Environmental Impact Assessment Training Manual

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About this Initiative

The *EIA Learning Platform* and the accompanying manual seek to help build capacity for key aspects of environmental impact assessment (EIA) at the project and initiative levels in the context of national legislation and policies. This platform is summarized in an online learning tool that can be used for individual and/or group learning with or without a teacher. This document can be used as a support material while working with the online platform.

Focus

This document provides an overview of common EIA processes and illustrated with examples of issues, case studies and sectors relevant for Honduras. The examples are mostly centred on countries that are part of the Central America Free Trade Agreement (CAFTA). CAFTA is a regional agreement between the United States, five Central American countries (Costa Rica, Honduras, Nicaragua, El Salvador and Guatemala) and the Dominican Republic. Under CAFTA, proposed large projects are required to develop an EIA to identify and mitigate negative impacts and enhance potential beneficial impacts throughout their whole lifecycle. This platform summarizes relevant information for the involved countries and others in the region. Regarding enforcement, the guidelines emphasize auditable commitment language, monitoring and follow-up, as well as compliance with EIA procedures and existing environmental performance requirements that are benchmarked in Appendix C for many different countries and international organizations.

Specifically, the *EIA Learning Platform* aims to help its target users:

- Understand the key elements of the EIA process based on best practices from global initiatives, including those led by development banks such as the World Bank, the Inter-American Development Bank and others.
- Understand the importance of a mandate for an EIA using specific case studies and examples from CAFTA countries and other Central American countries.
- Become familiar with key aspects of EIA project screening in order to gain skills in assessing the planned project/initiatives features to decide if an EIA is needed.
- Acquire the knowledge and skills to understand basic EIA steps with a focus on legislation in Honduras.

Capacity is multidimensional, particularly in an area as complex as an EIA, which requires a targeted approach. Such a targeted approach includes the need for immediately available information (in a user-friendly form). There is a large amount of information on EIAs, including guidance on methodological approaches, case studies and best practices at the national, local and project levels. Therefore, the *EIA Learning Platform* should be seen as providing a representative selection of the vast information sources on EIA relevant for this application and context.

The Audience

The target audience for the *EIA Learning Platform* includes facilitators who construct EIA training curricula and, ultimately, the participants in capacity-building programs. The latter group primarily includes junior policy-makers and EIA developers in public and private agencies, with overall responsibility for initiating and managing EIA assessment. They may work on different scales, from national governments to states and provinces, and municipalities. Many of them would have prior assessment or state-of-the environment assessment experience. Based on experience with previous training efforts, EIA practitioners may also include representatives of non-governmental organizations, academics, students, and media. The emphasis is on the EIA process as a whole and on helping diverse participants learn from listed case studies and resources materials, and use the developed checklists.

Contents

The *EIA Learning Platform* builds on elements of published information on EIA and best practices as well as other teaching resources and experiences with previous EIA initiatives[1]. Content is organized around the keys steps of an EIA. There is also a detailed manual with all the information listed in the platform as well as agendas and materials for teachers who would like to teach this as a course. The intention is to provide maximum flexibility to audiences and facilitators in deciding what content is most relevant.

[1] Sections of this platform are adapted from the open educational resource "Environmental Impact Assessment: Course Module," published in 2007 by the United Nations University (UNU), United Nations Environment Program (UNEP) and RMIT. Retrieved from http://sustainability-research.mcgill.ca/documents/EIA%20readings/eia-local/page173.htm

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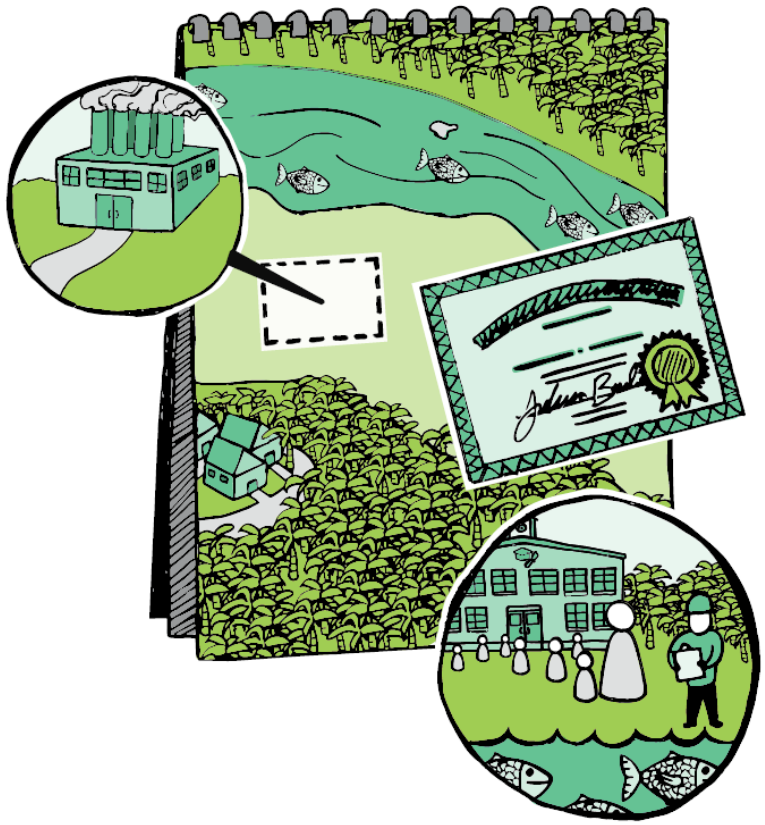
1.0 Environmental Impact Assessment – What? Why? How?

In this section you will learn about the most common definitions and objectives of EIAs, together with a brief history and examples to illustrate why EIAs are important. This will help you to gain a basic understanding of the purpose of EIAs to guide the next steps.



Environmental Impact Assessment is much more than a means to obtaining an environmental operating licence. It aims to minimize environmental and social impacts and if done properly, can even enhance sustainability development in the area where large-scale infrastructure projects are being implemented.

An environmental impact assessment (EIA) is commonly described as an assessment of the impact of planned activities on the environment, including impacts on biodiversity, vegetation and ecology, water, and air. An EIA can be seen as a process of identifying, predicting, and evaluating the likely environmental, socioeconomic, cultural and other impacts of a proposed project or development to define mitigation actions—not only to reduce negative impacts but also provide positive contributions to the natural environment and well-being.

Essentially, an EIA is designed to identify the potential risks of a project (e.g., infrastructure development such as a dam) to environmental and human well-being and identify measures to eliminate and/or mitigate these risks. This can be done by replacing and/or modifying planned activities to reduce impacts. In this context, an EIA can be seen as an information-gathering activity by the project proponent to outline (and if possible quantify) the risks, impacts and mitigation actions built into the project's whole lifecycle from design to closure so that decision makers are fully informed when approving the project.

EIAs are carried out in a wide variety of sectors, including agriculture, manufacturing, tourism, mining and forestry. Projects requiring an EIA can be large, such as a hydroelectric dam, or small, such as a new hotel on a beach. However, the level of impact on human and environmental health—rather than the size of the project—is the most important aspect of decision-making on the need for an EIA.

Currently, over 100 countries have legislation mandating the implementation of an EIA when a development/project is deemed to potentially have considerable impacts on environmental and social contexts In some countries, there is also an indirect mandate for EIAs—e.g., if the project is supported by development banks such as the World Bank and the Inter-American Development Bank.

TABLE 1 . DEFINITIONS AND EIA LEGISLATION IN SELECTED COUNTRIES IN THE CAFTA AND NEIGHBOURING COUNTRIES

Country	Definitions and EIA mandate
Belize	Instrument to identify and evaluate the effects of specific developments and to recommend mitigation measures.
Costa Rica	Technical Instrument with a format defined by National Environmental Technical Secretariat (SETENA) and signed by the developer. Instrument describes activities, works, and projects, the environmental impact and the required prevention, mitigation, and compensation measures.
Dominican Republic	Instrument for environmental policy and management that consists of procedures, studies, and technical systems to estimate the effects that works, activities, or projects may have on the environment.
Ecuador	Instrument to prevent or minimize environmental damage caused by public and/or private investments. Ensures access for public officials and the public to relevant environmental information about a proposed project or activity prior to a decision on the implementation or execution of the activity or project.
El Salvador	Ensures that activities, works, and projects follow procedures to identify and quantify impacts and mitigation measures.
Guatemala	Ensures that activities, works, and projects follow procedures to identify and quantify impacts and mitigation measures.
Honduras	To identify, predict and describe the possible positive and negative impacts of a project proposal, as well as, the proposed mitigation measures for negative impacts and a regular monitoring and control plan (Article 4.16 of ED189-2009). National Environmental Impact Assessment System (SINEIA) is also looking for the sustainable development of the country (Article 6 of ED189-2009).
Mexico	Procedure to protect the environment, and avoid or reduce negative impacts by setting conditions for infrastructure projects or activities that could disrupt ecological balance, or violate established limits and conditions.
Nicaragua	Administrative instrument consisting of procedures, studies, and technical systems for predicting the impacts of a specific work, activity, or project for which an environmental permit is being sought.
Panama	Early warning system based on continuous analysis that enables preventive decision making to protect environment; required prior to beginning specified activities, works, or projects.

Source: Tiffer-Sotomayor et al. (2015).

1.2 Why conduct an EIA?

Human well-being is closely connected to environmental sustainability. As a result, all forms of human development such as building infrastructure (i.e., roads and pipelines, mines, and tourism facilities etc.) have an impact on the surrounding natural environment and vice versa. This is evident when we consider the results of large-scale development like open-pit mines, hotels for thousands of people and large hydroelectric dams that often have irreversible impacts on the environment and the livelihoods of people because of large-scale deforestation, excessive water use, habitat destruction and resettlement.

Because of the complex relationship between the natural and human environments, it is very important to try to predict the environmental and social impacts of programs, projects and planned developments that may alter the

quality of the environment and impact well-being. As the human population continues to increase and natural resources become more limited, the importance of improving the sustainability of development and identifying mitigation measures—and thus the importance of creating high-quality EIAs—becomes greater. Table 2 below lists seven parameters of successful EIA performance, as rated by EIA experts on a scale ranging from "Very successful" to "Not successful". This table shows that EIA provides many key benefits but that there is room for improving the quality of EIAs.

TABLE 2. KEY BENEFITS OF EIAS AND THEIR LEVEL OF SUCCESS

Benefit of EIA	Very successful	Moderately successful	Marginally successful	Not Successful
Including a full range of considerations (e.g., social, ecological, risk, etc.)	11%	53%	27%	6%
Making precise, verifiable predictions.	2%	34%	45%	15%
Identifying appropriate mitigation measures.	12%	57%	24%	3%
Indicating confidence levels for data used in predicting impacts.	3%	17%	43%	32%
Specifying the significance of residual impacts.	3%	28%	45%	19%
Providing clear, understandable information for decision makers on the potential consequences of development proposals.	14%	51%	26%	8%
Providing relevant advice to decision makers on alternatives to the proposal being assessed.	8%	34%	37%	16%

Source: Sadler, 1996.

1.3 What is the outcome of an EIA?

The final product of an EIA is an Environmental Statement or Report. The EIA report provides information to decision makers prior to issuing an operating licence so they can properly assess the project's impacts on both the environment and people. Therefore, the report needs to be based on accurate and relevant information that accounts for diverse impacts and cumulative effects of the planned project's life cycle. The ultimate audience of the EIA report is the decision makers: it aims to help them decide whether to accept the project as it is, ask for revisions in the project or reject it.

There are also wider outcomes associated with an EIA. It should lead to better standards of development, and in some cases, limit development completely in sensitive areas. Where developments do go ahead, environmental assessments should help propose proper mitigation measures. When done well, an EIA can help stimulate growth and production in the local economy while promoting sustainability. In this context the specific contributions of the EIA can be listed as follows (Gazzola & Fischer, 2008, p. 44):

- Ensure that environmental considerations are explicitly addressed and incorporated into the development decision-making process.
- Anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of development proposals.
- Protect the productivity and capacity of natural systems and the ecological processes which maintain their functions.
- Promote development that is sustainable, optimizing resource use and management opportunities.

