A CRITICAL APPRAISAL OF THE CONSIDERATION OF BIODIVERSITY ISSUES IN ENVIRONMENTAL IMPACT ASSESSMENT IN BELIZE

by

100074067

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School of Environmental Sciences
University of East Anglia
University Plain
Norwich
NR4 7TJ

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Abstract

Environmental impact assessment (EIA) is a requirement in Belize for projects that may have significant impacts on the environment. Although the country has approximately 25 years of experience with the EIA system, the consideration of biodiversity in Belize’s EIA reports has not been explored before. This study adopts a review checklist method that examines a stratified random sample of 39 EIAs produced between 1995 and 2014 in order to determine the extent to which biodiversity issues are considered. The results reveal that approximately 60% of Belize’s EIA reports consider biodiversity issues at a satisfactory level. The results also highlight several shortcoming which are commonly found in other similar reviews of EIA reports in other countries. Key findings include a lack of adequate survey methods, a lack of details regarding alternatives, mitigation measures and monitoring, a lack of impact prediction methods and a lack of consideration of protected areas management plans. Furthermore, the results suggest that EIA reports often focus on delivering the information required by the EIA Regulations and the Terms of Reference (TOR). However, the information is often vaguely presented and issues are inadequately addressed.
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**Acronyms and Abbreviations**

CBD – Convention on Biological Diversity

CBO – Community Based Organization

DOE – Department of the Environment

EBI – Ecological and Biodiversity Assessment Index

EIA – Ecological Impact Assessment

ECP – Environmental Compliance Plan

EIA – Environmental Impact Assessment

EPA – Environmental Protection Act

EU – European Union

GOB – Government of Belize

IA – Impact Assessment

IEEM – Institute of Ecology and Environmental Management

IUCN - International Union for Conservation of Nature

LLES – Limited Level Environmental Study

NEAC – National Environmental Appraisal Committee

NEPA – National Environmental Protection Act

NGO – Non-governmental Organization

TOR – Terms of Reference
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1 Introduction

"In a world of increasing globalization and environmental degradation, management of its most precious living resource, biological diversity, is one of the most important and critical challenges facing humankind today." (Secretariat of the Convention on Biological Diversity, 2000)

1.1 Biodiversity and the CBD

Biodiversity is the variety within and between all species of plants, animals and micro-organisms and the ecosystems within which they live and interact (WWF, 2015). This natural resource is locally and globally important, as it provides the goods and services needed for our existence. However, despite our intricate dependence on biodiversity, human activity has long been drastically degrading the environment, leading to significant losses in biodiversity.

Although concern for the environment has been constant in history, it is in 1992 that efforts for the global conservation and sustainable use of biodiversity began. That year, the Convention on Biological Diversity (CBD) became the first treaty to legally hold countries accountable in addressing biodiversity issues. The treaty’s main goals are to conserve biodiversity, to sustainably use biodiversity components, and to equitably share benefits from the use of biodiversity components (Secretariat of the Convention on Biological Diversity, 2000). To achieve these goals the treaty recognizes the use of several strategies.

One of the strategies recognized in the CBD to help achieve its goals is that of environmental impact assessment (EIA) (Secretariat of the Convention on Biological Diversity and Netherlands Commission for Environmental Assessment, 2006). This strategy encompasses the study of development projects in an effort to identify and mitigate their impacts before allowing clearance for construction. For this reason, environmental impact assessment systems have been embedded in the ‘sustainable development’ agendas of many countries, as they endeavour to ensure their development is with the goals of the CBD.

1.2 Biodiversity and EIA

Impact assessment is at the forefront of sustainable development agendas. The EIA system typically includes a formal study of the potential environmental consequences of a project or development action with the objective to address and report these consequences (Glasson et al., 2012). This study is presented and submitted as a document to decision makers who are entrusted to make informed decisions that prevent avoidable losses of environmental resources.
It appears however, that biodiversity loss, avoidable or not, is not slowing. In his analysis of 31 indicators of the state of biodiversity, Butchart et al. (2010) found no significant reductions in the rate of biodiversity loss. Moreover, there were no reductions in the indicators of pressure on biodiversity, such as resource consumption. This suggests that efforts to curb biodiversity loss are failing. One of those efforts may be the EIA system. Although the CBD entrusted EIA as a prevention mechanism, there is a growing body of work that shows that EIA often fails to adequately address biodiversity issues (Glasson et al., 2012, Gontier et al., 2006, CBD Secretariat, 2015).

The appraisal of EIA reports for many countries show that biodiversity issues are not always considered at satisfactory levels. Issues in EIA that have been brought to light include the lack of adequate baseline data, a lack of survey methods and lack of site-specific and updated data (Thompson et al., 1997, Vun et al., 2004). These issues have led to the poor quality of many EIA reports in several countries, regardless of their number of years of experience with the EIA system. As a result, in both the developed and developing countries, there is a growing lack of trust in the EIA system and its ability to consider the biodiversity-related impacts in the way it is intended to.

1.3 Biodiversity and EIA in Belize

A small, developing country that is a haven for biodiversity is Belize. Committed to conserve its natural and cultural environment, Belize has established 103 protected areas. Within it natural environment and its National Protected Areas System, Belize embraces more than 150 species of mammals, 540 species of birds, 151 species of amphibians and reptiles, nearly 600 species of freshwater and marine fishes, and 3,408 species of vascular plants (Ministry of Forestry & Fisheries and Sustainable Development, 2014). Belize’s Maya Golden Landscape forms part of the Mesoamerican Biological Corridor, an unbroken stretch of broadleaf forest that hosts over 45 globally threatened species and at least 18 endemic species (FFI, 2015).

Belize also embraces the largest unbroken barrier reef in the western hemisphere. Within it there are seven sites (totalling 96,300 hectares) which have been declared a United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Heritage Site because of their rich biodiversity and global importance. Of global importance as well are the large lagoons and forest-lined creeks of the Crooked Tree Wildlife Sanctuary which are an important wetland recognised as a RAMSAR site for their support to rich populations of waterbirds.
Inescapably, Belize’s natural environment faces degradation from human activity, especially from agricultural expansion, housing and tourism (FFI, 2015, Ministry of Forestry & Fisheries and Sustainable Development, 2014). Tropical forests such as that of Belize are considered to contain the highest levels of genetic and species diversity (Slingenberg et al., 2009) and so far forest cover in the country decreased by 11.26% between 1989 and 2012 (Cherington et al., 2012). In its marine environment, coastal and caye development have been cited as one of the key impacts to marine protected areas (Walker and Walker, 2011). Consequently, any loss of marine or terrestrial resources leads to displacement of flora and fauna and significant loss of biodiversity. This loss, it seems, is prevalent despite the provisions in place for the protection and sustainable use of natural resources in the country.

One of the systems in place for biodiversity conservation is the Environmental Protection Act (EPA), a comprehensive piece of legislation which established the Department of Environment (DOE) and mandated it to manage the EIA system within the country. The EIA system requires for all development projects with potential significant environmental effects to be screened by the DOE. If the DOE determines that an EIA is required, it must “identify and evaluate the effects on human beings, flora and fauna, soil, water, air and climatic factors, material assets including cultural heritage and landscape, natural resources, ecological balance and any other factors which need to be taken into account” (Department of the Environment, 2011, p. 8). The consideration of flora and fauna is vital for the identification of impacts on biodiversity. However, despite the EIA system being in place for over 20 years, there is no information about the extent to which biodiversity issues are considered in Belize’s EIA reports.

Given the considerable criticisms levied on the consideration of biodiversity issues in EIA, the overarching aim of this research is to review a stratified random sample of EIA reports in Belize using a strategic checklist that will help to identify the extent to which biodiversity issues are considered. The review will include reports from the year 1995, when the EIA legislation in Belize was enforced, to the year 2014. A further step will involve the structured interview of a random sample of organizations (CBOs and NGOs) that manage protected areas in Belize to gather their insight about strength and weaknesses of the EIA system in the context of the system's consideration of biodiversity in the country.
2 Literature Review

2.1 Purposes of EIA

Environmental impact assessment (EIA) is an important environmental policy and management tool. Its basic philosophy and principles, founded in the US National Environmental Protection Act of 1970, is to “promote efforts which will prevent or eliminate damage to the environment and biosphere”. Such efforts have traditionally been the focus of international agreements and conventions that address global issues of climate change, loss of biodiversity, threats to freshwater sources, threats to water quality, damage to marine areas and other forms of environmental change (Morgan, 2012). However, in addition to the consideration of these natural and biophysical elements of the environment, EIA practice has begun to consider other elements that affect human quality of life such as social, health and economic impacts (United Nations Environment Programme, 2002). Despite the widening of its scope, the main purposes of EIA remain constant.

Glasson et al. (2012) describe four purposes of the EIA system. Firstly, EIA is an aid to clear and structured decision-making by environmental authorities. Within the EIA system, environmental authorities are entrusted to make the best decisions for the environment regarding proposed development projects and their impacts. Secondly, EIA is an aid to the formulations of development actions. For example, when EIA reports are submitted, the environmental authority can negotiate with developers to implement ‘greener’ technologies or solutions in the design of projects. Thirdly, EIA is a vehicle for public participation. It gives provision for the consultation and participation of communities and stakeholders in the planning and development process. This enables the public participants to be aware of potential effects of the project and to assist in the consideration of alternatives to the design and location of the project in an effort to ensure minimum impacts on the environment. Lastly, EIA is an instrument for sustainable development. Although it is a complex concept, the general aim of sustainable development is to strike a balance in the relationship between humans and the planet (Hopwood et al., 2005). In this capacity, the EIA system seeks to prevent or mitigate harmful effects of projects before they occur, thereby applying the principle ‘prevention is better than cure’. But to what extent is EIA achieving its purposes? This is the question addressed in many studies examining EIA quality. After all, good quality EIA reports are one of the main preconditions to ensuring EIA is on good standing to achieving its purposes.
2.2 Quality in EIA

There is significant discussion in the literature about the quality of EIA. Studies have examined EIA reports in many countries to identify trends in quality. The studies have shown that overall EIA quality differs across countries or regions but that general trends exist. The first trend is that the proportion of satisfactory reports is often 50% or more. The second trend is that the strongest performance is often found in the descriptive components of the EIA report and weakest performance is often found in its analytical components. These trends can be seen in the studies of overall quality of EIA reports for both developed and developing countries.

