <p>Motives</p> <p>Too focused on strengthening institutions at the national level?</p>

<b>ESCAP</b>	Give assistance loan to strengthen GoT capacities to develop the gas resources.	<p>Support NEMC with the NOSCP and the SEA and the development of community based warning systems.</p> <p>Strengthen communication of impacts from the industry.</p> <p>Develop training programs and create access to education.</p>	Too focused on strengthening institutions at the national level?
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## 9.0 CONCLUSION AND FUTURE SCENARIOS

### 9.1 Conclusion

This study has attempted to illustrate some of the complexities associated with socio-economic and environmental aspects of petroleum sector development in Tanzania. Attention has been focused on institutions, companies and petroleum-related assistance programs that are involved in the Tanzanian petroleum sector, and how rights and responsibilities are shared between these. Findings indicated that the governmental institutions (NEMC, TCMP, TPDC and SUMATRA) lack financial and human resources to adequately fulfil all their responsibilities with respect to petroleum sector management. Current focus in these government institutions seemed to be focused on the NOSCP and mapping of the ESA in case of future oil spills in the coastal areas. Concerns were raised as to how a future oil spill could be handled when institutional capacities are weak. The research association WIOMSA expressed the importance of future coordination and capacity building on petroleum issues, for instance on how to handle large oil spills, and were planning to organize workshops for discussion on the issue.

Findings further revealed that one bilateral and one multilateral program agreement, OfD and ESCAP, were in the planning process to assist Tanzanian institutions on resource and environmental management of the sector, in particular NEMC, TPDC and SUMATRA. In addition, collaboration with the UDSM on establishing a program for petroleum education and training is planned. The oil companies, in this study represented by Statoil, emphasised that the lack of standards and lack of competent authorities on technical issues made it a challenge to do business in the country.

The comprehensive approach applied by using concepts of resilience, vulnerability and robustness has attempted to show that these are concepts and analytical tools useful for addressing complex interactions in petroleum management. Focus has been on socio-economic factors that seemed significant in responding to a new petroleum sector in Tanzania, and how these linked institutions with ecosystems and social learning. Wealth disparity and inequality, corruption, disregard for people's rights, and lack of regulations have been discussed as factors that may contribute to negative development tracks, while cooperation and coordination, transparency, capacity building, and environmental justice could possibly enrich a healthy extractive environment in a long-term perspective.



In addition, factors that may enhance or detract from robustness in key institutions were analysed to better understand the overall robustness of the management system. This involved issues of funding and infrastructure development, access to financial and human resources, external forces and their possible effects on infrastructure and institutions, and regulations for operations in the sector crucial for the effective utilization of petroleum resources. Thus, future infrastructural development might exacerbate biodiversity loss and cause displacement of communities. People living along the coast are likely to experience the building of industrial infrastructure close to their homes, farms and resources.

Without dialogue and coordination between different levels of management it might be easier for foreign companies and state agencies to capture control over petroleum resources in the short-term, and to leave the poor even more vulnerable. Adaptive governance has thus been suggested as a management strategy that could potentially shift human conflict and competing interests towards cooperation. In a process where dialogue is practiced genuinely, groups could have the opportunity to think holistically and learn about social–ecological interactions from different perspectives. Whereas emergency planning seems to be high on the agenda, social networks of collaboration on oil spill preparedness could be traced. Overall, knowledge-sharing between institutions and other actors across levels may result in valuable discussions about the challenges with petroleum sector development and how to transform conflicting interests into effective and sustained collective action.

James Scott's (1998:7) quote summarises the conclusion of this thesis quite well, "*I'm making a case about resources of both social and natural diversity, and a strong case for the limits, in principle, of what we are likely to know about complex, functioning order*". Thus, managing petroleum resources in isolation from other socio-economic and environmental factors in the coastal system may influence long-term resilience.