1.4 What is essential in an EIA?

An EIA should allow decision makers to understand a project's impacts in all its phases. It should also allow the public and other stakeholders to present their views and inputs on the planned development. Furthermore, to be truly effective, an EIA must contribute to and improve the project design, so that environmental as well as socioeconomic measures are core parts of it. Information used in the EIA needs to be based on good data, use accepted methodological approaches and be summarized in plain language that is understandable for decision makers.

Finally, the EIA does not end with the granting of a licence to operate. It is critical that that the approved practices and design are followed during the project operations and construction and that ongoing monitoring is in place during the lifetime of the project.

TABLE 3. TYPICAL ESSENTIALS OF AN EIA AND APPLICABILITY IN HONDURAS

Generic Example of Essentials of EIA
• Clear identification of all the potential impacts to human health and the environment, both positive and negative. • Potential alternatives developed along with a mitigation plan to decrease the severity of the impacts. • Improvements to the environmental design and social considerations relevant to a proposal. • Clear information for decision makers to include terms and conditions for environmental sustainability of the project. • Explanation how irreversible changes or damage to the environment will be avoided. • Clear indication of protection of important resources, ecosystems, cultural heritage sites and areas of providing environmental services.
Essentials of EIA in Honduras
• Applicable to all actions expected to have a significant environmental impact. • Two alternatives would compare the proposed actions (including the possibility of not acting). • Would generate a study in which the significance of probable impacts and their specific features will become clear both to experts and laypeople. • Would include a broad public participation. • Programmed to provide information for decision makers. • Would include monitoring and control procedures.

Source: UNEP, 2002; Friends of the Earth, 2005.

1.5 Assessments related to EIAs

Beyond EIAs, there are other types of environmental assessments that are used to identify and eliminate the harmful environmental impacts of projects, investments and other activities. These include **Strategic Environmental Assessments (SEAs) and Integrated Environmental Assessments (IEAs)**.

- **Strategic Environmental Assessments (SEAs)** (sometimes referred to as Environmental Assessments [EAs]): An SEA is a systematic decision-making process done to analyze the environmental and human health effects of a proposed development activity. This process is conducted prior to the environmental impact assessment and determines the EIA's scope, depth of analysis and types of public participation and consultation to be integrated into the plan. Public participation and consultation are essential aspects of this process and should be integrated at every step of the EA process where possible (United Nations, 2012).
- **Integrated Environmental Assessments (IEAs)**: An IEA is a process of producing and communicating future-oriented, policy-relevant information on key interactions between the natural environment and specific human activities (IISD & UNEP, 2008).

Compared to SEAs and IEAs, EIAs are the most commonly used environmental assessments. However, it is important to stress that all EIAs are rooted in concepts of sustainable development, namely they all aim at the preservation of natural resources and the environment for future generations by informing how human development activities will unfold and what steps can be taken to reduce their impact.

1.6 Timeline of EIA globally and in Honduras

An EIA is an important part of environmental policy and efforts to minimize the negative impacts of projects, initiatives, and planned investments on environmental resources such as biodiversity, water, forests, soil and others. At first, EIAs were included as part of environmental policy: later, they became part of broader efforts to promote sustainable development. These efforts take a broader approach to EIAs not only to assess impacts on water, soil, forests and biodiversity, but also to focus on the interaction between water, land and biodiversity and habitat fragmentation, while taking a more precautionary approach. Over time, EIAs have moved from only including impacts on the natural environment, toward integrating social and health impacts as well.

In Honduras, the principles of EIA were introduced in 1993 as the part of the the General Law of the Environment, adopted by Executive Decree No. 104-93. In 2009, legislation on the actualization and modernization of the EIA system was adopted as a Ministerial Agreement No. 189-2009 and published in the official newspaper. The 2009 EIA modernization legislation is currently applicable in Honduras.

TABLE 4. HISTORY OF EIA GLOBALLY AND IN HONDURAS

History of EIA globally	History of EIA in Honduras
1960s – EIA begins as a component of U.S. environmental policy. 1969 - The U.S. National Environmental Policy Act (NEPA) in 1969 requires an environmental assessment of all major federal projects and programs that could affect the quality of the human environment. 1972 - At the United Nations Conference on the Human Environment in Stockholm, the UN General Assembly agrees upon a Declaration containing 29 principles concerning the environment and development. 1973 – Canada formally introduces EIA legislation through the federal Environmental Assessment and Review Process (EARP). 1974 - Australia introduces EIA legislation 1975 - Germany and Thailand introduce EIA legislation 1976 - France introduces EIA legislation 1977 - Brazil introduces EIA legislation 1978 - Philippines introduces EIA legislation 1981 - Israel introduces EIA legislation 1982 - Costa Rica introduces EIA legislation 1983 - Pakistan introduces EIA legislation 1984 - The World Bank adopts its "Environmental Policy and Procedures" which stipulate the integration of environmental consideration at the initial stages of defining and preparing projects. 1985 – The EIA Directive for European Union Member States implements the requirement that EIAs must be conducted prior to the authorization of development projects likely to have significant environmental effects. 1986 - Italy introduces EIA legislation 1987 - The Netherlands introduces EIA legislation 1987 - United Nations Environment Programme (UNEP) adopts the Goals and Principles of Environmental Impact Assessment– 13 rules designed to facilitate the introduction and promotion of EIA systems in member countries as well as promoting the development of an international EIA procedure. 1988 - Tunisia and Sri Lanka introduce EIA legislation 1989 - The EIA Operation Directive (OD), designed for its staff outlines methods and procedures for EIA implementation in proposed projects, as well as providing sector-specific manuals. 1992 - Belize and Estonia introduce EIA legislation 1992 – Principle 17 of the United Nations- Rio Declaration emphasized the importance of EIAs as a "national instrument" to be used for all projects likely to have significant adverse environmental impacts and which are subject to the decision of national authority. 1993 - Bosnia & Herzegovina introduces EIA legislation 1994 - Nicaragua introduces EIA legislation 1995 - Romania introduces EIA legislation 1996 - Montenegro and Nepal introduce EIA legislation 1997 - Japan introduces EIA legislation 1999 - Ecuador and Ireland introduce EIA legislation 2002 - Lebanon introduces EIA legislation 2002 – UNEP emphasized that EIAs need to put more emphasis on integrating social and health impacts. 2006 - Panama introduces EIA legislation Recently (after 2010) – Additional studies are carried out to supplement the EIA decision-making process.	1993 –The principles of EIA are Introduced in the Honduran General Law of the Environment, adopted by Executive Decree No.104-93. 1993 – National System of Environmental Impact Assessment (SINEIA) is established and put in charge of all EIAs in Honduras. General Law of the Environment Decree 109-93. 1994 – The Regulation of the SINEIA is issued (published in the official newspaper "La Gaceta" No. 27.291 on March 5, 1994), a procedure for obtaining an environmental license. The Office of Environmental Evaluation and Control (DECA) and the Environmental Unit are also created 1997 – The regulation "Reglamento de Competencias del Poder Ejecutivo" is enacted, which determines that there will be two sub-secretaries within the Office of Environmental Evaluation and Control (DECA): the Sub-secretary of Natural Resources and the Sub-secretary of the Environment. 2002 – The modernization and strengthening of SINEIA follows parameters established by the Agreement of Ministers of the Environment and the Central American Action Plan developed by the Central American Commission on the Environment and Development (CCAD). 2009, a new regulation is enacted by SINEIA, (Ministerial Agreement No. 189-2009 published in the official newspaper) on the actualization and modernization of the EIA system - no significant changes had taken place since 1994. Recently (after 2010) – Honduras introduces an online licensing system to register and submit EIAs.

Sources: Gilpin, 1995; UN, 1992; UNEP, 2002; OECC, 2000.

2.0 What are the Steps in an EIA?

This section covers each step of the EIA process with examples of approaches used by international agencies, selected countries in the Latin American and the Caribbean region (LAC) and practices in Honduras. The EIA process aims at an assessment to inform development decisions by mandating a consideration of project alternatives and ways to prevent, mitigate, and control potential negative environmental and social impacts. This generally involves a number of steps, including project screening, scoping, assessment, impact management, EIA report development, public participation, review, decision, and monitoring.

2.1 Screening

In this section you will learn methods of conducting a quick assessment of the planned projects and developments to decide if their impacts on the environment and well-being are severe enough to develop a full EIA.

What is screening?

Screening is the first stage of the EIA process which results in a key EIA decision, namely to either conduct the assessment (based on the likely significant impacts) or not conduct it (in the anticipated absence of such impacts). Screening needs to follow specific procedures often described in the legislation so all the projects follow the same process. In some cases, particularly if the possible impacts of a project are not known, a preliminary environmental assessment will be prepared to determine whether the project warrants an EIA.

- Key contributions of screening to a good EIA:
  - Facilitates informed decision making by providing clear, well-structured, factual analysis of the effects and consequences of proposed actions.
  - Influences both project selection and policy design by screening out environmentally and/or socially unsound proposals, as well as modifying feasible action.

Why do we need to conduct a screening?

An essential aspect of conducting an EIA is to determine the level of impact of the proposed project, development or initiative. When we look at major development projects—especially those involving natural resources, such as mining, hydroelectric dams, oil extraction, or tourism—we can say for certain that they will require an environmental and social impacts assessment. On the other hand, the development of a tourism project may seem a low-risk at first, but a second look could reveal that the project requires the removal of endangered flora or fauna from the development site, large amounts of drinking water, energy and extensive sewage production. It will also lead to increased road and air traffic to deliver supplies, visitors and workers. Finally, the impacts of project can change over time—thus during screening and the whole EIA impacts are considered over the lifetime of the project, from its construction through to operations and after closing.

The threshold requirements for conducting or not conducting an EIA vary from country to country. In some countries regulations and laws provide a list of the types of activities—i.e., certain types of significant environmental and social impacts such as resettlements, large-scale deforestation, land-cover change and extensive water use or waste production or projects above certain monetary values. Most proposals can be screened very quickly and often the majority of them may have few impacts and will be screened out of the EIA process. Only a limited number of proposals, usually major projects, will need a full EIA because they likely have major irreversible impacts on environmental resources such as biodiversity, water, air, fragile ecosystems, on people through health impacts or their livelihood, needs for resettlement and on cultural heritage sites. We can thus identify three types of projects:

1. For high-impact projects: Projects that are likely to have significant serious adverse environmental impacts (i.e., irreversible, affect vulnerable ethnic minorities, involve involuntary resettlement, or affect cultural heritage sites) and thus likely a full EIA is required:

- Dams and reservoirs forestry and production projects.
- Industrial plants (large-scale).
- Irrigation, drainage, and flood control (large-scale).
- Mining and mineral development (including oil and gas).
- Port and harbour development.
- Reclamation, resettlement and new land development.
- Thermal and hydropower development; manufacture, transportation, and use of pesticides; and other hazardous and/or toxic materials.

2. For projects likely to have adverse environmental impacts that are less significant than those of in the previous category: These projects likely won't have irreversible impacts, and mitigation measures can be designed more readily than for high-impact projects. Normally, a limited EIA will be undertaken to identify suitable mitigation and management measures, and incorporate them into the project.
   - Agro-industries
   - Electrical transmission; rural electrification
   - Aquaculture, irrigation and drainage (small-scale)
   - Renewable energy
   - Tourism
   - Rural water supply and sanitation
3. For projects that are likely to have minimal or no adverse environmental impacts: No EIA is required.

These categories are often numbered 1, 2, and 3, or indicated as A, B and C to distinguish between them.

What are the approaches to screening?

Screening is done by the project developers often using a set of criteria determined by the responsible agency. It is important that screening be done as early as possible in the development of the proposal in order for the proponent and other stakeholders to be aware of possible EIA obligations. It is also important that screening be applied systematically and consistently, so that the same decision would be reached if others did the screening. There are some specific methods applied to screening, which reflect prescriptive and/or discretionary approaches.

Overall, we can distinguish two different types of screening (United Nations University [UNU], UNEP, RMIT, 2007):

- Prescriptive or standardized approaches in which development proposals that either require or are exempt from EIA are listed in legislation and regulations, and proponents can often decide based on these standardized approaches; this could include:
  - Legal (or policy) definition of proposals to which EIA does or does not apply.
  - Inclusion list of projects (with or without thresholds) for which an EIA is automatically required.
  - Exclusion list of activities which do not require EIA because they are insignificant or are exempt by law (e.g. national security or emergency activities).
- Customized approaches in which proposals are screened on an individual or case-by-case base, using indicative guidance with categories.