In their review of a sample of EIA reports for eight EU countries, Barker and Wood (1999) found the overall proportion of ‘satisfactory’ EIA reports reports for the years 1994-1996 was 71%. The results showed that the descriptive components – description of the environment and communication of results – had the strongest performance while the analytical components – identification and evaluation of impacts alongside the identification of mitigation measures and monitoring – had the poorest performance. Likewise, Canelas et al. (2005) found that the proportion of ‘satisfactory’ EIA reports in Spain and Portugal for the years 1990-2003 was 65% and 78%, respectively, and that the strongest performance was on the descriptive components of the reports – the description of the environment likely to be affected and the description of the project. Furthermore, in Bangladesh, Kabir and Momtaz (2012) found that 66% of sampled EIA reports performed tasks at ‘satisfactory’ levels. Badr et al. (2011) also found that in Egypt about 69% of sampled EIA reports were ‘satisfactory’. For both Bangladesh and Egypt, the shortcomings were found in the analytical components of the EIA reports such as impact prediction, significance evaluation, and consideration of alternatives.

The shortcomings in EIA have been extensively studied. One of the main areas of focus of the studies is the consideration of biodiversity in EIA reports. It is widely established in EIA regulations across the globe for a chapter in EIA reports to study the impacts of a proposal on flora and fauna components. This chapter, which is the focus of this study, is often generally presented as an Ecological Impact Assessment (EcIA).

2.3 Consideration of Biodiversity in EIA

The ecological impact assessment (EcIA) chapter in EIA is meant to predict biodiversity impacts in order to design practical mitigation measures (Wale and Yalew, 2010). It is important for ensuring “the best possible outcomes for biodiversity from land use changes” (Institute of Ecology and Environmental Management, 2006, p. 6). The level and type of information
required in these chapters vary according to legislation in different countries. However, a review of literature suggests that there are some practices of EcIA that are considered sound and are adapted universally. These ‘sound practices’ are the basis for checklists used in many studies that examine the extent to which biodiversity is considered in EIA. A review of these practices is presented next, as they form the basis of the checklist used in this study.

2.3.1 The Proposed Project

One of the key components of EIA is the description of the project or development. This component is required to be clear and concise, avoiding the over-use of technical language to ensure that it’s easy to understand by non-experts in the project’s technical field. In this component, the report should contain a description of the project’s phases, purpose, location, size and lifetime, including possible decommissioning (Department of the Environment, 1995). Phases include the sequence of development within construction, operation and possible decommissioning. Furthermore, there should be a description of the activities likely to cause impacts such as the type and volume of emissions (Institute of Ecology and Environmental Management, 2006). These can also be linked to the phases of development.

2.3.2 The Impacted Environment

Another component of an EIA is the description of the key ecological elements of flora and fauna likely to be affected. The IEEM’s Guideline for Ecological Impact Assessment in the United Kingdom recommends for the establishment of a zone of influence within which the spatial and temporal scope must be considered. This establishment of boundaries should include areas that can be affected directly or indirectly. Furthermore, this component should identify the quality of habitats and communities, as well as the distribution and abundance of key ecological receptors identified (Byron et al., 2000, Institute of Ecology and Environmental Management, 2006). This can be achieved using rigorous surveys and background sources (Morris and Therivel, 2009). All background sources used should be cited in the report.

The report should also contain a review of national and international policies and plans that may have implications on the project (Department of the Environment, 1995). This may include development plans at the district levels. The report should demonstrate awareness of these policies and plans in context of environmental impacts, and how they have been taken into account. Also for this component, it is required that the public be consulted, especially when impacts are imminent on natural resources that benefit communities (Institute of Ecology and Environmental Management, 2006).
2.3.3 Assessment of Effects

The EIA report must also provide the necessary data to assess the likely effects of proposals. This is achieved through the identification and analysis of impacts. Having identified the activities likely to have environmental impacts, the characteristics of the impacts must be assessed. Widely acknowledged characteristics include the nature of impacts, whether it is positive, negative, direct, indirect or cumulative; the duration of impacts, whether it is short term, long term, intermittent, continuous; the permanence of the impacts, whether it is permanent or temporary, and the significance of impacts (United Nations Environment Programme, 2002). Accordingly, impacts must also be presented in qualitative and quantitative formats (Atkinson et al., 2000).

The CBD defines biodiversity at three different levels – species, ecosystem and genetic. Atkinson et al. (2000) indicates in his checklist that impacts on biodiversity must also be considered at these three levels. Some examples of impacts on biodiversity at the ecosystem level include fragmentation of natural habitats, loss of wetlands, loss of riparian forests and loss of wetland. For the species level, examples of biodiversity impacts are impacts to ecologically sensitive species or elimination of native flora and fauna. At the genetic level, biodiversity impacts can occur, for example, if there is pressure of inbreeding especially due to the isolation of small group of species.

2.3.4 Alternatives, Mitigation and Monitoring

Three other important components of EIA are the examination of alternatives and mitigation measures and the proposal of monitoring actions to ensure minimum impacts on the environment.

The examination of alternatives for projects requiring an EIA is stipulated in the CBD text. Accordingly, alternatives are to be considered and their impacts, costs and benefits analyzed (Secretariat of the Convention on Biological Diversity and Netherlands Commission for Environmental Assessment, 2006). Alternatives in EIA are often considered for the siting of a project. For example, if the project site is in a sensitive habitat or too near to a designated site, then alternative sites must be considered that will allow the project to proceed with less impacts. However, some projects are not able to consider the option of alternative sites because of the uniqueness of the selected site. For example, an alternative site suitable for gold mining may not be easily found. Such sites can consider other types of alternatives.
Other alternatives can be considered for different aspects of the project itself, such as the design, processes and other means to achieving the project’s objectives (Department of the Environment, 1995). Steinemann (2001) suggests that, ideally, EIA should consider the alternative approach to meeting the project’s objectives and not just focus on alternative designs. Another alternative that can be considered is the ‘no-action alternative’. This alternative can be interpreted in two ways: ‘no change’ or ‘no activity’ (Steinemann, 2001). A decision can be made for an aquaculture facility to continue its current ongoing activities without ‘no change’. The ‘no activity’, however, involves a decision not to build an aquaculture facility. Either of these forms of alternatives are important to ensure that the project has the least impact on the environment. However, where impacts cannot be addressed by alternative sites and project design, mitigation measures must be considered.

The purpose of impact mitigation is to either avoid impacts at a source, reduce impacts and/or remedy impacts (Morris and Therivel, 2009). Impact mitigation measures must be effectively planned by ensuring that they do not transfer impacts from one receptor to another (Glasson et al., 2012). Treweek (1996) acknowledges that the need for mitigation measures to be implemented for impacts such as habitat loss, species loss and pollution is a critical and widely accepted aspect of EIA. Accordingly, priority should be given to reducing impacts at the source. For example, mitigation measures should be incorporated while refining a project with the selection of alternatives to design or location. However, if impacts cannot be avoided, mitigation measures should again be sought to ensure that impacts can at least be reduced to the point they are no longer significant (Institute of Ecology and Environmental Management, 2006). Finally, EIA reports should include the details of the mitigation measures adapted and their likely success.

The Institute of Ecology and Environmental Management (2006) positions that an EcIA should make provision for monitoring to gather feedback about the success of mitigation measures implemented as well as their ecological outcomes. This is especially important where mitigation measures are part of planning obligations and the developer is responsible for their implementation. Treweek (1996) stated that “monitoring of project impacts is essential if ecological predictions are to be improved” (p. 196). This is because monitoring can assist in assessing mitigation measures and their likely success so that those measures that are successful can be ‘endorsed’ by ecologists and used with a higher level of confidence for other projects. Thus, monitoring is necessary in order to identify the effectiveness of mitigation.
measures in the long-term (Thompson et al., 1997), and to study the consequences of projects over time (Treweek, 1996).

2.4.5 Strengths and Weaknesses

A large body of literature exists on the critical appraisal of biodiversity issues in environmental impact assessment. However, researchers tend to focus on the deficiencies and inadequacies found. For this reason, the strengths of EIA in considering biodiversity are least described. In terms of the overall quality of EIA reports, strong performance is usually found in the descriptive components of the EIA, such as the description of the project and environment (Samarakoon and Rowan, 2008, Sandham and Pretorius, 2008). However, the weakest performance is found in the areas of the EcIA requiring scientific data gathering and analysis.

One of the weakest areas of performance in EcIA is found in the low quality of baseline data, especially regarding surveys undertaken and background sources uses. Surveys are commonly criticized for their focus on broad categories of habitats for flora (Samarakoon and Rowan, 2008) and large mammals for fauna (Thompson et al., 1997). Survey methods are also often not specified nor reasons for their selection stated (Vun et al., 2004). Even when vaguely specified, the survey methods are often inappropriate for the species being surveyed (Thompson et al., 1997). For example, opportunistic sighting of fauna during vegetation surveys is not an appropriate survey method for fauna. Alternatively, when surveys are not undertaken, the use of background sources becomes the focus for baseline data, which has also been criticized for shortcomings. Because surveys are often done for a specific purpose and are site-specific, using them for another purpose and for a different site affects its validity. Thus, using them for different purpose in EIA is of concern to ecologists since it forms the basis for impact prediction.

Other weaknesses include the lack of adequate impact prediction methods. Impact prediction has been criticized for its vague methods and techniques (Kabir and Momtaz, 2012), and its inadequate coverage of impacts (Thompson et al., 1997). Another weakness is found in the limited coverage of alternatives (Treweek, 1996), the lack of detail regarding the implementation, feasibility and reliability of mitigation measures (Barker and Wood, 1999, Byron, 2000), and the lack of details about monitoring such as criteria, indicators, frequency and limitations (Khera and Kumar, 2010).
2.4 EIA in Belize

2.4.1 Legislative Context

The EIA Regulations are stipulated under sections 20 to 22 in the Environmental Protection Act (EPA) as well as the National Lands Act and the Mines and Minerals Act. Although the EPA was revised in 2000 and amended in 2009, the EIA regulation was amended in 2007. Under the EIA Regulations, any public or private project with potential to have significant impacts on the environment must have an EIA submitted to the Department of Environment for screening. Failure to carry out an EIA can result in a fine of BZ$25,000. If a project is started without an EIA, the EPA makes provision for the DOE to apply to the Supreme Court for an injunction and subsequent actions can be undertaken for any loss or damage caused by the project.