## 9.2 Future Scenarios

Petroleum sector development in Tanzania may result in both a "blessing" and a "curse". The industry can create job opportunities and welfare services as it did in Norway, while on the other hand, increase corruption and exacerbate risks to local communities and the natural environment, as has been evident in Nigeria (Duruigbo 2004; Okoh 2005; Amnesty 2008). Experiences from other resource rich countries may provide some considerations on how to succeed or not succeed in petroleum management. Norway has often been pictured as a success

story where revenues from oil have contributed to overall welfare of the population. However, even though Norway has been pictured as a “front example”, Steven (2003), professor at the Centre for Energy, Petroleum, Mineral Law and Policy at Dundee University, emphasizes that “*no country got it all right at all time*”. Norway did not adopt any simple textbook solutions, but its experience was rather more complex and dependent on timing and history (Steven 2003). Frankel (2010: 12) argues, “*It is not that countries with petroleum wealth will necessarily achieve worse performance than those without. The question is how to make best use of the resource; the goal is to be a Norway rather than a Nigeria*”. The question then tears down to how Tanzania can avoid the ecological crisis and unsustainable trajectory that happened in Nigeria. With petroleum facilities located far out the sea, and little history of violence a Nigerian style scenario may not be predicted in Tanzania.

#### ***Access to land and coastal resources***

According to McNeish and Logan (2012) focus on the curse has shifted away impacts of imperialism and inefficiency in state planning and state institutions. The reality is often far more complex (Scott 1998). Several factors may challenge a resilient coastal system and long-term benefits for the Tanzanian population. Honey (2008) argues how ecotourism in Tanzania has delegated large areas of land to the industry, while the GoT has refused to grant local management rights over resources. Accordingly, the GoT and companies have cashed in on tourism, while little has been done to curb corruption (Honey 2008). In other words, access to control and management of resources in a system might be negatively influenced by lack of cooperation and unaddressed corruption. Bermey-Farris and Bassett (2012) and Benjaminsen and Bryceson (2012) have similarly illustrated how international initiatives and GoT have used power to grab control over coastal areas where local people have lived for centuries. In both Rufji and Mafia, the locals have been commanded from their land and deprived access to the natural resources that their livelihoods depend on (Bermey-Farris and Bassett 2012; Benjaminsen and Bryceson 2012). Could the petroleum development create similar scenarios? Most of the petroleum explorations are located in offshore areas, which makes it less likely that local communities land rights will be directly affected. However, some infrastructure, such as an LNG plant and pipelines to transfer, will be needed to move from the exploration and drilling stages to processing and production (Statoil 2012). The planned pipeline from Mtwara to Dar es Salaam may create power generation for thousands of homes.

### ***Corruption or transparency?***

With new opportunities for revenue streams from gas reserves in southeastern parts of Tanzania, some may concern that temptation for rent – seeking behaviour and short-term thinking could be exacerbated. Large and unregulated inflows of funds into the government accounts’ might serve as great temptation for those in power with access and information on resource use.

Lack of transparency in oil contracts and information released to the public sometimes lead to corruption or financial losses, as happened to contracts signed in the mineral industry in the past (Lange 2009). Could the parliament require the GoT to disclose the details of petroleum contracts? Semboja and Kabwe (2012) have criticized the Product Sharing Agreement for being silent on whether the indigenous population or natives have legal right of ownership of their land and petroleum resources explored or exploited. They have argued that poor people are easily losing the battle if the government does not take responsibility and create a legal framework that secures a fair share of the revenues. In Norway the inclusion of “local content” was an explicit element in concession policies, such as requirements to invest in research and development projects to broaden education on petroleum issues. The companies that offered best investments in Norwegian research and preferential treatment for locally based companies were favoured in concession rounds.

On recommendations from PWYP, the GoT has called upon to ensure that every Tanzanian is well - informed on the on-going petroleum exploration and development (Andrew 2012). The NDI report on “Transparency and Accountability in Africa’s Extractive Industries” (2007:8) underlines that the interests of the citizens should be taken into account, “*from environmental concerns at the local level to the allocation of revenues collected by the government*”. As an effect, openness may create trust among the citizens. Some moves are already taken; TPDC plans to arrange open bidding rounds on 8 blocks offshore in September 2012 (TPDC 2012). In addition, President Kikwete announced recently that the GoT plans to put up a sovereign wealth fund to ensure that the revenues from petroleum benefit the people (Abroko 2012).