Different countries and international agencies combine these types of screening procedures. Most often, a simple categorization (such as A – C or 1 – 3) is used. These categories help proponents and licensing agencies decide when a whole EIA is needed. The need for an EIA can be estimated based on planned projects whose impacts

extend beyond the project site, such those as using water that cannot be produced (or producing sewage and waste that cannot be processed) the on the project site. Specifically, the European Union suggests a set of questions to quickly assess project proposals. These questions are designed so that a "Yes" answer will generally point toward the need for EIA and a "No" answer to one not being required (European Commission [EC], 2001).

1. Will there be a large change in environmental conditions?
2. Will new features be out-of-scale with the existing environment?
3. Will the effect be unusual in the area or particularly complex?
4. Will the effect extend over a large area?
5. Will there be any potential for transboundary impact?
6. Will many people be affected?
7. Will many receptors of other types (fauna and flora, businesses, facilities) be affected?
8. Will valuable or scarce features or resources be affected?
9. Is there a risk that environmental standards will be breached?
10. Is there a risk that protected sites, areas, and features will be affected?
11. Is there a high probability of the effect occurring?
12. Will the effect continue for a long time?
13. Will the effect be permanent rather than temporary?
14. Will the impact be continuous rather than intermittent?
15. If it is intermittent will it be frequent rather than rare?
16. Will the impact be irreversible?
17. Will it be difficult to avoid, or reduce or repair or compensate for the effect?

In these cases, proposals are screened based on preliminary assessments of the potential impacts (or on the type and magnitude of activities) that the project is planning to undertake. These may include such planned activities as amount of land cleared or water use, sewage and air emissions produced over certain thresholds. Here it is really important that thresholds are set across the potential areas of impacts such as the extent of water withdrawal, air emission release to the air, destruction of soils or changes to land cover. Specific projects such as oil refineries, thermal power stations, gas and oil extraction and large agricultural operations would all require EIAs. Finally, most countries in the LAC region focus on defining the types of projects, as well as their size and potential impacts to determine the need for an EIA.

TABLE 5. EXAMPLES OF DIFFERENT TYPES OF SCREENING CATEGORIES

Organization	Types of screening	Details on types of screening
Inter-American Development Bank (IDB)	Project categories—A, B, C, and Uncategorized — According to the scale of the project, location, sensitivity and potential impact.	**C** – No EIA required, but some Category "C" operations may require specific safeguards or monitoring requirements to address environmental and other risks (social, disaster, cultural, health and safety etc.). ***B*** – Projects require an environmental and/or social analysis, according to, and focusing on, the specific issues identified in the screening process, and an environmental and social management plan (ESMP). Category B if its potential adverse environmental impacts on humans or environmentally important areas— including wetlands, forests, grasslands, and other natural habitats—are less adverse than those of Category A projects. **A** – Projects likely have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites. Potential impacts are considered "sensitive" if they may be irreversible (e.g., lead to loss of a major natural habitat) or raise impacts on indigenous peoples; natural habitats; physical and cultural resources; or/and involuntary resettlement.
World Bank	Three categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.	**Category A**: Projects likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works. EIA examines the potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the "without project" scenario), and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance. The proponent is responsible for preparing an EIA report. **B**: Proposed project can have potential adverse environmental impacts on human populations or environmentally important areas, but less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigating measures can be designed more readily than for Category A projects. The scope of EA for a Category B project may vary from project to project, but it is narrower than that of Category A EIA. **C**: A proposed project is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required.
European Union	Case-by-case examination based on lists of sectors and types of activities that require an EIA and a set of activities that may require EIA depending on their location, activities, and impacts.	Decided according to thresholds and/or criteria (for example size), location (sensitive ecological areas in particular) and potential impact (surface affected, duration). Member States may set thresholds or criteria for the purpose of determining which of such projects should be subject to assessment on the basis of the significance of their environmental effects such as: • For power stations: capacity in MW • For landfills: total volume, volume/day, tonnes/day, total capacity in tonnes • For shopping centres: area in hectares or m^2 (area, floor space) • For roads: length of road (in km) Specific project are listed, including crude-oil refineries, thermal power stations and other combustion installations, installations for the extraction of asbestos, chemical installations, groundwater abstraction, works for the transfer of water resources between river basins, dams, extraction of petroleum and natural gas, pipelines for the transport of gas, intensive rearing of poultry or pigs, quarries and open-cast mining.

Source: IDB, 2011;World Bank, 1999; European Union, 2001.

TABLE 6. APPROACHES TO SCREENING THE SELECTED COUNTRIES IN THE CAFTA AND NEIGHBOURING COUNTRIES

Country	Project types	Criteria	Details
Belize			Regulations list the types of projects that require, do not require, and may require EIA, depending on size and location. Proponents should apply early to the government agency to determine whether project requires an EIA or EMP.
Costa Rica	X	X	Two-stage screening: (i) legislation lists the type of activities, projects, and works that require EIA; and (ii) application of Form D1 or Form D2, depending on project category.
Dominican Republic	X	X	Law defines the types of projects, works, and activities that require EIA—and determines the type of study required for each category—according to the potential environmental impact; for projects not included in the list, national agency determines if an EIA is needed
Ecuador	X		Legislation defines the type of projects that require an EIA. Proponents must register the project in the online Environmental System (SUIA), to request a certification of the project's location in relation to conservation areas and forest protected areas.
El Salvador	X		Legislation defines the type of projects that require an EIA. Group A: does not require the presentation of any information Group B-1: EMP Group B-2: EIA.
Guatemala	X		Regulation lists different types of activities that require an EIA, including hotels of a certain size, marinas, desalination plants, hydroelectric projects, and coastal development.
Honduras	X	X	Law and regulations list the types of projects and activities that require an EIA; Category 1: SINEIA F-01 form and Category 2 or 3: SINEIA F-02 form and Environmental Management Plan Category 4: EIA. Four categories (1, 2, 3, and 4) based on the characteristics of operation, nature of the actions, its potential environmental impacts or risk.
Mexico	X	- partially	Law and regulations list the types of works and activities that require an EIA; States and Federal District can demand an EIA under certain conditions.
Nicaragua	X	-	Law lists types of projects that require an EIA.
Panama	X		Law and regulations list the types of activities depending on the risks associated with the project.

Source: Tiffer-Sotomayor et al., 2015.

How is screening conducted?

The screening is usually done by a self-assessment by the project/development proponents using guidance and question forms provided by the designated authorities. These could range from open- ended questions—in which it is up to the proponents to create the structure around the questions/areas provided—or the proponents are asked to fill out a detailed form and present their activities and impacts.

Most countries in the LAC region focus on defining or specifying the types of projects, their size and potential impacts to determine the need for an EIA.

In Honduras, Article 24 of Decree 189-2009 establishes that all projects, construction work or activity (both public and private) need to obtain an environmental license prior to beginning construction and operation. Based on the type of the planned projects, low-impact or low-risk projects (Category 1) shall not be compelled to comply with the formality of an environmental license. However, these projects still need to comply with existing environmental legislation and the Good Environmental Practice Code of Honduras (Article 30 of ED 189-2009). Finally, exemptions from EIA application are provided to any (groups of) activities identified in the regulation as not requiring an EIA (e.g., military or emergency activities). The actual screening is done using two forms: Form SINEIA Form F-01 and F-02 SINEIA. The first it is for low-impact projects (Category 1) and the second for moderate-impact projects (Categories 2 and 3).

- The SINEIA Form F-01 environmental form is intended to carry out the impact assessment of environmental activities, works or projects under Category 1 activities, i.e., those with low environmental impact or potential environmental risk. The form must be completed by the holder or its legal representative, and is intended to present the characteristics of the activity, work or project to be developed, and the basic environmental conditions of the site where it is to be located. The review procedure SINEIA Form F-01 may entail, according to the reviewing authority, the inspection of the project site, work or activity.
- SINEIA Form F-02 is an instrument of environmental assessment to be filed by the legal representative of the holder or holders of projects, works or activities of moderate risk or potential environmental impact environmental such as Categories 2 and 3. This form is an environmental self-assessment tool in a digital format/spreadsheet by which, the holder, with the support of an environmental service provider makes a description of project or land area where the project is to be located and assess the significance of the environmental impacts that will occur.

Currently, the screening is done using an online system that can be accessed at: http://miambiente.prohonduras.hn/MiAmbiente

More details on Honduran EIA and EMP regulations and procedures are provided in section 3.7

TABLE 7. SUMMARY OF THE CATEGORIES OF PROJECTS, WORKS OR ACTIVITIES IN HONDURAS

CATEGORY	EXPLANATION
Environmental Categorization	Activities, works or projects are arranged in four different categories (1, 2, 3, and 4) taking into account the relevant factors or conditions in terms of its dimensions and activities, known characteristics of operation, nature of the actions developed, its potential environmental impacts or environmental risks.
Category 1	Activities, works or projects in Category 1 correspond to those human activities classified as Low-Impact Potential environmental or Low Environmental Risk.
Category 2	Activities, works or projects in Category 2 correspond to those human activities classified as Moderate – Low Potential Environmental Impact and Environmental Risk.
Category 3	Activities, works or projects in Category 3 correspond to those human activities classified as Moderate – High Potential Environmental Impact and Environmental Risk.
Category 4	Activities, works or projects in Category 4 correspond to those human activities classified as High Environmental Impact or Environmental Risk. Megaprojects, defined as large-scale project and those that are national in scope, are included as this category. Identifying an activity as a Category 4 Megaproject is done initially through the Categorization table. Verification is the responsibility of the Secretariat Natural Resources and Environment through the Directorate of Evaluation and Environmental Control. This identification includes indicating whether it is a megaproject of a strategic nature or not.

Source: Decree 189-2009

2.2 Scoping

In this section you will learn how to specify and narrow down the focus of the EIA, define the project area, alternatives and baseline data.

What is scoping?

Scoping is a critical step in the preparation of an EIA, as it identifies the issues that are likely to be of most importance during the EIA and eliminates those that are of little concern. Scoping is a systematic exercise that establishes the boundaries of your EIA and sets the basis of the analyses you will conduct at each stage. A quality scoping study reduces the risk of including inappropriate components or excluding components that should be addressed.

- Identifying all relevant issues and factors, including cumulative effects, social impacts, and health risks.
- Facilitating meaningful public engagement and review in at least two stages of the process: once when scoping the impacts and issues to be considered, and again during the presentation of initial findings of the EIA, including a non-technical summary.

- Determining the appropriate time and space boundaries of the EIA.
- Identifying the important issues to be considered in an EIA, such as setting the baseline and included alternatives.

Why do we need conduct a scoping process?

Scoping is critical as it sets up the boundaries of the EIA, including the project area, what to include in the EIA, and how to put the EIA together guided by the terms of reference (TOR). An EIA is an intensive process in terms of costs, cross-sectoral expertise and assessments that must be completed, and types and extent of the consultations that must be conducted. Thus, scoping helps to select what is needed and what is not relevant, and thus it serves as a work plan for the entire EIA process. During the scoping phase the area of the focus of the EIA, baseline data and the type of information needed, project alternative considered are determined and then used in the next steps of the EIA.

What are the approaches to scoping?

The environmental information provided to competent authorities must focus on those issues that are important for decision making on the particular project. It should not burdened with irrelevant details or insignificant issues.

The key approaches to scoping:

- **Determining the key aspects and criteria for evaluating the significance of environmental and socioeconomic impacts**. This first approach includes creating a list of environmental, biological and socioeconomic resources and issues that are important to consider, such as water, soil and land use, biodiversity and people's access to water, land and food and energy. At this stage it is also important to identify the criteria based on which impacts will be assessed, such as the amount of water extracted, waste produced, or agricultural land lost and forest cover cut/replanted. The selected environmental and social resources and issues and the set of criteria will then be analyzed in detail in the next phases.
- **Public consultation.** This is a critical part of the EIA, and in many LAC countries it is mandated by legislation. The key groups involved in the consultations include project-affected people, host communities and local NGOs, as appropriate. It is critical to provide these stakeholder groups with opportunities to participate in the planning, implementation, and monitoring of the planned project/investment. For more on public consultation see section 3.6.
- **Selecting appropriate baseline** - baseline surveys and investigations should be carried out on the issues that have significant environmental effects order to:
  - Provide an understanding of existing conditions linked to a specific year e.g., base year or period.
  - Decide about a timeline that will allow for predictions of how the project may change the key environmental component e.g., number of years of project operations.
  - Allow for predictions of how adverse effects can be mitigated and beneficial effects enhanced e.g., years needed until the mitigation responses are implemented and start making impacts.
  - Provide a sound basis for the design and evaluation of post-EIA studies e.g. early monitoring.