2.4.2 Minimum Requirements of an EIA

The minimum requirements of an EIA in Belize is similar to that of other countries, within which ‘sound practice’ is also incorporated (table 1).

Table 1: Minimum Requirements of an EIA in Belize (Department of the Environment, 2011).

<table>
<thead>
<tr>
<th>Minimum Requirements of an EIA in Belize</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. The physical characteristics of the proposed development, the land use requirements during the construction and operational phase.</td>
</tr>
<tr>
<td>b. The main characteristics of the production processes proposed, including the nature and quality of the materials to be used.</td>
</tr>
<tr>
<td>c. The estimated type and quantity of expected residue and emissions (including pollutants of water, air, or soil, noise, vibration, light, heat and radiation) resulting from the proposed development when in operation.</td>
</tr>
<tr>
<td>d. The main alternatives (in outline), if any, studied by the applicant, appellant or authority and an indication of the main reasons for choosing the development proposed, taking into account the environmental effects.</td>
</tr>
<tr>
<td>e. The likely significant direct and indirect effects on the environment by the development proposed which may result from:</td>
</tr>
<tr>
<td>a. The use of natural resources;</td>
</tr>
<tr>
<td>b. The emission of pollutants, the creation of nuisances, and the elimination of waste;</td>
</tr>
<tr>
<td>c. These &quot;effects&quot; include secondary, cumulative, short, medium and long term, temporary, positive and negative effects.</td>
</tr>
</tbody>
</table>
f. The forecasting methods used to assess any impact on the environment about which information is given under sub-paragraph (e);

g. Any difficulties, such as technical deficiencies or lack of know-how, encountered in compiling any specified information.

2.4.3 Required Contents of an EIA

The required contents of an EIA in Belize are stipulated in chapter 15 of the EIA Regulations of 1995. Although the sequence may be similar to that of other countries in the region, it differs from that of other countries such as the UK. In the UK, EIA chapters are named after the components of the environment that were scoped in. For example, there is a chapter on flora and fauna where all impacts on flora and fauna are addressed. However, in Belize, flora and fauna has its own chapter where baseline data and impacts are presented but impacts on flora and fauna are also addressed in other chapters as well.

Table 2: Required Contents of an EIA (Department of the Environment, 2011).

<table>
<thead>
<tr>
<th>Section</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. COVER PAGE:</td>
<td>A single page listing the title of the proposed project and its location; the name, address, and telephone number of a contact person, a designation of the report as draft or final and a one-paragraph abstract of the EIA report.</td>
</tr>
<tr>
<td>b. SUMMARY:</td>
<td>A summary of the proposed project, preferably less than 15 pages in length that accurately and adequately describe the content of the EIA report. The summary should stress the conclusions, areas of controversy and issues yet to be resolved.</td>
</tr>
<tr>
<td>c. TABLE OF CONTENTS:</td>
<td>A list and page numbered index of the chapters, sections and subsections in the EIA report, including a list of tables and a list of figures.</td>
</tr>
<tr>
<td>d. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK:</td>
<td>A brief analysis of any relevant policy, legal or administrative issues that may impact on the proposed development.</td>
</tr>
<tr>
<td>e. A DESCRIPTION OF THE PROPOSED DEVELOPMENT:</td>
<td>comprising information about the site, the design and size/scale of the development, and its immediate surroundings.</td>
</tr>
<tr>
<td>f. A DESCRIPTION OF THE ENVIRONMENT: (local and regional).</td>
<td></td>
</tr>
<tr>
<td>g. SIGNIFICANT ENVIRONMENTAL IMPACTS:</td>
<td>the data necessary to identify and assess the main effects which that development is likely to have on the environment.</td>
</tr>
</tbody>
</table>
h. **A DESCRIPTION OF THE LIKELY SIGNIFICANT EFFECTS**: direct and indirect impacts on the environment of the development, explained by reference to its possible impact on:
   - human beings; flora; fauna; soil; water; air; climate change; material assets, including:
   - The cultural heritage and landscape;
   - Natural resources; the ecological balance;
   - Any other environmental factor which needs to be taken into account.

i. **A PRESENTATION OF ALL REASONABLE ALTERNATIVES IN COMPARATIVE FORM**: exploring each alternative, including the "no-action alternative", and the reason why certain alternatives were recommended or eliminated. The goal is to identify the least environmentally damaging alternative that satisfies the basic purpose and need of the proposed action.

j. **ENVIRONMENTAL CONSEQUENCES OF THE PROJECT AS PROPOSED, AND BRIEFS OF THE ALTERNATIVES ASSESSED**, identifying any adverse effects that cannot be avoided if the action is implemented, all mitigation measures to be employed to reduce adverse effects, the relationship between short-term uses of the environment and the enhancement of long-term productivity, and any irretrievable or irreversible commitments of resources that would occur if the actions were implemented as proposed.

k. **A MITIGATION PLAN**.

l. **A MONITORING PLAN**.

m. **INTER-AGENCY AND PUBLIC/NGO INVOLVEMENT**.

n. **REPORT ON PUBLIC HEARINGS**.

o. **A SUMMARY IN NON-TECHNICAL TERMS** of the language used above.

p. **LIST OF PREPARERS**: include a list of the names and a Statement of the professional qualifications of persons who were primarily responsible for the preparation of the EIA report.

q. **INDEX**: A listing of the major components of the EIA report by topics or issues, together with page number references;

r. **APPENDICES**: Materials prepared in connection with an EIA report that substantiate analyses fundamental to the report, that relate to the decision to be made and that should be circulated with the EIA report. They could include data and unpublished Reference documents as well as photo - inventory of site and environs. Materials incorporated by reference are generally included in these appendices.
2.4.4 EIA Stages and the NEAC

The stages of EIA in Belize is similar to that of other countries (figure 1). The process begins with the submission of a project plan to the DOE. The DOE screens the project to determine whether the project requires an EIA, an LLES or none. An LLES is requested for projects that could have negative impacts on the environment and it addresses these specific negative environmental impacts only (Department of the Environment, 2011). If an EIA is not required, environmental clearance is granted to the developer with certain conditions stipulated in either an Environmental Compliance Plan (ECP) or an Environmental Clearance letter. If during screening the DOE determines that an EIA or LLES is required, then a Terms of Reference (TOR) or scoping paper is developed. The developer then needs to get the EIA or LLES done and submit a hard copy to the DOE. The DOE ensures that the report is in compliance with the TOR before requesting from the developer thirteen hard copies for the National Environmental Appraisal Committee (NEAC).

Thirteen members of the NEAC will review the EIA and make recommendations to the DOE. The NEAC is an appointed body whose function is to review all environmental impact assessments, advise the Department of the adequacy or otherwise of environmental impact assessment and also advise the Department of circumstances where a public hearing is desirable or necessary. It comprises of the following:

   a. the Chief Environmental Officer or his nominee;
   b. the Commissioner of Lands or his nominee;
   c. the Housing and Planning Officer or his nominee;
   d. the Chief Forest Officer or his nominee;
   e. the Fisheries Administrator or his nominee;
   f. the Chief Hydrologist or his nominee;
   g. the Archaeological Commissioner or his nominee;
   h. the Director of Geology and Petroleum or his nominee;
   i. the Chief Agricultural Officer or his nominee;
   j. two (2) non-governmental (NGO) representatives appointed by the Minister on the recommendation of the Department.

After the NEAC’s review and recommendations are provided to the DOE, the DOE then makes a decision to approve or deny the project. If the project is approved, an ECP is developed and
signed, and environmental clearance is granted. If the project however is denied, then environmental clearance is not granted.

Figure 1: Stages of the EIA process in Belize (Department of the Environment, 2011)
2.5 Public Participation in EIA

Public participation in general plays a vital role in the conservation of biodiversity and, consequently, the impact assessment process. All stakeholders in society have a vested interest in biodiversity and are key players in the valuation of biodiversity and ecosystem services (Secretariat of the Convention on Biological Diversity and Netherlands Commission for Environmental Assessment, 2006). In fact, the CBD’s Voluntary Guidelines on Biodiversity: Inclusive Impact Assessment endorses effective public participation as a precondition for a successful EIA (p. 22). However, successful public participation is often met with several constraints.

Bagri and Vorhies (1997) identify several constraints to public participation and these include the lack of appropriate identification of stakeholders, the lack of command use of local languages potentially segregating public involvement, and the public’s confusion of the legislation about rights and responsibilities. These constraints have limited the capacity for public participation to influence EIA. However, research has shown that certain groups can be a greater influence than others. For example, an important stakeholder group is that of non-governmental organizations (NGOs) which have been found to be better able to influence outcomes of public hearings than other participants, making their representation preferable (Nadeem and Fischer, 2011). Many times, however, project proponents tend to focus public consultations on members of the public who are positively and directly affected, especially economically in terms of employment (Sinclair and Diduck, 2001). This limits the consideration of issues and their significance – a gap NGOs can help to close.

2.5.1 Roles of NGOs

As stakeholders, Ryu et al. (2004) suggests that NGOs play a major role in EIA. Firstly, they are a main source of information for project proponents as they may have environmental information and expert knowledge about a project’s location. Secondly, they can act to monitor the impact assessment process by reviewing EIA reports and determining the adequacy of baseline data and the robustness of impact prediction on the environment, and can even play important role in monitoring projects. Thirdly, NGOs can also play a role in pressuring project proponents to undertake adequate EIA reports. Yet despite the many roles outlined, few NGOs have taken on such roles to the full extent. Even if NGOs are fully aware of their roles, many of them simply do not participate. This may be due to lack of awareness about EIA timeframes as a result of the
lack of understanding of the EIA system and lack of access to the draft and final EIA report (Ryu et al., 2004).