### ***The way forward***

Projected revenues and possible power generation from gas discoveries might provide a potential scenario for financing Tanzania’s development. IMF has highlighted that Tanzania has potential for becoming a major producer of gas by 2020 (Dennys 2012). Increasing the energy supply to the population could be important for national development and economic growth. The Medium Term Strategic Plan 2012/13 – 2015/ 16 launched by MEM promise an increase access to modern energy services, particularly to rural communities in an environmental friendly manner.

However, poverty may not be solved by energy supply alone. Land ownership and rights to resources are of primary concern to people (Lange 2009). Local communities are the closest to be affected by both infrastructural developments and pollution in the coastal and marine environment. Thus, management strategies that include cooperation across scales may over time increase participation, and thus, the resilience of the coastal system.

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## 11.0 APPENDICIES

### **APPENDIX A**

Websites for Tanzanian institutions:

TPDC (2012): <http://www.tpsc-tz.com/tpdc/>

NEMC (2012): <http://www.nemc.or.tz/>

SUMATRA (2012): <http://www.sumatra.or.tz/>

TCMP (2012): <http://www.tcmptz.org/>

IMS (2012): <http://www.ims.udsm.ac.tz/>

IRA (2012): <http://www.ira.udsm.ac.tz/>

WIOMSA (2012): <http://wiomsa.net/>

### **APPENDIX B**

Websites for Norwegian Institutions and other international institutions:

NORAD (2012): <http://www.norad.no/no/tema/energi/olje-for-utvikling/olje-for-utvikling>

OED (2012): <http://www.regjeringen.no/nb/dep/oed.html?id=750>

STATOIL (2012): <http://www.statoil.com/no/Pages/default.aspx>

IFC (2012):

[http://www1.ifc.org/wps/wcm/connect/corp\\_ext\\_content/ifc\\_external\\_corporate\\_site/home](http://www1.ifc.org/wps/wcm/connect/corp_ext_content/ifc_external_corporate_site/home)



ESCAP (2012): <http://www.unescap.org/>

WB (2012): [www.wb.org](http://www.wb.org)

## **APPENDIX C**

**TPDC efforts to minimize possible negative effects on coastal- environments and livelihoods. The following are best practices that TPDC insist/ advises oil and gas operators to observe during operations in coastal and marine waters in Tanzania.**

1. Respect a defined distance between the survey vessel and fishing areas.
2. Prepare Company Specific Oil Spill Contingency Plan (OSCP)  
Comprehensive OSCP, including arrangements for mobilization of external resources required be in place prior to drilling in the unlikely event of a major oil or fuel spill during drilling.
3. Inclusion of NO GO zones for Oil and Gas exploration and production such as National parks, coral reefs and sensitive sea areas such as mangroves and certain estuaries  
Allow independent observers onboard the seismic surveying vessels and drilling ships (observers from Fisheries Department, NEMC and TPDC)
4. Avoid Disturbance to Sensitive Ecology in offshore operations
  - Pre-drilling survey carried out by Remote Operated vessels and site inspections at drill locations and navigation routes
  - Provide seabed images that will be provided to NEMC for monitoring purposes.
  - Records kept of whale sighting and other species of concern.
  - Route adjustments to deviate around high valued features/habitats and significant/sensitive areas.
5. Advocate environmental friendly ways of Offshore Waste Management (Managing of 3 Types Of Wastes)
  - (a ) Waste from Drilling mud and cuttings
    - Water Based Management 8 in % and drilled cuttings from Upper hole section 500m: Discharged onto seabed at end of each well (customary practices in offshore industry)
    - Synthesized Oil Based Mud and drilled cuttings from lower hole sections: treated to reduce oil to the level of 6.9% Hydrocarbon base and 9.4% for ester base. Discharged at the well location directly into the sea (Discharged to sea at well location following treatment with solids control equipment's)
  - (b ) Waste from Drilling rig and support ships
    - Waste separation and segregated transported to Mtwara port and disposed according to Operators Waste management Plan. Currently there is a modern incinerator built in Mtwara and operated by SBS.

- (c) Mud Plant wastes
- Disposal designed under separate EIA according to Operators Waste Management Plan