The description of the existing environment may include various biophysical, social and economic parameters such as air , water , geology, soils, biodiversity, land use, community conditions (socioeconomic, health & cultural) with the potential to be affected by the project. "Baseline data should provide a statistically valid measure of the parameter's natural variability during the pre-project period in order to be of value for impact prediction and environmental monitoring" of the project's impacts (Government of Saskatchewan, 2007, n.p.). Similarly, methods for the collection of baseline and monitoring data on particular issues should be consistent—thus it is important to review the baseline data when designing the monitoring plan during the last stage of the EIA. Finally, the use of existing information is encouraged, although there will often be a

need to collect additional data for certain parameters such population, vegetation details, human health data, and data on livelihood conditions in the local communities. Information should be presented in a simple and understandable form so the connection of the project impacts (both positive and negative) can be identified. This will be also important in the next phases when the EIA is evaluated.

- **Defining alternatives.** At this stage alternatives for project construction, implementation and closure can be developed that will then be further assessed in the next phase. The consideration of alternatives to a proposal is a requirement of many EIA systems. During the scoping process, alternatives to a proposal can be generated or refined, either directly or by reference to the key issues identified. A comparison of alternatives will help determine the best method of achieving project objectives while minimizing environmental impacts or proposing the least harmful and the most environmentally and socially friendly solutions. Often, however, the consideration of alternatives is a superficial rather than a meaningful exercise. This happens for example when the EIA is developed when all the project planning is nearly completed and thus the alternatives are only added for the sake of the EIA, but the proponent is not serious about them. Depending on timing, the type and range of alternatives open to consideration might include (UNU, UNEP, RMIT, 2007):
    - Demand alternatives to improve efficiency and reduce resource use (e.g. using energy more efficiently rather than building more generating capacity).
    - Inputs or supplies alternatives (e.g., where a mix of energy sources permits).
    - Considering different actions to achieve the same/similar outcomes (e.g. providing public transport rather than increasing road capacity).
    - Relocating activities or the entire planned project (e.g. the location of a dam and/or irrigation channels).
    - Changing processes and technologies (e.g., use of waste-minimizing or energy-efficient technology).
    - Changing the timing of planning activities (e.g., for airport and transport operations, reservoir drawdown).
- **Terms of Reference**. In concluding the scoping process, the preparation of Terms of Reference (TOR) for an EIA is an important task. Alternatively, or as a supplement to TOR, a formal scoping report may be issued (especially useful if the issues and/or process are controversial). In some EIA systems, the project proponents prepare their own TORs guided by legislation; in other countries the TOR is prescribed in the legislation. This is further discussed in section 2.5 (The EIA Report). Examples of TORs from 3 different organizations can be found in section 3.4.

TABLE 8. OVERVIEW OF SCOPING IN SELECTED LAC COUNTRIES

Country	Scoping (Y/N)	Consultation (Y/N)	Scoping practice
Belize	Y	Y	Scoping required. Requires consultation, meetings with the government and other agencies. Scoping includes identification and analysis of impacts on human beings, flora and fauna, soil, water, air, cultural heritage, landscape, and other environmental factors; it also includes analysis of alternatives.
Costa Rica	N	N	Agency defines scope in TORs for the EIA.
Dominican Republic	N	N	No formal scoping procedure. Scope determined by government agency and includes impacts on natural resources, environmental quality, health, and on other factors.
Ecuador	N	N	No scoping procedure. Proponents submit draft TORs to ministry or EIA. For Category III projects, the ministry has guidelines for TORs on its web site.
El Salvador	N	N	Potential impacts and risks during construction, operation, and closure on the environment's and population's physical, biological, socioeconomic, and cultural resources are expected to narrow down during the scoping
Guatemala	N	N/A	The Minister responsible for planning may make regulations that specify details related to the content, criteria, and procedures for public participation and review.
Honduras	Y	Y	Proponent publishes information about the project in print media and the public, and NGOs have 15 days to submit comments to MiAmbiente. DECA decides which comments need to be included in the TORs.
Mexico	N		Consideration of ecosystems, their preservation and restoration, and protection of the environment must be narrow down during scoping
Nicaragua	N	N/A	Includes activities that can damage the environment or natural resources, or that can have negative socioeconomic, cultural, biotic, abiotic, or aesthetic impacts
Panama	Y	Y	Plan for citizen participation (meetings, surveys) and respond to inquiries about project components from those who would be affected.

Source: Tiffer-Sotomayor et al. (2015).

How is scoping conducted?

In reviewed LAC countries, the legislation specifies the scoping procedures, listing the key sectors that need to be considered, guidance on public consultation and the TOR. The main steps for carrying out a scoping activity are:

- Set up the team of experts that will conduct the EIA.
- Describe the project area and the area of the project influence.
- Outline project alternatives for preparation, implementation and closure.
- Conduct public meetings and stakeholder consultations; integrate comments and collected feedback into project planning and the alternatives.
- Outline a set of environmental, biological and socioeconomic resources and issues that will be addressed in the assessment.
- Define a set of criteria to assess the planned project/development.
- Identify the project impacts, during its all stages, list the significant and non-significant impacts and explain why.
- Identify a set of data for baseline descriptions and potential additional data collection needs.
- Start inserting this information in the appropriate section of the TOR.

In Honduras, it is suggested that a multidisciplinary team prepare the EIA. It is important that the multidisciplinary team is well-coordinated so that the results of environmental studies become more integrated into the design and operational plan as well as the execution of the activity, work or project. The multidisciplinary team

should have a professional technical coordinator, who will be responsible for overseeing the actions and tasks. The rest of the team should be selected according to the competencies needed to comply with the requirements of the EIA. The core parts of the scoping process in Honduras are:

- **Project Location:** Municipality and department; location on map of the project area reference from the main paved road and nearest geolocation.
- **Project area, construction area and area of influence:** The area of construction is the number of square metres to be developed. The area of the land on which the project corresponds is called the "net project area," which is part of the "total project area." The total project area is likely to be affected by impacts generated by the project e.g., during construction by the negative environmental impacts (such as noise, emissions, vibrations, visual effects, etc.). The "area of influence" is defined as the project environment that located outside the area of the overall project and extends from its boundaries to a distance of 500 metres. This area should be included in the environmental analysis and maps should be made for the EIA. The "area of indirect influence" corresponds to the area outside the direct influence yet where the effects of the activity, work or project are detectable. Its extent depends on the specific environmental effects, and thus in turn the environmental and social impacts of the project.

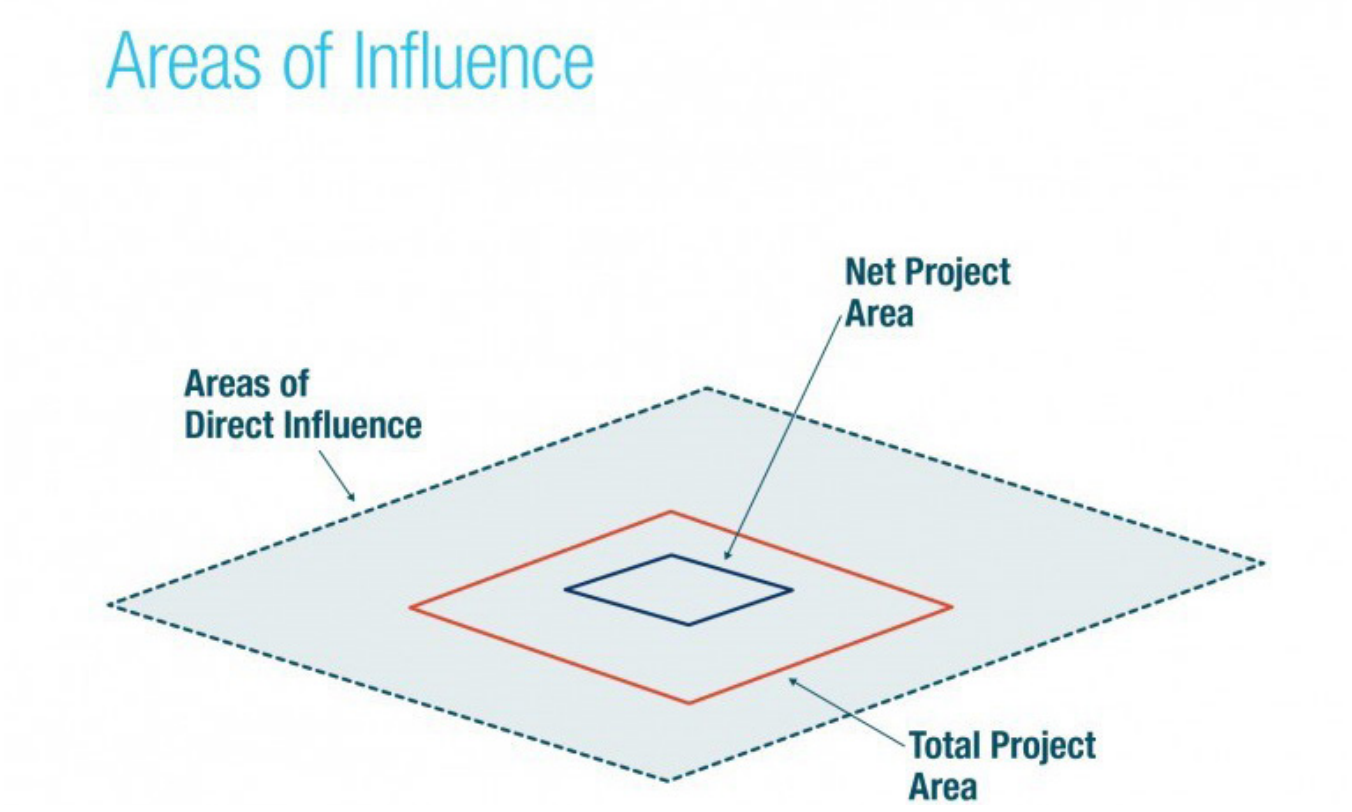


FIGURE 1. SCHEME OF THE PROJECT AREAS AND DIRECT INFLUENCE

- **Applicable legal considerations and environmental regulations:** In order to determine its legal feasibility, a project must be considered to be in compliance with all legal provisions applicable to the project's local, national, and/or regional area. It is important to identify and collect the legislation and regulations so they can be used during the scoping phase.
- **Description Environmental Physical Environment:** Description of the relief and topography of the site where the project will be implemented. This includes the pattern of natural surface drainage, soil type, class capacity and land use, geological situation of the land to be developed and its geomorphological situation. Determination if there is an aquifer under the area, and if there is vulnerability to natural hazards

and threats, such as landslides, faults, floods, volcanic eruptions, among others. Supporting information is provided with maps, profiles and other figures.

- **Biological Environment Environmental Description:** Description of the existing plant cover that will be affected for project implementation, including a tree inventory and description of species and indication whether any are found on lists of endangered species.
- **Description of Socioeconomic environment:** Description of the characteristics of the population in the project area according to the baseline statistical data. Description of the public services available in the area of influence (Water, roads, electricity, telecommunications, education, health, emergencies). Summary of existing archaeological data for the project area.
- **Consultation summary:** Outcomes of public consultations in the vicinity of the project areas to get affected stakeholders' opinions and feedback on project activities.
- **Overview of the alternatives.** Provide an overview of the alternatives considered in the project and their major characteristics, differences and why they were chosen.

2.3 Impact Assessment and Mitigation

In this section you will learn how to assess the impacts of the planned project and its alternatives on the environment and socioeconomic conditions and livelihoods and then identify mitigation measures to reduce impacts and/or provide positive contributions.

What is impact assessment?

Impact assessment is the core part of the EIA. At this step, a detailed assessment of the planned project and selected alternatives compared to the baseline conditions is performed. This is done by using both qualitative descriptions, such as high, medium and low impacts, and by quantitative descriptions, such as indicating the cubic metres of water withdrawn, sewage produced, and pollutants released. This is done for the planned project and the identified alternatives allowing the comparison of these alternative for their impacts on the local and regional environmental, and socioeconomic and cultural characteristics. Once the detailed assessment is completed, mitigation measures to reduce impacts are identified.