2.5.2 NGOs and Management of Protected Areas in Belize

In 1981, the Government of Belize (GOB) established the National Parks System Act to preserve and protect highly important natural and cultural features of protected areas and to regulate their scientific, educational and recreational use. The government also designated three government ministries to create and manage protected areas. These ministries – the Forest Department, the Fisheries Department and the National Institute of Culture and Heritage/Institute of Archaeology – have co-management agreements with non-governmental organizations (NGOs) and community based organizations (CBOs) (Figure 2). A number of private lands are also under protection as private reserves and these are managed by private land-owners or organizations.

![Figure 2 Government Agencies with legal jurisdiction over protected areas.](image)

The local conservation NGOs/CBOs and private organizations play an important role in conducting research and monitoring biodiversity. However, there is limited literature on their participation in Belize’s EIA system. It is important to note that there is provision for their participation in EIA. Firstly, NGOs are able to participate in the EIA process through the NEAC. Two members of NEAC are NGO representatives and are appointed by the Minister of Natural Resources. Secondly, NGOs and CBOs are important stakeholders as part of the public, and the EIA Regulations of 1995 paragraph 18 makes provision for public participation.
18. (1) During the course of an environmental impact assessment, the developer shall provide an opportunity for meetings between the developer and interested members of the public, especially within or immediately adjacent to the geographical area of the proposed undertaking, in order:

(a) to provide information concerning the proposed undertaking to the people whose environment may be affected by the undertaking; and

(b) to record the concerns of the local community regarding the environmental impact of the proposed undertaking.

(2) At any time during an environmental impact assessment of a proposed undertaking the Department may invite written comments from interested persons concerning the environmental impact of an undertaking.

(3) The Department may forward the written comments under subsection (1) to the developer who shall answer any pertinent questions raised in such written comments.

(Environmental Protection Act Chapter 328. Revised Edition 2003)

A part of this research involves interviewing NGOs and CBOs to gather insight about the weaknesses of the EIA system in Belize in terms of the consideration of the biodiversity found in the protected areas that they manage.
3 Methods

The overall aim of this research is to examine the treatment of biodiversity issues in EIA in Belize. A systematic review using a defined checklist as well as interviews with key stakeholder organizations will be used (table 3).

*Table 6: Summary of Methodological Approach.*

<table>
<thead>
<tr>
<th>Objective</th>
<th>Data Collection</th>
<th>Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To what extent are flora and fauna assessed in Belize’s EIA reports to ensure consideration of potential biodiversity issues?</td>
<td>- A stratified sample procedure will be used to select EIA reports – two (2) EIA reports will be randomly selected for each year from 1995 when the EIA legislation was first enforced to 2014. - A critical appraisal of Belize’s EIA reports using a modified version of the checklist used by Söderman (2005). Modification of the checklist will be done to align it to reflect the EIA legislation and EIA requirements in Belize.</td>
<td>Results will be discussed and compared to that of other similar studies.</td>
</tr>
<tr>
<td>2. What are key recommendations to improve the consideration of biodiversity issues in Belize’s EIA system?</td>
<td>- A stratified sampling procedure will be used to include the different types of protected areas in Belize. - Structured interviews with key stakeholders – NGOs and CBOs – that manage or co-manage protected areas.</td>
<td>Interview responses will be presented and discussed and their recommendations presented as common themes.</td>
</tr>
</tbody>
</table>

3.1 Selection of EIA Sample

A critical appraisal of Belize’s EIA reports is achieved using a systematic review sample of 39 EIA reports (Table 4). This represents 29% of all EIA reports in Belize for a period of 20 years – 1995 to 2014. Two reports were randomly selected from the list of existing EIA reports for each year. However, for the year 2011 there was only one EIA available to review. All EIA reports were accessed and reviewed at the archives office at the Department of Environment (DOE) in the nation’s capital – Belmopan City.
The EIA sample has good representation of the different project types as classified by the DOE (Figure 3). ‘Aquaculture projects’ sampled included shrimp and fish processing plants which were mainly located in the southern districts of Stann Creek and Toledo. ‘Development projects’ included tourism projects as well as a highway project, an access road and golf course, a yacht club and marina. ‘Industrial projects’ were mainly in the sugar industry. ‘Mining and dredging projects’ included gold mining, seismic activity and energy exploration. The other two project types, ‘resorts, hotels and construction’ as well as the ‘subdivisions’ were also well represented.

**Table 7: Sample of EIAs selected for this research.**

<table>
<thead>
<tr>
<th>Company_Name</th>
<th>General_Index</th>
<th>District</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emerald Bay</td>
<td>Subdivision Projects</td>
<td>Belize</td>
<td>1995</td>
</tr>
<tr>
<td>Sittee Point Limited</td>
<td>Subdivision Projects</td>
<td>Stann Creek</td>
<td>1995</td>
</tr>
<tr>
<td>Eden Isles Development</td>
<td>Subdivision Projects</td>
<td>Belize</td>
<td>1996</td>
</tr>
<tr>
<td>Cherax Hatchery Inc.</td>
<td>Aquaculture Projects</td>
<td>Stann Creek</td>
<td>1996</td>
</tr>
<tr>
<td>Tex Mar Limited Shrimp Farm</td>
<td>Aquaculture Projects</td>
<td>Stann Creek</td>
<td>1997</td>
</tr>
<tr>
<td>Barton Creek Farms Ltd.</td>
<td>Industrial Projects</td>
<td>Stann Creek</td>
<td>1997</td>
</tr>
<tr>
<td>The Plantation</td>
<td>Subdivision Projects</td>
<td>Stann Creek</td>
<td>1998</td>
</tr>
<tr>
<td>Hydro Maya Limited</td>
<td>Development Projects</td>
<td>Toledo</td>
<td>1998</td>
</tr>
<tr>
<td>Orange Walk Town Bypass</td>
<td>Development Projects</td>
<td>Orange Walk</td>
<td>1999</td>
</tr>
<tr>
<td>Tao San Marine Products Co. Ltd.</td>
<td>Aquaculture Projects</td>
<td>Stann Creek</td>
<td>1999</td>
</tr>
<tr>
<td>NOVA Toledo Ltd</td>
<td>Aquaculture Projects</td>
<td>Stann Creek</td>
<td>2000</td>
</tr>
<tr>
<td>Royal Mayan Shrimp Farm</td>
<td>Aquaculture Projects</td>
<td>Stann Creek</td>
<td>2000</td>
</tr>
<tr>
<td>Galeria Maya Limited Hotel &amp; Casino</td>
<td>Resorts/Hotels Construction Projects</td>
<td>Corozal</td>
<td>2001</td>
</tr>
<tr>
<td>Company/Project Name</td>
<td>Project Type</td>
<td>Location</td>
<td>Year</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>-------------------------------</td>
<td>---------------</td>
<td>------</td>
</tr>
<tr>
<td>Trigone Limited</td>
<td>Aquaculture Projects</td>
<td>Stann Creek</td>
<td>2001</td>
</tr>
<tr>
<td>BSI-Bagash Co-generation Project</td>
<td>Industrial Projects</td>
<td>Orange Walk</td>
<td>2002</td>
</tr>
<tr>
<td>Bel-Euro Aquaculture</td>
<td>Aquaculture Projects</td>
<td>Toledo</td>
<td>2002</td>
</tr>
<tr>
<td>Water Caye Development (Coral Sands Resort)</td>
<td>Development Projects</td>
<td>Belize</td>
<td>2003</td>
</tr>
<tr>
<td>Marbington Limited</td>
<td>Development Projects</td>
<td>Stann Creek</td>
<td>2003</td>
</tr>
<tr>
<td>Dolphin International Development Ltd. (Regalia All Pines)</td>
<td>Development Projects</td>
<td>Belize</td>
<td>2004</td>
</tr>
<tr>
<td>Marine Farms</td>
<td>Aquaculture Projects</td>
<td>Stann Creek</td>
<td>2004</td>
</tr>
<tr>
<td>Belize Rus Resort Tours</td>
<td>Resorts/Hotels Construction Projects</td>
<td>Belize</td>
<td>2005</td>
</tr>
<tr>
<td>Cerros Sands Ltd</td>
<td>Subdivision Projects</td>
<td>Corozal</td>
<td>2005</td>
</tr>
<tr>
<td>Blackadore Resort</td>
<td>Resorts/Hotels Construction Projects</td>
<td>Belize</td>
<td>2006</td>
</tr>
<tr>
<td>RSM Production Corporation</td>
<td>Mining &amp; Dredging Projects</td>
<td>Orange Walk</td>
<td>2006</td>
</tr>
<tr>
<td>Belize Natural Energy</td>
<td>Mining &amp; Dredging Projects</td>
<td>Cayo</td>
<td>2007</td>
</tr>
<tr>
<td>Marine Cage Farm - Lark and Bugle Caye</td>
<td>Aquaculture Projects</td>
<td>Stann Creek</td>
<td>2007</td>
</tr>
<tr>
<td>Pelican Point Marina and Resort</td>
<td>Development Projects</td>
<td>Belize</td>
<td>2008</td>
</tr>
<tr>
<td>Caribbean Investors Ltd. (Mountain Pine Ridge Quarry)</td>
<td>Industrial Projects</td>
<td>Cayo</td>
<td>2008</td>
</tr>
<tr>
<td>The Placencia Marina</td>
<td>Piers, Seawalls, etc.</td>
<td>Stann Creek</td>
<td>2009</td>
</tr>
<tr>
<td>Toledo Free Zone</td>
<td>Industrial Projects</td>
<td>Toledo</td>
<td>2009</td>
</tr>
<tr>
<td>Big Creek Port</td>
<td>Development Projects</td>
<td>Stann Creek</td>
<td>2010</td>
</tr>
<tr>
<td>Yum Balisi</td>
<td>Resorts/Hotels Construction Projects</td>
<td>Stann Creek</td>
<td>2010</td>
</tr>
<tr>
<td>Saca Chispas</td>
<td>Development Projects</td>
<td>Belize</td>
<td>2011</td>
</tr>
<tr>
<td>Green Tropics Ltd (Sugar Mill Mediation Area)</td>
<td>Industrial Projects</td>
<td>Cayo</td>
<td>2012</td>
</tr>
<tr>
<td>Ceibo ChicoGold - Boiton Minerals</td>
<td>Mining &amp; Dredging Projects</td>
<td>Cayo</td>
<td>2012</td>
</tr>
<tr>
<td>Blue Water International Belize Ltd.</td>
<td>Aquaculture Projects</td>
<td>Belize</td>
<td>2013</td>
</tr>
<tr>
<td>Texbel Agricultural Investment</td>
<td>Development Projects</td>
<td>Stann Creek</td>
<td>2013</td>
</tr>
<tr>
<td>BCH International, Inc.</td>
<td>Mining &amp; Dredging Projects</td>
<td>Belize</td>
<td>2014</td>
</tr>
<tr>
<td>Sapodilla Springs Limited</td>
<td>Subdivision Projects</td>
<td>Stann Creek</td>
<td>2014</td>
</tr>
</tbody>
</table>

### 3.2 Review Checklist

Review checklists are commonly used in EIA research. For example, the review checklist developed by Lee and Colley has been extensively used in the review of quality of EIA reports in many countries (Glasson et al., 2012, Kabir and Momtaz, 2012, Lee et al., 1999). It has also been used in modified versions to examine regulatory and procedural compliance of different...
countries or project sectors (Cashmore et al., 2002, Sandham and Pretorius, 2008, Sandham et al., 2013). Furthermore, review checklists are also commonly used in the examination of ecological components of EIA reports (Drayson et al., 2015, Samarakoon and Rowan, 2008, Söderman, 2005).

A total of 32 questions examining the ecological content of the EIA reports were used. These questions were adapted from the work done by Söderman (2005). Some questions were modified in order to adapt the checklist to Belize’s EIA regulations and the DOE’s requirements.

For this checklist, five categories of questions were selected (table 5). The first review area, description of the environment, is a review area designed to determine whether important details of the project are given that will enable assessment of ecological impacts. The second review area, description of the flora and fauna to be affected, examines whether the baseline data was adequately studied in order to enable assessment of ecological impacts. The third review area, description of the ecological impacts, examines the types of impacts considered, the significance of impacts and the whether quantitative or qualitative methods were used. The fourth review area, examination of alternatives, reviews the alternatives and the ‘no-action’ option. The fifth review area, examination of mitigation measures and monitoring, reviews the level of treatment of mitigation measures and the details of the monitoring program.

Table 8: Review checklist: Areas of review and corresponding questions.

<table>
<thead>
<tr>
<th>1 Description of development</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Is the purpose, construction, operation (possible decommissioning) of the development described?</td>
</tr>
<tr>
<td>1.2 Is the size/scale of the proposed development established?</td>
</tr>
<tr>
<td>1.3 Is the land area taken up by the development clearly shown on a map?</td>
</tr>
<tr>
<td>1.4 Are the type of expected residue and emissions and other environmental stress affecting flora and fauna estimated?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 Description of the flora and fauna likely to be affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Is the area/environment expected to be affected by the proposed development indicated?</td>
</tr>
<tr>
<td>2.2 Is delineation of study boundaries considered (spatial and temporal)?</td>
</tr>
<tr>
<td>2.3 Is the area affected/study area presented on the map as part of a larger system (ecosystem, watershed area etc.)?</td>
</tr>
<tr>
<td>2.4 Are the ecologically relevant receptors of the flora and fauna specifically selected?</td>
</tr>
<tr>
<td>2.5 Are the important ecological receptors identified and described sufficiently for the prediction of impacts?</td>
</tr>
</tbody>
</table>
2.6 Are the important components of the flora, fauna and habitats measured quantitatively?

2.7 Is there evidence of detailed field surveys on flora?

2.8 Is there evidence of detailed field surveys on fauna?

2.9 Is the reporting periods throughout the course of implementing the study stated?

2.10 Are the sources of the data identified?

2.11 Are the relevant policy, legal or administrative issues that may impact on the proposed development identified and reviewed?

2.12 Were arrangements made to collect the opinions and concerns of relevant public agencies, special interest groups, and the general public on biodiversity issues?

3 Description of the ecological impacts

3.1 Are the direct ecological impacts described?

3.2 Are both positive and negative impacts considered?

3.3 Are the indirect, secondary and cumulative ecological impacts described?

3.4 Is the time span of the impacts described (short-term, medium and long-term)?

3.5 Is the permanence of the impacts described (permanent and temporary)?

3.6 Is the significance of the impacts assessed?

3.7 Are the effects on biodiversity addressed specifically (on the ecosystem level, species level and genetic level)?

3.8 Are the ecological impacts predicted in quantitative terms?

3.9 Are the ecological impacts predicted in qualitative terms?

4 Examination of alternatives

4.1 Are the ecological impacts of the alternative solutions/sites described and compared with the proposed development?

4.2 Is the "no-action alternative" considered and the reason why it may be recommended or eliminated?

5 Examination of mitigation measures and monitoring

5.1 Are mitigation measures proposed to address the ecological impacts?

5.2 Are the details of how the mitigation measures will be implemented given (mitigation plans for each potential adverse impact at each stage of the project should be documented and the cost assessed)?

5.3 Is monitoring of ecological impacts proposed?

5.4 Are the details of how the monitoring will be implemented given?

5.5 Does the monitoring plan focus on the mitigating measures to be implemented during the construction and operating phases of the project?
3.3 Qualitative Rating

Each area reviewed was done using the qualitative rating used in the review package by Lee and Colley. This is different from Soderman’s review because in her work, Soderman evaluated the quality of the EIA reports based on the ecological and biodiversity assessment index (EBI) to compare them based on years. For the EBI, Soderman used three ratings – ‘satisfactorily addressed’, ‘part satisfactorily addressed’ and ‘not addressed’. However, this research intends to look at the proportion of EIA reports that are satisfactorily addressing ecological issues in different review areas and overall. Lee et al. (1999) intended for their rating to be used to review the quality of EIA reports and this research takes on a similar stance in looking at quality of EIA reports with a focus on ecology. Thus, the quality ratings are deemed appropriate to use.

An overall assessment was achieved using the following procedures slightly modified from Lee and Colley’s review package (Figure 4):

1. The questions under each review area were assessed using the information from the EIA reports. A decision was made on the appropriate assessment symbol which was recorded.

2. The assessments of the questions were used to derive to an overall assessment symbol for each corresponding review area. This was not done by averaging the assessments of the questions.

3. The EIA report as a whole is then assigned an overall assessment symbol.

![Figure 4 A representation of the hierarchical structure of the review areas and questions.](image)

To further evaluate results, the scales A, B and C, are considered satisfactory and the scales D, E, and F, are considered unsatisfactory. Each review area and questions are evaluated using this rating technique.
Table 9: Qualitative rating (Lee and Colley’s, 1990).

<table>
<thead>
<tr>
<th>Scale</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Task has generally been well performed with no important omissions.</td>
</tr>
<tr>
<td>B</td>
<td>Generally satisfactory and complete with only minor omissions and inadequacies.</td>
</tr>
<tr>
<td>C</td>
<td>Satisfactory despite some omissions and inadequacies.</td>
</tr>
<tr>
<td>D</td>
<td>Parts well attempted but, on a whole, just unsatisfactory because of omissions or inadequacies.</td>
</tr>
<tr>
<td>E</td>
<td>Not satisfactory, revealing significant omissions or inadequacies.</td>
</tr>
<tr>
<td>F</td>
<td>Very unsatisfactory with important tasks poorly done or not attempted.</td>
</tr>
</tbody>
</table>

3.4 Selection of NGO Sample and Interview Method Used

A stratified sample of twenty (20) NGOs and CBOs were selected to include a representation across majority of the types of protected areas in Belize. Emails were sent to corresponding NGOs and CBOs. A total of five NGOs and CBOs responded and agreed to the structured interviews. The five NGOs and CBOs manage a total of seventeen (17) protected areas in Belize: four natural monuments, four national parks, three nature reserves, three marine reserves, two wildlife sanctuaries, and one private reserve. This sample is representative of the five types of protected areas mentioned. The exceptions are forest reserves, bird sanctuaries, spawning aggregation reserves and archaeological reserves.

Structured interviews were carried out with one participant from each NGO/CBO. A consent form (Appendix 1) and a standardised set of questions (Appendix 2) were both administered through email. Due to time constraints, the structured interview method was selected because it is the quickest to analyse.

3.5 Limitations

The main limitation for this research is that of subjectivity in the review of EIA reports. It is recommended for reviews to be done by two or more reviewers (Lee et al., 1999). However, due to the nature of the research as a Masters dissertation, only the student was involved as the reviewer. Another limitation is the use of Lee and Colley’s rating method used with a checklist designed to be used with the EBI. To address this, the checklist was modified using the researcher’s objectivity to ensure that the questions considered are ‘best practice’ for each review area.
Another limitation is the small number of NGOs interviewed. The limited time for conducting the entire research - reviewing EIA reports, conducting interviews and analyzing the data – altogether is then the main logistical constraint.
4 Results

4.1 Overall Quality of EIAs Addressing Biodiversity Issues

For the sample of 39 EIA reports, 60% address biodiversity issues at satisfactory levels while 40% performed this task unsatisfactorily. Majority of the EIA reports were satisfactory (46.2%) with a ‘C’ quality rating because of minor omissions and inadequacies. Meanwhile, none of the EIA reports achieved an ‘A’ quality rating with all tasks well performed.

![Overall Quality of EIAs Addressing Biodiversity Issues](image)

*Figure 5: Overall quality rating of EIA sample.*

4.2 Description of the development

This review area is one of the areas with strong performance with 87.2% of the reports satisfactorily providing a description of the development. Majority of the reports received a ‘B’ quality rating which demonstrates a good performance with minor omissions and inadequacies.

For the sub-categories in this section, 85% of the reports satisfactorily described the purpose, construction and operation of the development although there was little or no mention of possible decommissioning of projects.
The establishment of the size or scale of the proposed development is critical and is required by Belize’s EIA legislation. Of the 39 reports, 95% of them established the size of the project. Of these, 78% explicitly stated the total acreage of the project (table 7) while the remaining ones mentioned the sizes of different aspects of the project but did not recognize the total scale of the project. Almost half of the projects required 500 acres or less of land area with only three requiring more than 2500 acres.