Mitigation actions are a critical part of the EIA process, as these actions aim to prevent adverse impacts from the planned project on the environment and people, making sure that those that are unavoidable are maintained within acceptable levels. At this step, the focus is on incorporating mitigation measures into the project design (and the alternatives) as well as on providing guidance for the monitoring of the impacts during the whole duration of the project.

The key contributions of impact assessment and mitigation to a good EIA:

- Provides a clear and itemized list of relevant impacts on the environment and people, including cumulative effects, social impacts, and health risks.
- Outlines any cumulative effects, bringing together identified impacts on environment, society and health.
- Based on the results of the impact assessment, it lists the adverse effects of proposed actions; a detailed list of mitigation actions is identified.

Why do we need to conduct an impact assessment and mitigation?

An essential aspect of conducting an EIA is determining the level of impact of both the proposed project and the identified alternatives. This is important because the outcomes of the assessment will indicate if the impacts are low, medium, moderate or high, and/or provide specific quantitative data using the baseline data identified in the scoping section. This includes a systematic assessment of types of impacts across selected environmental, social and cultural characteristics of the area that the project influences.

Finally, the impacts of the project and its alternatives can change over time; thus, during the assessment and the whole EIA the impacts are considered over the lifetime of the project from its construction through to operations and after the closing.

It is important to systematically characterize the impacts based on the following characteristics:

- **Magnitude and frequency:** This refers to the size or amount of an impact, determined on a quantitative basis if possible (e.g., scale of vegetation removal, water withdrawals, increased emissions from transportation, operations, energy production etc.).
- **Duration:** This refers to the time over which the impacts lasts, including during construction, operations and after site closing; the duration of an activity may differ from the duration of the resulting impact caused by the activity.
- **Spatial distribution:** This refers to the extent of the impacts to both the project site and beyond.
- **Reversibility:** According to the Chartered Institute of Ecology and Environmental Management (CIEEM, n.d., n.p.), "An irreversible (permanent) impact is one from which recovery is not possible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it; and a reversible (temporary) impact is one from which spontaneous recovery is possible or, for which effective mitigation is both possible and an enforceable commitment has been made."
- **Positive/negative effects:** According to the Chartered Institute of Ecology and Environmental Management (CIEEM, n.d., n.p.), "Positive impacts merit just as much consideration as negative ones, as international, national and local policies increasingly press for projects to deliver positive . . . outcomes" for environmental, social and other sustainable development impacts.
- **Likelihood of occurrence:** This indicates the risks that the impacts may occur and then a risk mitigation options can be considered for impacts that are high risks but low occurrence.
- **Direct/indirect effects:** These are both effects directly related to the development such as land and soil lost because of a road development, and indirect impacts related to habitat fragmentation and downstream effects on the hydrological systems.
- **Cumulative effects.** This indicates "changes to the biophysical, social, economic, and cultural environments caused by the combination of past, present and 'reasonably foreseeable' future actions" in a specific location (Indigenous and Northern Affairs Canada, n.d., n.p.).

Impacts are evaluated according to key categories such as those on environmental resources, social issues and others focus on such things as disaster management. An overview of the key categories is presented in Table 9.

TABLE 9. CATEGORIES INCLUDED IN THE IMPACT ASSESSMENT

Categories	Subcategories			
Environment	Land use and soil: soil removal and pollution Land-cover change: wetlands, floodplains, mangroves, other subsoil (composition, depth, etc.); surface (types and distribution, characteristics, uses, etc.); Topography (altitude, gradients, relief variations, orientation, etc.)	Sewage release (treated, untreated) Groundwater (location, description of aquifers, recharge areas, level of use, etc.) Surface water (location and description of areas that could be affected by the project; identification of use of surface water; description of drainage areas and channels; discussion on potential for floods, sedimentation, erosion, and eutrophication of water sources)	Air: emissions, noise, odour, dust; Climate (rainfall, temperature, radiation, fog, wind, etc.); Air quality (description of existing air quality levels); identification of sources of pollutants; fragile receptors in the area; description of supervision programs	Biodiversity: impacts on endangered species; trees and canopy, migratory birds, indicator species and different groups of species and introduction of invasive species; Vegetation and terrestrial and aquatic flora (identification of types and characteristics of local species;); Land and aquatic fauna (identification and discussion on wildlife species and their characteristics); Fragile areas (identification and characteristics).
Social issues	Characteristics of the population (parameters, growth projections, etc.); Sociocultural features (ethnic minorities, habits, population of special interest)	Present land use and zoning; Land-use plans (utilization or master plans, including the project area and surroundings; discussion of future trends or development pressures, etc.); Resettlements	Community impacts: impact on poor, low income people; impacts on culture, heritage; social impacts (access to jobs, food, energy), aesthetics	Visual resources (physical description of the community); natural areas of significant scenic value; identification of structures with significant architectural design; etc.); Historic and archaeological resources (listed historic areas or structures, according to national or community designation; sites of potentially significant archaeological value).
Other	Disaster management	Adaptation and increasing vulnerability to climate change		

Overall, mitigation measures are a response to the findings of the impact assessment; they need to cover all the areas identified. The key focus should be on:

- Preventive measures that avoid the occurrence of impacts and thus avoid harm or even produce positive outcomes.
- Next are those that focus on limiting the severity and the duration of the impacts.
- Identifying compensation mechanisms for those impacts that are unavoidable and cannot be reduced further.

What are the approaches to impact assessment and mitigation?

Impact assessment is done by a multidisciplinary team of experts who have the skills and qualification to assess the impacts across the diverse environmental resources and other areas. At the global level, international agencies and banks often provide a list of categories that the EIA needs to include (for example the environment it needs to cover, such as air, water and land). They also specify the types of impacts that need to be assessed, such as direct, indirect and cumulative. For the overview of these requirements see Table 10.

Table 10. Examples of different types of impact assessment and mitigation actions by selected development banks

Organization	Details on impact assessment procedures
Inter-American Development Bank (IDB)	An EIA needs to account for indirect and cumulative impacts and include associated facilities. It needs to include mitigation measures to address adverse impacts. Bank-financed operations require mitigation measures; and for impacts that cannot be fully mitigated, compensation or offsets should be implemented. Here, the second consultation should preferably occur when the impact assessment is being reviewed, in order to inform, gather comments, and adjust the assessment and the corresponding environmental and social management plan. The process must have the necessary budget, time, and human resources to ensure good technical quality. When the project team considers it necessary, the Bank may complement the sociocultural evaluation process carried out by the project proponent with its own studies and evaluations.
World Bank	Impact assessment takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and physical cultural resources) and transboundary and global environmental aspects. It considers natural and social aspects in an integrated way. It also takes into account the variations in project and country conditions; the findings of country environmental studies; national environmental action plans; the country's overall policy framework, national legislation, and institutional capabilities related to the environment and social aspects; and obligations of the country, pertaining to project activities, under relevant international environmental treaties and agreements.
European Union	Evaluation of the environmental impacts in the baseline scenario and then comparing the impacts of the outlined alternatives in scoping. It also includes an assessment of environmental and wider socioeconomic impacts in a qualitative and quantitative manner. Alternatives that have the same impacts can be group together and then separately the differences in impacts between the alternative need to be highlighted.

Source: IDB, 2011;World Bank, 1999; European Union, 2001.

Methodological approaches to impact assessment combine qualitative and quantitative methods depending on the available information and data. These approaches include multi-sectoral and sectoral modelling such as hydrological modelling, case studies to address specific challenges and expert-based assessment of specific impacts where other more exact approaches are not available.

Expert judgment is based on the professional option of experts that have considerable experience in the areas of assessed impacts such as on water, soil, biodiversity and communities. Expert judgments can be used when limited data and information are available that did not allow for predictive modelling to explore the impacts. Expert judgments can be used in conjunction with quantitative modelling and to complement modelling. They can also help interpret results and their consequences on other sectors and communities, for example.

For issues where data are available, *quantitative physical and mathematical models* linking different aspects of the hydrological cycle, watershed-level impacts, impacts of changes in water and other land and ecosystems available for biodiversity and resources accessible for the surrounding communities. The choice and use of quantitative models for impact prediction should be suited to the particular cause-effect relationship being studied; for example, transport and fate of oil spills, sediment loadings and fish growth and pesticide pollution of groundwater aquifers; examples of the use of quantitative models include (UNU, UNEP, RMIT, 2007):

- Air dispersion models to predict emissions and pollution concentrations at various locations resulting from the operation of a coal-fired power plant.
- Hydrological models to predict changes in the flow regime of rivers resulting from the construction of a reservoir.
- Ecological models to predict changes in aquatic biota (e.g., benthos, fish) resulting from discharge of toxic substances.

Recently, there is a stronger focus within EIAs to assess social impacts and consequences of the planned project and alternatives. The focus on the social issues is now formulated in a standardized procedure called a *social impact assessment* (described in greater detail in section 3.2).

Cumulative impact assessment: A key part of the impact assessment is the assessment of cumulative impacts of the already listed impacts. Multiple and successive environmental and social impacts from existing developments can reinforce each other, leading to more serious consequences on environment and people than each of the developments separately. This may result in significant cumulative impacts; such cumulative impacts could include (USAID, 2008):

- Increases in pollutant concentrations in a water body or in the soil or sediments, or their bioaccumulation.
- Reduction of water flow in a watershed due to multiple withdrawals.
- Increases in sediment loads on a watershed or increased erosion.
- Interference with migratory routes or wildlife movement.
- Increased pressure on the carrying capacity or the survival of indicator species in an ecosystem.
- Wildlife population reduction caused by increased hunting, road kills, and forestry operations.
- Depletion of a forest as a result of multiple logging concessions.
- Secondary or induced social impacts, such as in-migration, or more traffic congestion and accidents along community roadways owing to increases in transport activity in a project's area of influence.

According to the International Finance Corporation (IFC) (2013, p.26), "[b]ecause it is usually beyond the capability of any one party to implement all of the measures needed to reduce or eliminate cumulative impacts, collaborative efforts will likely be needed. Governments can play a significant role in ensuring environmental and social sustainability by providing and implementing enabling regulatory frameworks that guide and support the appropriate identification and management of cumulative impacts and risks."

Matrices and interaction diagrams: These are the most commonly used approaches in the EIA. Matrices take the form of a grid or table that allows the assessment of linkages or impacts between the issues listed in the rows and columns. This includes, for example, the impacts at all stages of the project—development, operation and closure—for each of the elements of the environment and society. The matrices can display quantitative information by, for example, listing the amount of waste produced, water extracted or qualitative information such as high, medium, low impacts. Information entered into the matrices can be based on all of the already discussed methods. The advantages of using matrices is that they provide an easy-to-understand visual representation across all the impacts. There are several types of matrices have been used in EIA. Most commonly used matrix is the so-called Leopold Matrix applied in the paper industry in 1971. This matrix was designed for the assessment of impacts associated with most types of construction projects, listing 100 different project actions along one axis and 88 environmental characteristics and conditions along the other, including aspects of both the biophysical and socioeconomic environments (FAO, 1996).

Rapid Impact Assessment Matrix (RIAM)

RIAM is a systematic approach using qualitative data that can be expressed in a semi-quantitative way. The RIAM method uses a multidisciplinary team to organize the analysis process into an interactive and coherent form that encourages participation throughout the process (Inter-American Development Bank, 2010). The system makes it possible to create an impact profile which allows the practitioner to make a rapid comparison to the development options. There are four aspects of the environment that are analyzed; physical-chemical, biological, human and economic. The process that RIAM follows is to identify significant changes (positive and negative) caused by the project, establish a baseline for the monitoring plan, identify mitigation strategies and design a monitoring and evaluation system to determine the effectiveness of the mitigation strategies (FAO, 1996).

Using the RIAM method, public participation is carried out at the data collection and mitigation stages of the process. Both of these stages are directly followed by quality control measures during the analysis and program monitoring stages. The multidisciplinary team allows data from different sectors to be analyzed at the same time in

one common matrix. A rapid and clear evaluation of the most important impacts the project may have is thus made possible. Such a matrix also allows the team to compare different development options according to how the four aspects of the environment may react to an action.