Meanwhile, 75% of the reports ensured that the land area taken up by the development was clearly shown on a map and 78% estimated the type of expected residue, emissions and other environmental stress affecting flora and fauna.
Table 10: Size distribution of analysed EIA sample.

<table>
<thead>
<tr>
<th>Size (ac)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 500</td>
<td>18</td>
<td>46</td>
</tr>
<tr>
<td>501 - 1000</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>1001 - 1500</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>1501 - 2000</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2000 - 2500</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>&gt; 2501</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Not stated</td>
<td>9</td>
<td>23</td>
</tr>
</tbody>
</table>

4.3 Description of flora and fauna to be affected

For this review area, 64% of the reports satisfactorily described the flora and fauna likely to be affected. However, majority of these reports (53%) received a ‘C’ quality rating which means that the reports were satisfactory but had some omissions and inadequacies.

For the sub-categories, 90% of the reports indicated the area/environment expected to be affected by the proposed development. Meanwhile, only 31% satisfactorily considered delineation of both spatial and temporal study boundaries. About half (54%) of the reports presented the study areas on a map as part of a regional system. Also, half (51%) specifically selected relevant receptors of the flora and fauna but only 41% described the important ecological receptors sufficiently for impact prediction.

For the surveys of fauna and flora, only 26% of the reports demonstrated evidence of detailed field surveys on fauna and 33% demonstrated evidence of detailed field survey on flora. Many of the surveys were based on existing published and unpublished data.

Arrangements to collect the opinions and concerns of relevant public agencies, special interest groups, and the general public on biodiversity issues was satisfactorily undertaken for 39% of the reports.
4.4 Description of Biodiversity Impacts

This section had the poorest performance with only 46.1% of the reports satisfactorily describing ecological impacts. However, unlike the results of other review categories, the satisfactory reports were spread across quality ratings ‘A’ (7.7%), ‘B’ (17.9%) and ‘C’ (20.5%). For the remaining unsatisfactory results, almost half (41%) received a ‘D’ quality rating, which is unsatisfactory due to omissions and inadequacies.

Although 87% of the reports satisfactorily addressed direct ecological impacts, there was limited identification of other types of impacts. Only 46% addressed both positive and negative impacts as emphasis was mainly placed on negative impacts. A small number (13%) attempted to address indirect, secondary, and cumulative impacts but their emphasis was mainly on indirect and cumulative impacts while secondary impacts were ignored or not clearly identified.

Meanwhile, about half (46%) addressed the time span of impacts but only 5% addressed the permanence of impacts. The significance of impacts was assessed in only 18% of the reports as emphasis was placed on the magnitude of impacts.

About 46% of the reports addressed the effects on biodiversity at the species and ecosystem level, completely ignoring biodiversity at the genetic level. Only 10% predicted impacts in
qualitative terms while none satisfactorily predicted impacts in quantitative terms. Although few EIA reports attempted to quantify impacts, this was mainly done by stating the percentage of vegetation to be cleared and the percentage of vegetation from the national inventory to be affected. However, this was only done for general vegetation or ecosystem types and was never attempted for fauna, making the results unsatisfactory with a ‘D’ quality rating.

4.5 Examination of Alternatives

The examination of alternatives was another area of poor performance for this appraisal. Here, less than half (44%) of the reports examined alternatives to development at a satisfactory level. 41% of the unsatisfactory reports received a ‘D’ quality rating, which means that the examination of alternatives was attempted, but fell short due to omissions and inadequacies.

The description and comparison of ecological impacts for alternative solutions/sites with the proposed development was satisfactorily done for 36% of the reports. Other reports (41%) also compared alternatives of technologies or site but this was done by examining social or economic impacts while ignoring ecological impacts. 75% of the reports considered the “no-
action alternative” and the reason why it may be recommended or eliminated. The rationale for not selecting the no-action alternative was based on economic gain/loss only.

4.6 Examination of mitigation measures and monitoring

For this review area, 69% of the reports satisfactorily proposed both mitigation measures and monitoring. Mitigation measures and monitoring plans are required by Belize’s EIA Regulations and thus are necessary for all EIA reports. Mitigation measures to address ecological impacts were satisfactorily addressed in 85% of the reports with 59% providing details of how mitigation measures will be implemented. However, this was not done for each impact at each stage of the project and cost for implementation was not assessed.

69% of the reports proposed monitoring of ecological impacts. Of these, 39% provided details of how monitoring will be implemented and only 5% of the monitoring plans satisfactorily focused on the mitigating measures to be implemented during the construction and operating
phases of the project. For the most part, monitoring was proposed for impacts during the operation phase of the projects.

4.7 NGOs and Belize’s EIA System

From the interviews, NGOs participation in Belize’s EIA system appears to differ for individual NGOs. Interview participants’ experience with the EIA system in their current job positions ranged from one year (plus four months) to eighteen years. All participants expressed that they were aware of the EIA system in Belize, although to varying degrees. All of the participants were fully aware of the process and had participated meaningfully in the process. For example, an organization had been asked by the DOE to review an EIA report. Another had been asked to participate in public consultations and have also expressed their concerns to the consultants via email. Only one organization expressed little awareness of the EIA system but had participated in it before.

It appears that NGOs confidence in the EIA process also differs across organizations. All of them agreed that they have been given the opportunity to participate in the EIA process before,
such as by expressing their concerns at public meetings or in question-and-answer sessions. However, two organizations stated their concerns have not been considered or documented in the EIA, one stated this has been done and the other two stated they are unsure as there have been EIA reports near their area.

Interview participants were asked to identify weaknesses in Belize’s EIA system with regards to the EIA system and its consideration of biodiversity and protected areas they manage. The main weaknesses identified were:

- The lack of transparency at the DOE. When EIA documents are requested by NGOs or information about NEAC’s decision on a project is requested, the DOE does not facilitate this.

- The lack of trust between NGOs and the DOE. It appears that the DOE and the developer are always on the same side and that the NGOs are their rivals.

- A lack of recognition of NGOs and their roles in protecting biodiversity. For example, there is no consideration of the NGOs management plan (including zonation) as the protected area is treated like all other land. Also, consultants and developers are not held accountable for not consulting meaningfully with managers of protected areas (that is, NGOs and CBOS), especially for projects near protected areas.

- Treatment of biodiversity issues is weak and the environment is not taken seriously in EIA documents. Although EIA reports “sometimes record important ecological aspects, high conservation value areas, endangered wildlife of conservation concern, yet under their conclusion and recommendation those things are completely ignored… saying the project has no significant environmental impact” (Anonymous).

- There is also a lack of consideration of additional costs on NGOs. For example, where a project increases access to a protected area, and NGO must increase its patrol in the area and enhance their protection measures, all at the NGOs very own cost.

- There is a lack of adequate public participation due to barriers in language. For example, Mayan communities that may not have good command of the English language are not able to fully participate in public consultations. EIA documents are not translated to their dialect and no effort is made to do this.

- There is a lack of respect for the National Protected Areas Act. Protected area managers uphold this Act but it is often ignored in EIA.
5 Discussion

5.1 Overall Quality of EIAs Addressing Biodiversity Issues

From the results, a little more than half of the EIA reports (60%) addressed biodiversity issues satisfactorily. The review area with the strongest performance is the ‘description of the development’. Meanwhile the review areas with the weakest performance are the ‘examination of alternatives’ and the ‘description of ecological impacts’, for which less than half of the EIA reports were considered satisfactory. It appears that the descriptive components of the report were well presented and the analytical or scientific components were weakly done. This reflects the trends found in the studies examining overall quality of EIA reports (Cashmore et al., 2002, Kabir and Momtaz, 2012, Sandham and Pretorius, 2008). Therefore, it appears that the strengths and weaknesses in EIA reports translate to the individual chapters and their consideration of biodiversity issues. Overall, the results of this study show similar shortcomings to that of other reviews of EcIA.

5.2 Review Area 1

As the best performing review area of Belize’s EcIA, the description of the development component was detailed in providing information about the project’s purpose, construction and operation. However, there was limited information about the possible decommissioning of projects. Only one EIA considered the possible decommissioning of a part of the project and the reason for this is because it was explicitly required by the terms of reference (TOR). This suggests that EIA consultants and developers only focus their efforts on the exact information the TOR outlines. Thus, TORs must be developed to ensure that all environmental considerations are outlined.

5.2.1 Size of Proposed Development

The establishment of the size or scale of the project or development was evident in 95% of the EIA reports and the reason for this may be because it is a legal requirement for the EIA document in Belize. This is similar to the EIA regulations in other countries. Belize’s EIA Regulations of 1995 and the EU’s DIRECTIVE 2014/52/EU both stipulate that the description of the proposed development must comprise of information about the design/scale of the development. Additionally, regulations offer other roles for size in EIA. In both Belize and the EU, it is the size of some types of developments that trigger an EIA. For example, in Belize, the construction of a seabed-based marine culture facility will fall under a schedule I or schedule II...
project depending on its size. If it requires 15 acres or more of production area it will fall under a schedule I project and it will require an EIA. However, if it requires less than 15 acres it will fall under a schedule II project and the DOE will determine if it will require an EIA or a LLES. In the EU, the EU Directive also stipulates that the project size must be considered in the monitoring program when deciding the type of parameters to be monitored and the duration of monitoring (European Parliament and the Council of the European Union, 2014). Perhaps the reason for the various roles that project size play in EIA are reflected in the reasoning by Thompson et al. (1997), who stated that project size is directly related to the overall ecological impact because the larger the project, the greater the probability of it affecting a wide range of habitats and species.

5.2.2 Estimation of Residues, Emissions and other Environmental Stress

Estimations of expected residues and emissions that may affect flora and fauna were satisfactorily done in about 77% of the EIA reports. It appears that EIA reports commonly report or estimate environmental stress factors which result in insignificant environmental impacts or for which the impacts can be easily mitigated. Many of the projects estimated only the nature and/or volume of wastes. For example, EIA reports focused on estimating solid waste and liquid waste, which can be easily mitigated with sewage treatment plants and disposal of solid waste at landfill sites, respectively. Another commonly estimated residue such as noise was estimated and mitigated by adjusting operation hours to daytime only. However, few projects estimated environmental stress such as the removal of habitat, the creation of barriers or the fragmentation of habitats, as these cannot be easily addressed with simple mitigation measures.