Battelle Environmental Evaluation System

In this method, environmental impacts are split into main categories; ecology, pollution, aesthetics and human interest. This method is helpful to determine alternatives to the proposed project plan. Indicators are then chosen to measure specific parameters within each category. For example: Ecology includes species and populations, habitats and communities and ecosystems. Indicators used to identify the current state of the environment. Once indicators are chosen for each category, three steps are carried out (UNEP, 2004; FAO, 1996):

1. Indicators are used to describe the current state of the environment, which is then rated between 0 to 1, 0 being poor quality and 1 being good quality, so that environmental deterioration or improvement can be quantified.
2. 1,000 total points (Parameter Importance Units) are shared among all the indicators to reflect the importance of each parameter.
3. A comparison is then done on the quality of the state of the environment with and without the project using the following equation:

$$EIU = \sum_{i=1}^{m} (Vi)_1 w_i - (Vi)_2 wi$$

$(Vi)_1$ environmental quality for indicator "i" project conditions
$(Vi)_2$ environmental quality for indicator "I" without the project
w_i relative weight of the indicator "i" (PIU)
m total number of indicators

Mitigation actions to address impacts

This refers to describing alternatives by including specific mitigation actions to reduce the impacts identified earlier. Examples of mitigation actions include changes in the technological process to eliminate organic effluents in fish meal plants, replanting of vegetation on slopes after road construction, building additional protection or using trees to limit noise, and training people for new kinds of jobs.

The development of alternatives to a proposed project is part of a comprehensive approach to mitigation.

Therefore there are four major guidelines for mitigation actions:

- Identify the mitigation actions that most reduce the impacts and are at the same time practical and capable of being integrated into the planned alternatives.
- Identify mitigation actions that are able to reduce the severity of the impacts to the lowest level possible over the lifetime of the project to avoid irreversibly and cumulative effects of the impacts.
- Include activities designed to monitor compliance with agreements established in the assessment and to provide specific and timely information on the environmental conditions and social variables in the area under study.
- Include assessment of the potential risks of accidents, malfunctions and other emergencies that may occur during all the project phases.

Key impacts and potential mitigation actions often relate to land. Almost all development proposals involve disturbance of the land surface. This is usually extensive for major linear projects (roads, pipelines), dams and reservoirs, and large-scale mining, agriculture, forestry and housing schemes. Environmental impacts of particular concern can include drainage of wetlands, conversion of natural areas, or expansion into areas that are vulnerable to natural hazards.

The mitigation hierarchy is a widely accepted approach for environmental conservation. It is a set of prioritised steps to limit environmental harm as far as possible through avoidance, mitigation (or reduction) restoration and offsetting of negative impacts.

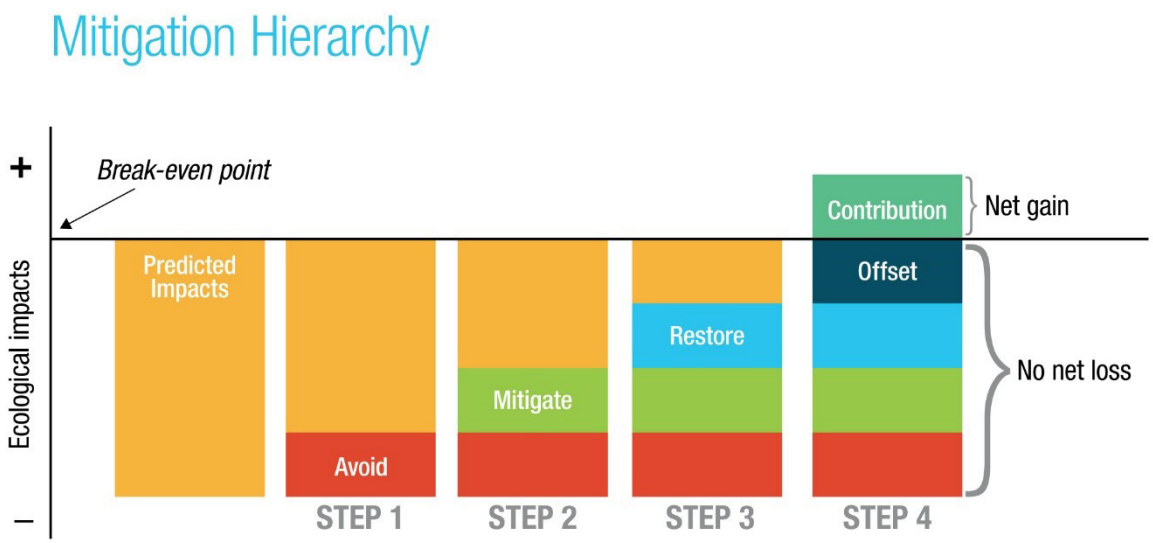


FIGURE 2. OVERVIEW OF THE TYPES OF MITIGATION MEASURES.

Source: Adapted from BBOP, 2009.

TABLE 11. APPROACHES TO IMPACT ASSESSMENT AND MITIGATION IN THE CAFTA AND OTHER COUNTRIES IN THE REGION

Country	Approach to impact assessment and mitigation
Belize	Must include direct, indirect, cumulative and short- and long-term impacts on humans, flora, fauna, soil, water, air, climatic factors, material goods, cultural heritage, landscape, natural resources, and ecological balance.
Costa Rica	Identification of positive and negative, direct and indirect, cumulative, and synergistic impacts on physical, chemical, biological, social, and cultural conditions and environments. EIA must predict and evaluate potential impact; and proposed prevention, mitigation, or compensation measures.
Dominican republic	Identification, prediction, and control of environmental impacts. "Impact" is defined as any significant alteration, positive or negative, of environmental categories and natural resources, caused by human activity or natural events.
Ecuador	Identification and evaluation of impacts on people and biodiversity; economic valuation of impacts, EMP, and mechanisms for citizen participation.
El Salvador	Must consider positive and negative impacts on physical, chemical, biological, socioeconomic, and cultural conditions at the site and in the site's area of influence. EIA must include a EMP.
Guatemala	Identification, prediction, and evaluation of environmental impacts of a project, work, industry, or activity.
Honduras	Description of project's components and project site; alternatives considered; results of consultations; evaluation of potential impacts on the physical and social environment; and plans for mitigation, contingency, and risk management.
Mexico	Environmental forecasts, and identification, description, and evaluation of the following impacts: environmental, cumulative, synergistic, significant or relevant, and residual.
Nicaragua	Identification, prediction, and oversight of environmental impacts of projects and of their alternatives.
Panama	Identification, analysis, evaluation, and ranking of all negative and positive impacts and induced risks.

Source: Tiffer-Sotomayor et al., 2015.

How to conduct impact assessment and mitigation

Impact assessment is done using one or more of the methods described here: the outcomes are then summarized in the form of a matrix. For impact assessments and mitigation in the LAC region, the legislation specifies the type of resources on which impacts need to be assessed and types of impacts that need to be specified. Key steps of conducting impact assessment and related mitigation are:

1. Detailed assessment of impacts of project phases on environment, socioeconomic systems and others as requested by the legislation and approval agency' guidelines and considering regional and international best practices.
2. Based on the completed analyses, assessment of cumulative impacts.
3. Consolidation of the identified list of impacts to groups those that are similar in nature to make the impact analyses easier to understand.
4. Identify mitigation actions to eliminate and/or reduce the identified impacts.
5. Identify specific mitigation measures to reduce cumulative impacts.

In Honduras, identification of environmental impacts is based on a Leopold Matrix. – a method based on the completion of table fields, which assists in conducting an inventory of the identified environmental impacts.

In the matrix, the rows cover the key aspects of the environment and society, while the columns list the project's activities during all stages of the project. Environmental factors must correspond to all those that could be affected by the development of the activity in the project area and the area of influence (see example in Table 12 to follow). Each box of interaction must determine whether the action in question will have an impact on the environmental factor given. If it will not, an empty or open circle is placed. If it will have an impact, you can place a filled circle and qualitatively describe the impact as: (A) High (B) Moderate or (C) Low. The corresponding letter is placed next to the filled circle, as shown in the example in Table 12.

There are three steps involved in building the matrix:

1. Mark a diagonal line on all boxes where the impacts of the action on the environment are considered significant.
2. Rate it from 1 to 10, 1 being lowest and 10 being highest, with the number placed in each box identified in Step 1 to indicate the *magnitude of the specific action's impact on that aspect of the environment*. This number is to be placed in the upper left-hand corner.
3. Using the same rating system, a rating is made in the lower right-hand corner of the defined boxes, representing the importance of the impact to the project.

Once all the impacts have been identified and rated, a detailed narrative must be written to describe and justify the impact significance (FAO, 1996).

Once you have finished filling out all fields, an inventory is made of the identified environmental impacts. Because there are impacts that have similarities, they should be summed up into one, whenever possible. The integrating factor used this case is that the activities that generate an impact are given simultaneously. The final product of this phase is a prediction of significant environmental impacts that could occur in both the construction and the operation phase of the activity or work.

TABLE 12. EXAMPLE OF A LEOPOLD MATRIX (MODIFIED) TO IDENTIFY IMPACTS OF A PROJECT CONSTRUCTION WORKS

	Construction			Operation			
Actions » Factors	**Movement of land**	**Urban services of the project**	**Building works**	**Use of housing draft**	**Consumption services**	**Generation of waste**	**Maintenance works: built and green areas**
Air (Quality Air System Sonic)	H	H	H	M	L	L	M
Floor (Use)	H	M	H	M	H	M	M
Surface water (Storm drain)	H	M	H	M	H	M	M
Underground water (Aquifer Level, Groundwater)	M	H	M	L	L	L	M
Flora fauna (Biotopes)	H	M	L	L	L	L	H
Empowerment	H	M	H	M	B	B	B
Sociocultural Condition (neighbours)	H	M	H	H	M	M	M
Generation Solid Waste	H		H	H	M	M	M
Management of dangerous substances (Combustibles etc.)	H	M	H	H	H	L	M
Scenery	H	M	H	H	B	B	H

Key: Significant Impact – requires assessment and establishment of measures
Impacts of low or non-existent significance (rated as A = High, M = Moderate, L = Low)

Once the more significant environmental impacts have been identified and placed in order (according to either the construction or operational phase) and according to relevant environmental factors, we proceed to assess the impacts according to Matrix of Importance of Environmental Impact (MIIA). This methodology allows for a score (from 1 to 100) for each of the identified environmental impacts, which may, at the end of the process, produce a total score of environmental impacts generated by the activity or work. An impact assessment for the reference areas to be must considered the overall and net project areas.

The outcomes of the impacts assessment and mitigation then include:

- A list of impacts and description of the severity of the impacts over the lifetime of the project in the context of the environmental, social, cultural and esthetical resources and issues using the Leopold Matrix.
- A grouping of similar types of impacts using the MIIA methodology.
- A list of mitigation actions linked to the groups of impacts.
- The presentation of the groups of impacts and related mitigation measures in a table.

2.4 Impact Management

In this section you will learn about plans that you need to develop to specify, implement and monitor the identified mitigation measures and address other risks that the project could present, such as technological failures and other emergencies.

What is impact management?

Impact management is a series of plans and protocols that are part of the EIA process (and also continue after project implementation) to manage and monitor identified mitigation measures and other risks such as technology failures and natural disasters that may occur over the project lifetime.

Why do we need to conduct impact management?

The analyses of the impacts and mitigation measures (carried out in the previous step) will likely identify a number of changes in the project design, implementation and closure. It will also require additional action plans to manage risks and carry out monitoring. The need for these plans depends on the type of project, the identified impacts, and the risks associated with the project based on its activities and the natural and social context where it will take place. Some of the plans are compulsory, such as an environmental management plan (EMP) which is required as part of an EIA report in most countries. Other plans are context-specific and/or depend on guidance from national legislation. For example, if the project takes place in close proximity to a community; a resettlement plan may be needed, while if there are no communities close by; a resettlement would not be necessary.

What are the approaches to impact management?

A core part of impact management is developing an environmental management plan (EMP) which is usually prepared as part of EIA reporting. An EMP translates recommended mitigation measures into specific actions that will be carried out by the proponent. An EMP also forms the basis for impact management during project construction and operation, and outlines activities for continuous monitoring. The content of the EMP can be summarized as follows:

- **Mitigation**: The EMP summarizes all mitigation measure and details about how they will be implemented; the mitigations are linked to the finding's impact analyses.
- **Monitoring:** Monitoring of the environmental impacts during project implementation and also monitoring of the effectiveness of mitigation measures to address impacts.
- **Capacity Development:** The assessment of capacity-building needs that would require stakeholders' involvement in managing environmental and social impacts and monitoring efforts.
- **Implementation Schedule and Cost Estimates:** Costs of the outlined mitigation activities, capacity-building and monitoring; this will include cost of implementation and then ongoing monitoring and follow-up capacity development costs.
- **Integration of the EMP with the Project:** The EMP needs to be developed in a way that fits with the planned project and the mitigation actions and other activities are linked to the project activities.

Contingency plan: The EIA must include an assessment of possible risks and external contingency (natural events and disasters) relevant to the activities developed by the project, identifying and determining the activities that pose risks or threats to the health of the population and the structure of ecosystems. Materials or dangerous substances used during the project lifecycle can lead to serious impacts if accidents happen and thus the plan needs to specify emergency response actions.

Finally, other types of plans include for example *resettlement and rehabilitation plans*. The purpose of these plans is to minimize or reduce the number of people affected and displaced by a project. These plans need to be developed in close collaboration with the local authorities such as municipal leaders and key agencies that are aware of the local situation, and must have processes in place to reach out to the community and establish good connections with community leaders.

TABLE 13. APPROACHES TO DEVELOPING EMPS AND OTHER PLANS IN THE CAFTA AND OTHER COUNTRIES

Country	Approaches to developing EMP and other plans
Belize	Proponent must summit a Mitigation Plan and Monitoring Plan. Government agency and proponent must agree on an Environmental Compliance Plan (ECP). Government agency is responsible for monitoring the ECP.
Costa Rica	EIA must include an EMP that provides a comprehensive plan to prevent, mitigate, correct, compensate for, or restore environmental impacts that could occur. The EMP must also include a budget, timelines, and definitions of responsibilities for implementing these measures.
Dominican Republic	EPM includes the prevention, mitigation, and compensation measures identified in the EIA. Includes self-monitoring program, risk-management program, and contingency plan.
Ecuador	EMP includes measures for mitigation, control, and compensation for impacts; plans for waste management, communication, health and safety, and monitoring.
El Salvador	EMP must be incorporated into the construction, operation, and closure of the activity. EMP must include measures to prevent, mitigate, and compensate for impacts; a budget and plans for restoration and monitoring.
Guatemala	EMP includes measures by proponents to mitigate projects' environmental impacts. An EMP may be required as a complement to the EIA.
Honduras	EMP must include mitigation and preventive measures; contingency and monitoring plans; and other plans, as needed. EMP can be requested for projects, activities, and works in Category 2, 3, or 4.
Mexico	Specific EIA must include measures to prevent and mitigate impacts. Regional EIA must include strategies to prevent and mitigate impacts (cumulative and regional impacts should be addressed as well).
Nicaragua	Final Resolution issued by national agency establishes the guidance for mitigation measures, monitoring requirements.
Panama	EMP must include identification, analysis, evaluation, and ranking of all negative and positive impacts and induced risks.

Source: Tiffer-Sotomayor et al. (2015).

Section 3.7 describes EIA and EMP regulations and procedures in general, providing more details on Honduras.

How to conduct impact management?

Development of an EMP is required based on the legislation in most of the reviewed LAC countries. According to this legislation, the project must outline specific mitigation measures, integrate those measures into the planned project activities and present indicators to monitor the impacts. Based on the legislation in Honduras and in the LAC countries (and examples from the literature), the following key steps in developing an EMP can be summarized as follows:

- Summary of the potential impacts of the proposal.
- Linkages to the national and subnational legislation to set environmental commitments thresholds for acceptable impacts and to frame the mitigation and monitoring measures.
- Description of the recommended mitigation measures.
- Statement of their compliance with relevant standards.
- Allocation of resources and responsibilities for plan implementation.
- Schedule of the actions to be taken.
- Program for monitoring and auditing.
- Contingency plan to address additional risks and emergencies.

This assessment forms the basis for the preparation of the Contingency Plan. This plan aims to clearly establish lines of action to follow, assigning responsibilities, functions and setting organization of responses to address emergency situations. It needs to be prepared so that at critical moments of an emergency there is flexibility to facilitate the rapid mobilization of personnel and equipment to the right place, so that the response is quick and effective. The Contingency Plan shall include the following:

1. Preventive actions to be taken to avoid, if possible, all types of emergencies that may occur during the unloading, storage and supply of fuel.
2. Actions to be taken when emergencies occur.
3. Provisions to prevent, as far as possible, loss of life and damage to the environment and to people.
4. Measures that should be adopted to exercise operational control of cash in an emergency.
5. Information and arrangements regarding the provision and use of equipment to be used during an emergency.

Another part of the EMP is to define the objectives and specific actions for monitoring of the progress of the plan under which the project's activities are executed, work or activity. They should clearly define what environmental variables or factors are to be followed (frequency, methods, type of analysis, and localizing sites). Finally, the submitted plans should have a cost component to indicate total costs of implementation of proposed environmental measures, including implementation, maintenance and monitoring. This should include a *cost analysis of the environmental benefit*, which summarizes the social desirability of a project, work or activity. Such an analysis must be in those projects in which the economic factor is crucial to decide on environmental viability. Part of this study is a financial analysis that determines costs and direct private benefits of the project, work or activity and its ability to find financing.

2.5 The EIA Report

In this section you will learn about key components of an EIA report and how to put together all the research and work done during the previous steps into a comprehensive report.

What is the EIA report?

Once you have completed the assessment, mitigation measures and related management plans, this step includes pulling the information together into a comprehensive report using the terms of reference (TOR). Aspects of a good EIA report include:

- Is well-structured and uses non-technical language supported by data and well-executed analyses.
- Provides information that is helpful and relevant to decision making.
- Results in the satisfactory prediction of the adverse effects of proposed actions and their mitigation using conventional and customized techniques.

After the EIA report is completed, the review process is conducted by the responsible agencies.

Overall there are often many challenges in putting together a comprehensive EIA. These challenges include limited description of the critical impacts, insufficiently described alternatives and mitigation measures and use of outdated models (Table 14, to follow).

TABLE 14. SHORTCOMINGS AND DEFICIENCIES OF EIA REPORTS

Example EIA Report	Shortcoming
An EIA report describes the proposed construction of an industrial plant but omits information about construction of a pipeline and other facilities to transport and handle raw materials and finished products to and from the plant.	The description of the proposal does not cover key features.
An EIA report describes the proposed construction of a coal-fired power plant using surface water as a cooling medium. It does not divulge that the surface water body is already used by other industrial activities for this purpose to the limit of its cooling capacity.	Key problems affected by the proposal are not described.
An EIA report for a pipeline project does not indicate that the proposed alignment will dissect certain areas of ecological value.	Sensitive elements in the affected environment are overlooked.
An EIA report for a sanitary landfill indicates that the soil types in the area are very diverse, ranging from sand and clay to peat. The alternatives do not take into account the large differences in compaction and subsidence of these soil types, with subsequent failure of underlining and drainage systems.	Alternatives do not comply with environmental regulations and standards.
An EIA report for a sanitary landfill does not describe a system for collecting methane gas produced in the landfill, even though greenhouse gas emissions contribute to climate warming and should be capped at current levels.	Appropriate mitigating measures are not considered.
An EIA report for a sanitary landfill in an area with very variable soil conditions does not describe the environmental risks and consequences of a possible failure of the underlying sealing and drainage systems.	Serious environmental impacts or risks are not described or are incorrectly described.
An EIA report on an urban development scheme makes use of a mobility prediction model using national averages, although local data is available and would permit a more precise prediction to be made.	Insufficient or outdated prediction models are used.

Source: Adapted from Netherlands EIA Commission in UNU, UNEP, RMIT (2007).

Why do we need to do an EIA report?

Reporting is an important part of the EIA to pull together all the conducted analyses, mitigation measures, plans and outcomes of the consultation. An EIA report should be complete, easily understood, objective, factual and internally consistent. These objectives are difficult to achieve in a process that involves many contributors, different types of impacts and mitigation measures and a number of specific plans. Therefore, it is very important to allocate enough time for writing the EIA report so there is opportunity to process the outcomes of each EIA step and put them together in a way that the outcomes are relevant for decision making. Once the report is submitted, designated authorities will review the EIA report to determine how the planned project will address major environmental and social impacts.

What are the approaches to creating an EIA report?

The general approach of preparing and EIA report is to structure the information and interpret the material collected (such as research outcomes) in a way that it provides reasoning for the suggested mitigation measures and changes in project implementation. This structuring and interpretation is important because often a large amount of data, trends and research covering diverse issues—from impacts on water to impacts on culture and aesthetics—is completed during the previous step.

The document structure and interpretation is guided by the Terms of Reference which the project is subjected to. Guidelines for TORs vary according to funding organizations and countries. The following table provides examples of Terms of Reference by major international organizations:

TABLE 15. EXAMPLES OF TERMS OF REFERENCE BY MAJOR INTERNATIONAL ORGANIZATIONS

Agency/country	EIA - Term of Reference
Inter-American Development Bank (IDB)	• Project title and identification • Legal and regulatory framework • Identified Impacts/Risks • Disaster risk summary • Impact Mitigation • Economic Analysis • Analysis of Alternatives • Monitoring Plan
European Union	• Contact Details of the Developer • Characteristics of the Project (incl. boundaries including any land required temporarily during construction, physical form of the development). • Location of the Project (maps; land uses, zoning, policies, protected areas). • Characteristics of the Potential Impact (hydrology, air quality, climate, noise and vibration, the landscape and visual environment, historic and cultural heritage resources, and the interactions between them). • Nature of the impacts (i.e. direct, indirect, secondary, cumulative, short, medium- and long-term, permanent and temporary, positive and negative). • Extent of the impact (area, size of the affected population/habitat). • Risk analyses. • Mitigation options. • Monitoring plan.
World Bank	• Project Description • Project site, its location map • Project Alternatives (sites, infrastructure, technologies) • Existing Environment and Baseline Data Collection • Determination of the Potential Impacts • Analysis and Evaluation of Risks • Formulation of Environmental Management Plan • Mitigation Plan • Monitoring Plan • Resettlement Action Plan (if relevant)

Source: IDB, 2011;World Bank, 1999; European Union, 2011.

How is an EIA report developed?

The EIA report is done by the project team and the involved consultants. At this step, all the data collection, analyses, developed plans are summarized together in a well-structured and concise document according to the TOR identified during the Scoping stage. For example, in Honduras, the TOR is structured as follows:

- Proponent details and Index
- Executive Summary of the EIA
- Project description and alternatives
- Legal considerations and environmental regulations applicable
- Description of the physical environment
- Description of the biological environment
- Description of the socioeconomic environment
- Identification and prioritization of environmental impacts
- Environmental Management Plan

- Risk Analysis and Contingency Plan
- Cost Analysis - Environmental Benefit
- Environmental Policy for the project and its regulations
- Environmental monitoring plan

2.6 Review of the EIA report and licensing

What is the review?

The review is the final check on the quality of the EIA report submitted to obtain a project license. Often this process leads to a requirement for additional information on potential impacts, mitigation measures or other aspects.

The key objectives of EIA review are to:

- Assess the adequacy and quality of an EIA report.
- Take into account public comments.
- Determine if the information is sufficient for a final decision to be made.
- Identify, as necessary, the deficiencies that must be addressed before the report can be submitted.

If the report is accepted, a license is issued to permit the developers to begin project implementation.

Why do we need to undertake review?

The ultimate purpose of the EIA is to provide critical inputs for decision making about the planned development. The review is carried out to confirm the quality of the information and methods used in the EIA, and that the EIA report addresses all the critical and cumulative impacts as well as the relevant mitigation measures.

Once the EIA report is submitted, designated authorities will usually go through it thoroughly, weighing the methods used, data, mitigation measures and conclusions to assess the impacts of the planned development. Their review will determine whether or not the project adequately addresses major environmental and social impacts and other risks, and whether or not to grant a licence to the project proponents (or perhaps to request changes). This means that a good quality EIA might still lead to the planned development not being permitted to go ahead based on the identified impacts.

What are the approaches to EIA reporting and review?