5.3 Review Area 2

5.3.1 Description of Study Area

Just a little over a half of the EIA reports (64%) were satisfactory in describing the flora and fauna to be affected. About 90% of the EIA reports indicate the area expected to be affected by environment. This was achieved with the use of maps and discussions of the environment. Maps were often used to present the typical vegetation of the project site or the project area was often presented within maps of larger ecosystem in the country or as part of a local watershed. Maps of the protected areas in Belize were also used to demonstrate the project’s proximity to these designated sites. These maps and their discussion in relevance to the project site allowed for spatial delineation of study boundaries of the project. Again, it appears that all this information is satisfactorily addressed in Belize’s EIA reports because the TORs require the
use and descriptions of maps to describe different aspects of a project or development. For example, a TOR for an agricultural and processing facility states that the EIA report must include maps at appropriate scale showing the topography in the area, the zone of influence in relation to protected areas, the existing land uses in areas adjacent to the project site among other aspects of the physical environment. This suggests that the TOR is an effective guiding document for consultants and developers.

5.3.2 Field Surveys and Desktop Studies

The provision of baseline information on flora and fauna resulted to be very weak. Less than 35% of the EIA reports demonstrated evidence of detailed field surveys for both flora and fauna. For those that carried out field surveys, the only identifiable methods used included transects, quadrats, point counts, Rover diver and Whittaker vegetation plots. Other reports were vague in stating their methods. Surveys were often described as a ‘general field survey’, ‘field visit’, ‘in-situ investigation’, ‘rapid vegetation assessment’, and ‘wildlife field assessment’ with no information about the specific methodology used. These shortcomings in survey methods are similar to those found in other studies. Samarakoon and Rowan (2008) and Vun et al. (2004) also found this tendency in their reviews whereby the survey methods used were rarely mentioned and even if they were, no rationale for their selection was given. Thompson et al. (1997) also found that survey of fauna was often done as an ‘opportunistic survey’ while surveying vegetation. This tendency was also evident in at least two of the EIA reports reviewed.

For flora, there was heavy reliance on the surveying or identification of vegetation types from which common or dominant plant species were identified. Samarakoon and Rowan (2008) and Treweek (1996) also found that surveys often focus on broad categories of vegetation with limited interest on specific species. The main species of interest in the studies that were surveyed were birds. However, the bird list was presented with little or no details about their migratory routes or breeding areas. This is also a common shortcoming found in other reports (Vun et al., 2004).

For fauna, there was heavy reliance on literature reviews. Fauna was mainly identified from past surveys of similar ecosystems. For example one report gave a list of ‘commonly reported aquatic species of the Placencia Lagoon’. Other reports either gave a list of birds expected to visit the ecosystems in the area or birds known to be found in or near the project site. It is not known, however, how valid such past survey data is. Because past surveys were done for a
different purpose and are not specific to the project site, they may be used out of context, making their use questionable (Vun et al., 2004). Furthermore, these surveys may possibly be out of date (Samarakoon and Rowan, 2008). Belize does not have a large number of qualified ecologists carrying out baseline surveys in different parts of the country or in different ecosystems. For this reason, there appeared to be heavy reliance on the same surveys throughout the EIA reports.

5.3.3 Quantitative Descriptions of Species

The components of flora and fauna were satisfactorily presented in quantitative format for 23% of the reports and, even for these reports, quantitative data was limited to species of flora or species of fauna but never both. One EIA identified the species composition and relative abundance of plant species. Another also identified the acreage of ecosystems in the project area as a percentage of the national inventory and as a percentage of the protected areas system. Meanwhile, two EIA reports provided a survey list of birds with their abundance. The lack of quantitative presentation of components of flora and fauna is also found to be a weakness in EIA reports in other countries. Söderman (2005) found that ECIAs often provided quantitative data for one studied subject and only qualitative data concerning other factors.

Although baseline data must include information about flora and fauna, field surveys are not specified in the EIA Regulations for Belize. However, many of the TORs for projects state that a ‘field study’ must be undertaken to collect baseline data on terrestrial and/or aquatic flora and fauna but there is no request for a description of the method to be used or a rationale for their selection. This may be a reason why not much thought is given by consultants to the selection and implementation of survey methods or to the presentation of their data in EIA reports.

5.3.4 Ecological Receptors

Ecological receptors of flora and fauna were satisfactorily identified in half of the EIA reports but only about 41% of them described them sufficiently for the prediction of impacts. The identification of ecological receptors was limited to species of conservation concern, especially those that are rare, endangered and/or listed in red list by the International Union for Conservation of Nature (IUCN). Moreover, their selection was largely based on the suspicion of their presence based on literature review. Such species commonly included the American crocodile, Morelet’s crocodile, West Indian manatee, Hawksbill Turtle and Jaguar. All other species of conservation concern identified were birds such as the Yellow Headed parrot, Keel-billed toucan, White Ibis, Black Catbird, Yellow-lored parrot, Acorn woodpecker, Pelican and
Grace’s warbler and the aquatic species Bull shark and Bottlenose dolphin. The information presented about these species included brief descriptions of their calving or breeding seasons, nesting, foraging and sometimes the sites these are known to occur. The only specie of conservation concern for flora was the mangrove ecosystems.

5.3.5 Consulting the Public

Effective public participation is a prerequisite to a successful EIA process. The public or key stakeholders can participate in the EIA process to provide information about the significance of impacts and to help in the formulation of mitigation measures and monitoring. The participation of the public in EIA, however, is limited in Belize. Often, the public is consulted to get their opinions about the project and their recommendations are noted but rarely considered with the level of seriousness expressed on their behalf. This is evident in the media coverage of large development projects, where the public, as a last resort, use the news to express their exasperation with the EIA document and the significance of the impacts documented by the consultants.

From the review, it is evident that consultations were held with key stakeholders and affected citizens to collect their opinions and concerns about projects or developments. However, ecological issues were the focus of only a limited number of consultations. Reports often gave a description of the issues discussed at the public consultations. However, where ecological issues were brought up by the public, these were vaguely noted in the reports with no discussion about their importance. Only two EIA reports discussed mitigation measures to address an issue about the destruction of wildlife and habitats, which was a main concern for the public consulted.

5.4 Review Area 3

5.4.1 Nature of Impacts

The review revealed several shortcomings in the identification of impacts. The nature of impacts was often not assessed to include indirect, secondary, cumulative and positive impacts. Only about half of the reports considered indirect impacts, less than ten reports considered positive effects and about a quarter of the reports considered secondary and cumulative impacts. Furthermore, about half of the reports considered the time span of impacts and less than five reports considered the permanence of impacts. Two reports considered the significance of impacts and half of the other reports identified the magnitude of impacts only. Khera and Kumar
(2010) found this similar weak coverage of biodiversity impacts in his review of EIA reports in India. Because the assessment of impacts on biodiversity requires scientific analysis of the data and this is often found to be weakly done in EcIA, it is almost expected that the impacts considered will be limited or weakly described.

5.5 Review Area 4

5.5.1 Alternatives

Where the examination of alternatives is not mandated in legislation, it is often not considered in EIA reports (Barker and Wood, 1999). However, where it is considered, there is often not enough attention given to it (Treweek, 1996). In Belize, the examination of alternatives is a requirement for EIA reports (table 1). However, less than half of the EIA reports satisfactorily considered alternative solutions with a focus on ecological impacts. For those that did, either alternatives to the site or alternatives to common technologies for operation were considered. For example, the alternative technologies for energy sources and sewage treatment plants were commonly the focus for this section. Although about a quarter of the remaining EIA reports considered alternatives, these were mainly discussed in terms of economic feasibility and not ecological impacts and thus were rated as unsatisfactory.

The ‘no-action’ alternative was satisfactorily addressed in about 75% of the reports. Some reports discussed it as an alternative when examining alternatives for a specific project activity while others discussed it as an alternative for the overall development (non-development option) alongside site selection options. Only about four reports did not consider alternatives. It appears that majority of the reports addressed alternatives as requested by the EIA Regulations. However, the Regulations do not require the alternatives to be addressed in terms of ecological issues, which may be the reason less than half of the reports did not consider it.

5.6 Review Area 5

5.6.1 Mitigation and Monitoring

Although about 85% of the reports satisfactorily proposed mitigation measures, only about 60% of them gave satisfactory levels of details about measures as the measures proposed were often vaguely described. For example, in one report it was determined that the decrease in forest cover will lead to a ‘decline in vegetation-dependent species like parrots’. The report suggested the ‘creation of micro-habitat reserves for negatively impacted species such as parrots by girdling and or restricting human access’ as a mitigation measure. However, no
further details were provided for this measure, such as the stage at which it will be implemented or the behavior of parrots described to determine the likely success that this measure would work. Perhaps this is an example of a ‘cosmetic’ measure which are often recommended and do not address impacts. This is a major concern because such measures can be more detrimental than beneficial (Mandelik et al., 2005, Söderman, 2005). Additionally, many of the reports failed to identify mitigation measures for each stage of the project and costs for measures provided were never assessed.

A monitoring plan is also a requirement for EIA reports in Belize. About 69% of the reports proposed monitoring of impacts and about 5% included the operation and construction phases in the monitoring plan. Furthermore, only about half of the reports gave satisfactory details about the plan. Details often described include frequency, critical levels and the relevant authority that should be responsible for the activity. This was often limited to the monitoring of water quality. Whereby monitoring of wildlife biodiversity was considered, such as bird and fish abundance, the monitoring plan often lodged that responsibility on the DOE or Fisheries Department, removing responsibility of such monitoring from the developer. The purpose of the monitoring plan, therefore, loses its essence of holding the developers responsible for their actions.

Another reason the monitoring plan loses its essence in the reports is due to the ambiguous nature of the monitoring activities proposed. For example, one EIA reported ‘vegetation and landscaping’ as a parameter, ‘ongoing’ as a frequency, and stunted growth or no growth’ as a critical level’ and the location was ‘buffer zones and green zones, and the road reserve around the development’. This monitoring activity was proposed in order to ‘determine over time whether affected wildlife have been able to relocate and recover from habitat loss’. It is difficult to make a connection between re-vegetation and wildlife presence and perhaps abundance if there is no indication as to how the success of wildlife relocation will be identified or which wildlife species are being considered in the first place. This disconnect between the objectives of the biological monitoring plan and the activities proposed is common throughout many of the reports.

5.7 Key Recommendations for the EIA Process

After reviewing the consideration of biodiversity in the EIA reports and interviewing NGOs, several shortcomings were identified. It appears that a number of NGOs are frustrated with the lack of transparency at the DOE. It is the desire of NGOs/CBOs for the DOE to communicate
the decisions made by NEAC in a timely manner and to allow access to the EIA reports, especially those under review. Thus, it would be in the DOE’s best interest to do this and start to build the trust within the department and these organizations.

It appears that some NGOs/CBOs are also frustrated that certain types of projects are allowed in protected areas against their management plans. Two of the NGOs/CBOs expressed that protected areas should be exempted from certain types of projects such as oil exploration and that for other projects, the EIA should consider the management and zoning plans prepared by the protected area managers. Furthermore, EIA reports lacking this consideration of applicable management plans should not be accepted by the DOE.

In terms of public consultation, it is recommended for the consultation period to be extended to 90 days to ensure that public participation is meaningful and adequate. This extra time allows for either developers to translate the EIA document to appropriate dialects and/or languages of key stakeholder communities, and this should be legal requirement. Alternatively, time can be given to NGOs to do this translation.
Conclusion

The proportion of EIA reports that consider biodiversity in Belize at a satisfactory level is a little more than half. The strengths appeared to be in the descriptive components of the EIA reports and the weaknesses in the analytic components. This is common to the results found in other reviews of quality for EIA reports and EcIAs. The analytic components is usually plagued by poor scientific rigor (Barker and Wood, 1999) which is attributed to the limited availability of resources, the complexity of ecosystems and the lack of basic scientific knowledge (Mangel et al., 1996). This can be addressed using the tools of conservation biology, a rigorous science that benefit environmental impact assessment.

Shortcomings in this review were also similar to that of other studies. The main shortcomings included the lack of adequate survey methods, lack of description of chosen survey methods and deficiencies in the survey data. Deficiencies in data included vague presentation of survey lists with little or no information about species distribution and abundance. Another shortcoming was found in the selection of key receptors. Key receptors were mainly species considered threatened or endangered by the IUCN. Their presence was mainly identified based on desktop studies about their distribution in Belize.

Other shortcomings of this review include the neglect of biodiversity issues during public consultations, the limited consideration of biodiversity impacts voiced by the public, the lack of details in the consideration of alternatives, mitigation measures and monitoring. Mitigation measures were often vague and their likely success never mentioned. Meanwhile, monitoring plans were incoherent in their presentation of objectives and the biological monitoring activities proposed.

It appears that the common denominator for most results was either the requirements of the EIA Regulations or that of the Terms of Reference. The EIA Regulations stipulate the contents of the EIA report and the Terms of Reference outline the information required in the report A TOR is exclusively done for each project. This review shows that the submitted reports often provide the necessary content required by both the regulations and the TOR, although not with the intensity or focus desired. Consultants often appear to deliver the information in a hassled format, with limited details about methods used to survey flora and fauna, or methods used to assess and predict impacts. This lack of details and limited consideration for adequate scientific methods is an issue that must be addressed by both the developers and the DOE. The DOE
must improve the TORs by being more specific and requesting more details, and the developers must hold the consultants accountable for providing high quality science in the EIA reports.

For a country with 103 protected areas managed by government departments, NGOs, CBOs and private entities, it is alarming that the participation of co-managing organizations such as NGOs and CBOs is limited. Some issues that NGOs/CBOs perceive include the lack of trust and transparency in the DOE and the lack of consideration for the management plans of the NGOs/CBOs. These issues can be addressed through communication among the DOE, NGOs/CBOs, developers and consultants. Consultants should seek the management plans of these organizations to ensure that projects within the protected areas fall within the management plans. The DOE should hold developers responsible for this type of information as well as they should seek to build trust with NGOs and CBOs by providing legally available information when requested and by ensuring that they remain objective throughout the EIA process.

This study is one of the first to formally examine EIA reports in Belize. The results of this study reveal several shortcomings in the reports which may or may not be a reflection of the quality of the EIA reports in general. This presents an opportunity for further research.
Appendices

Appendix 1: Consent Form

Consent Form


Researcher: Judith Lisbey, MSc. Student, 1506 George Price Drive, Dangriga Town, Belize Central America.

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.

3. I agree to take part in the above study.

4. I agree to the interview being audio recorded

5. I agree to the use of anonymised quotes in publications

________________________________________________________________________________________
Name of Participant                      Date                      Signature

________________________________________________________________________________________
Name of Researcher                      Date                      Signature
Appendix 2: Structured Interview Questions

Interview Questions

This is a basic list of questions for the interview. Please provide some detail for each question.

1. How long have you been working with your organization?

2. Are you aware of what an Environmental Impact Assessment (EIA) is?

3. Are you aware of any development projects that may impact or compromise the biodiversity of the Protected Area you manage or co-manage?

4. Has your organization ever been asked by EIA consultants to participate in the EIA process (as part of the public consultation process)?

5. Did the consultation allow you to express your concerns in terms of the impacts of the project on the Protected Area you manage or co-manage?

6. Have your concerns been documented in an EIA and your recommendations considered?

7. What do you consider is a weakness in Belize’s EIA system in terms of its consideration for Protected Areas?

8. What key recommendations can address that weakness (identified in #7)?
## Appendix 3: Review Areas, Questions and Results

### REVIEW CHECKLIST

<table>
<thead>
<tr>
<th>Description of development</th>
<th>Satisfactory</th>
<th>Unsatisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the purpose, construction, operation (possible decommissioning) of the development described?</td>
<td>84.6%</td>
<td>15.4%</td>
</tr>
<tr>
<td>2. <em>Is the size/scale of the proposed development established?</em></td>
<td>94.9%</td>
<td>5.1%</td>
</tr>
<tr>
<td>3. Is the land area taken up by the development clearly shown on a map?</td>
<td>74.4%</td>
<td>25.6%</td>
</tr>
<tr>
<td>4. Are the type of expected residue and emissions affecting flora and fauna estimated?</td>
<td>76.9%</td>
<td>23.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of the flora and fauna likely to be affected</th>
<th>Satisfactory</th>
<th>Unsatisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the area/environment expected to be affected by the proposed development indicated?</td>
<td>89.7%</td>
<td>10.3%</td>
</tr>
<tr>
<td>2. Is delineation of study boundaries considered (spatial and temporal)?</td>
<td>30.8%</td>
<td>69.2%</td>
</tr>
<tr>
<td>3. Is the area affected/study area presented on the map as part of a larger regional system (regional ecosystem, watershed area etc.)?</td>
<td>53.8%</td>
<td>46.2%</td>
</tr>
<tr>
<td>4. Are the ecologically relevant receptors of the flora and fauna specifically selected?</td>
<td>51.3%</td>
<td>48.7%</td>
</tr>
<tr>
<td>5. Are the important ecological receptors identified and described sufficiently for the prediction of impacts?</td>
<td>41.0%</td>
<td>59.0%</td>
</tr>
<tr>
<td>6. Are the important components of the flora, fauna and habitats measured quantitatively?</td>
<td>23.1%</td>
<td>76.9%</td>
</tr>
<tr>
<td>7. Is there evidence of detailed field surveys on flora?</td>
<td>33.3%</td>
<td>66.7%</td>
</tr>
<tr>
<td>8. Is there evidence of detailed field surveys on fauna?</td>
<td>25.6%</td>
<td>74.4%</td>
</tr>
<tr>
<td>9. Is the reporting periods throughout the course of implementing the study stated?</td>
<td>7.7%</td>
<td>94.9%</td>
</tr>
<tr>
<td>10. Are the sources of the data identified?</td>
<td>87.2%</td>
<td>12.8%</td>
</tr>
<tr>
<td>12. Are the relevant policy, legal or administrative issues that may impact on the proposed development identified and reviewed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Were arrangements made to collect the opinions and concerns of relevant public agencies, special interest groups, and the general public on biodiversity issues?</td>
<td>38.5%</td>
<td>61.5%</td>
</tr>
</tbody>
</table>
### III Description of the ecological impacts

1. Are the direct ecological impacts described? & 87.2% & 12.8%
2. Are both positive and negative impacts considered? & 46.2% & 53.8%
3. Are the indirect, secondary and cumulative ecological impacts described? & 12.8% & 87.2%
4. Is the time span of the impacts described (short-term, medium and long-term)? & 46.2% & 53.8%
5. Is the permanence of the impacts described (permanent and temporary)? & 5.1% & 94.9%
6. Is the significance of the impacts assessed? & 17.9% & 82.1%
7. Are the effects on biodiversity addressed specifically (on the ecosystem level, species level and genetic level)? & 46.2% & 53.8%
8. Are the ecological impacts predicted in quantitative terms? & 0.0% & 100.0%
9. Are the ecological impacts predicted in qualitative terms? & 10.3% & 89.7%

### IV Examination of alternatives

1. Are the ecological impacts of the alternative solutions/sites described and compared with the proposed development? & 35.9% & 64.1%
2. Is the “no-action alternative” considered and the reason why it may be recommended or eliminated? & 74.4% & 25.6%

### V Examination of mitigation measures and monitoring

1. Are mitigation measures proposed to address the ecological impacts? & 84.6% & 15.4%
2. Are the details of how the mitigation measures will be implemented given (mitigation plans for each potential adverse impact at each stage of the project should be documented and the cost assessed)? & 59.0% & 41.0%
3. Is monitoring of ecological impacts proposed? & 69.2% & 30.8%
4. Are the details of how the monitoring will be implemented given? & 38.5% & 61.5%
5. Does the monitoring plan focus on the mitigating measures to be implemented during the construction and operating phases of the project? & 5.1% & 94.9%
### Appendix 4: Assessment Scores of Randomly Listed EIA Reports

<table>
<thead>
<tr>
<th>EIA</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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