This is often a formal procedure in many EIA systems, which may be undertaken by the responsible authority itself, another government agency or committee or an independent body. This approach can be based on explicit guidelines and criteria for review, or if these are not available, draw on EIA principles, objectives and terms of references. Over time, the approaches to EIA review improved and they are often formalized to a set of criteria or checklists that the reviewers look for. This also helps proponents, since by knowing the criteria they can prepare their reports more efficiently. Specific procedures for EIA review are in place in different countries. In general, these can be divided into two main types:

- **Internal review** – undertaken by the responsible authority or other government agency, with or without formal guidelines and procedures; this is a relatively low cost option however it lacks transparency.
- **External review** – undertaken by an independent body, separate from and/or outside government agencies, with an open and transparent procedure for public comment; helps in ensuring high-quality outcomes. The environmental issues and the technical aspects of the proposal will determine the expertise required by a review team or individual.

Using input from public comment: Experience with EIA review in a number of countries has shown that public comment is a critical part of the EIA review process. Input may come from a public hearing, or from written comments submitted to the proponent or government department. From a hearing there will often be a summary of issues provided by the panel or officers responsible for hearing the submissions. With written comments, a summary of key points will be needed to guide the review of the EIA. In both cases the summary should focus on information that helps to identify problems with the EIA, contributing to the assessment of impacts, and identifying ways to reduce impacts. Read more about public consultation and participation in section 3.6.

Identifying the review criteria: A systematic review is based on specified criteria. Criteria can also be formulated as questions and then the reviewer assesses if the EIA meets the criteria completely, partially or not at all. A detailed list of criteria and questions for reviewers is presented in section 3.11.

Determining remedial options: Three remedial options are available when an EIA report fails to meet the standards required; these can be listed as follows:

- Acceptable – The EIA has acceptable quality; it identifies and mitigates the impacts of the development while at the same time identifying and addressing public participation and social impacts. Here it is also important that the data and methods meet national protocols and/or internally accepted relevant standards. At this level, it is also important that the information is well presented. The EIA is often considered satisfactory, although there may be some minor omissions and inadequacies of approach. The reviewing authority often provides a list of modification needed.
- Partially acceptable – The EIA considers the key impacts of the planned project, but there are significant omissions and inadequacies in the methods used, or some mitigation actions may be lacking. At this level, substantial modifications or complements are necessary. The reviewing authority often provides a list of modification needed.
- Deficient. The background data are unsatisfactory, poorly analyzed and presented and biased. They are not acceptable.

How to conduct a review?

The review can be carried out in three steps:

- Step 1: Identify the deficiencies in the EIA report, using the Terms of Reference, relevant guidelines, criteria and information on standards by national agencies and comparable EIA reports.
- Step 2: Focus on any shortcomings in the EIA report and identify gaps and areas that require further information and improvements in the methods based on suggested protocols; look at key gaps in areas that prevent qualified decision making. If no serious omissions are found, this should be stated clearly.
- Step 3: Recommend how and when any serious shortcomings are to be remedied, in to facilitate informed decision making and appropriate measures for project implementation.

The elements of EIA review and the aspects considered may differ from the arrangements that are in place in a particular country. A comprehensive review of the adequacy and quality of an EIA report would address many or all of the following issues:

- Does the report address the terms of reference?
- Is the necessary information provided for each major component of the EIA report?
- Is the information correct and technically sound?
- Have the views and concerns of affected and interested parties been taken into account?
- Is the statement of the key findings complete and satisfactory, e.g., for significant impacts, proposed mitigation measures, etc.?

- Is the information clearly presented and understandable by decision makers and the public?
- Is the information relevant and sufficient for the purpose of decision making and condition setting? The response to the last question is the most significant aspect for review conclusions, and will largely determine whether or not an EIA can be submitted as is or with minor revisions.

The reviewer should follow these steps:

- Read the *contents* of the analysis included in the qualification list, study them, and reflect on the information requirements and qualification criteria.
- Identify the information required. If the communication of results and fulfillment of formal and administrative aspects are not adequate, the reviewer should request the project coordinator to rewrite the study report and explain its deficiencies. If the communication of results is appropriate and the study provides the necessary information, the review team should continue with the analysis.
- Study the specific tasks that should have been carried out to comply fully with the requirements described.
- Seek answers to the questions in the tables. The information required can be found in the study itself; it may be necessary to look for it—*do not presume that it is implicit*.
- The study can be qualified negatively if information is repeatedly found to be lacking. Carefully review the qualification system to understand its logic, since this system will be used to deal with each review criterion.
- Decide on the appropriate qualification and record it in the qualification summary list.
- Decide if the EIA is acceptable and the licence to operate can be awarded, if the EIA needs improvements or shows that the planned development could have impacts to the area that are too severe and thus is to be rejected.

In Honduras, the technical review procedure of the EIA is done by MiAmbiente, through the Office of Evaluation and Environmental Control (DECA) to make sure that it complies with the methodological steps for review of EIAs and TORs. These steps are:

- Assign a multidisciplinary team and the role of coordinator responsible for preparing the Technical Report of EIA Review.
- The technical basis of the review will apply to each team member based on their expertise.
- Each professional can review all (or thematic parts) of the EIA assigned to review. The team leader will be responsible for reviewing the entire document and integrating the comments summarized in a report.
- As part of the review, the coordinator will conduct a field inspection to the project site (called a Committee Field Inspection).
- As part of the technical review and judgment of the coordinator of the team, you may request specialized technical criteria and inputs from other Directorates of MiAmbiente. There will be a time frame available to deliver these additional technical inputs, and they will be included in the final report.
- The final report will also integrate the outcomes of the public consultations.
- The review team coordinator, in conjunction with the Director of the DECA, may schedule a meeting with the consultant team that prepared the EIA, to answer questions and clarify aspects of the EIA. Reports from these meetings will be part of the final report.

If the EIA is deemed to be satisfactory, the environmental licence for the project activity is issued.

2.7 Monitoring

What is monitoring?

Environmental monitoring during project implementation will provide information on the environmental and social impacts of the project. The data collected during monitoring is critical in ensuring that the mitigation measures, priorities listed in the EMP, and contingency plans are implemented as approved and that they are effective in addressing the impacts.

Why do monitoring?

Monitoring commitments are one of the ongoing outcomes of the EIA for the whole project lifecycle. Most developments and projects conduct regular monitoring as part of their operations (including such things as ores extracted, materials processed, energy used and sewage released etc.). In addition to this data collection, the monitoring efforts and indicators identified in the EMP are more focused on the impacts of the development on the surrounding environment and communities and less on direct monitoring.

Monitor indicators that measure the impacts on the environment and communities in the context of mitigation measures are critical to ensure fulfillment of all the commitments made in the approved EIA. Monitoring is also important to keep track of changes that may happen in the environment and communities because of other global and local changes, such as changes in water availability due to droughts, economic crisis and out- and or in-migration. After the project is completed, basic monitoring efforts will continue during project remediation.

TABLE 16. ENVIRONMENTAL ASSESSMENT: FOLLOW-UP/MONITORING/ENFORCEMENT BY MAJOR DEVELOPMENT BANKS

Development Bank	Follow-up/Monitoring/Enforcement requirements
World Bank	During project implementation, the borrower reports on compliance with measures agreed upon with the Bank, including implementation of any EMP; the status of mitigation measures; and the findings of monitoring programs. The Bank bases supervision on the findings and recommendations of the EA, including the legal agreements, any EMP, and other project documents.
Asian Development Bank (ADB)	Borrowers must submit semi-annual reports on implementation of EMPs. The bank will conduct annual environmental missions on all aspects of the EMP and environmental covenants; ADB creates a project completion report evaluating the EMP, loan covenants and assessing the performance of the executing agency.
EBRD European Bank for Reconstruction and Development (EBRD)	EBRD sends missions to the project site, conducts environmental reporting and periodic environmental audits by independent experts. Includes environmental performance criteria in project completion exit audits. In most cases, project sponsors are required to do annual environmental reporting. Summary information is required to be published on the bank's website, and the bank may require the results of ongoing monitoring be made available to the public. For a Category A project, the EBRD requires that the project proponent provide an annual environmental report to affected public, and periodic reports the environmental performance of their investment portfolios.
Inter-American Development Bank (IDB)	IDB incorporates into project preparation, approval and implementation the mechanisms necessary to assess compliance with the safeguard requirements of the operation, but leaves vague the actual steps it will take to achieve this end. The profile states that the IDB will specify in loan contract documents the responsibility and timing of project monitoring to be carried out by the executing agency but does not require that monitoring reports by executing agencies and project sponsors be made available to the public.

Source: Adapted from Asia Pacific Environmental Exchange (APEX), 2004.

What are the approaches to monitoring?

Monitoring is a key part of EIA. The monitoring plan should specify the types of monitoring needed for measuring potential environmental and social impacts during construction, operation and closing phases.

Development banks and EIA legislation stipulate basic requirements for monitoring actions; emphasizing the importance of the monitoring during the whole project lifecycle. This legislation also includes details on the review and site inspection that is carried out by independent agencies and/or by government agencies.

Indicator selection and prioritization: The identified environmental and social impacts and mitigation measures should be the core part of monitoring efforts. It is critical to select indicators that:

- capture the most important impacts;
- measure the effectiveness of the mitigation measures to ensure that these indeed reduce the impacts;
- monitor actions in the contingency plans.

For each of these areas, different sets of indicators can be selected; it is therefore critical to define a set of criteria for the indicator selection (Table 17).

TABLE 17. OVERVIEW OF THE CRITERIA FOR INDICATOR SELECTION

Criteria	Questions
Relevant (R)	Does the proposed indicator illustrate an important aspect of the impacts and mitigation in the direct and indirect area of the project? Does it relate to specific decisions that can be used to reduce impacts?
Comparable (Cm)	Is the indicator similar to indicators from other projects and surrounding communities? Is the intent and spirit of the indicator close enough for some comparison to be made?
Understandable (U)	Does the indicator measure an aspect of the project implementation and impacts in a way that most decision makers, community members and other stakeholders can easily understand and interpret?
Consistent(Ct)	Is the information source likely to produce good-quality data over a number of years/relevant time frame? Can the data be collected, compiled, in the same way each year/relevant time frame?
Availability (Av)	Is it possible to obtain the needed data at a reasonable cost? Is information available in time to be of value in assessing performance and making decisions?
Outcome oriented (O)	Does the indicator measures the actual conditions in the environment and socioeconomic issues? Or does the indicator measure an outcome of the response to the issue (rather than the input of the response itself)?

Source: Developed by the authors

Data collection: once the indicators are selected; it is important to define data collection protocols for the indicators. Such protocols need to cover key aspects of data collection, including:

- The name and specific definition of the indicator
- Units used to measure the indicator
- Frequency of data collection (hourly, monthly, yearly)
- Methods and tools used for data collection
- People, departments responsible for data collection

Data collection can be carried out by both the project's implementers and by local communities/surrounding municipalities.

Reporting: Once the data has been collected it is important to make it available for key authorities, communities and other stakeholders (such as local municipalities) so that it can be used in the planning and cumulative assessments, as well as to help ensure that the commitments agreed upon in the EIA are being met. A central part of such reporting is providing an interpretation of the indicator trends. This includes the key factors that influenced the trends (even if these factors are beyond the control of the project) and possible additional corrective measures and indicators needed to address any negative trends.

TABLE 18. APPROACHES TO MONITORING IN THE LAC REGION

Country	Monitoring Requirement
Belize	Developers are required to prepare and submit a monitoring plan as part of the EIA report.
Costa Rica	SETENA establishes procedures for supervision and oversight, and is responsible for enforcing compliance with EIA licence. Developer's environmental consultants must be registered with SETENA and must provide progress reports to this agency. SETENA can also make announced audits to the projects.
Dominican republic	Government agency conducts inspections and environmental audits to assure compliance with conditions attached to permit or licence. EMP must include an oversight subprogram and self-monitoring program.
Ecuador	Monitoring mechanisms include (i) self-monitoring by proponent, (ii) environmental control, (iii) environmental auditing and supervision by the community, and (iv) audits performed by consultants. In addition, the General Accounting Office can audit projects directly or through contractors.
El Salvador	Laws and regulations establish a process to ensure developer's compliance with the conditions set in the environmental permit for the project.
Guatemala	Mandatory supervision by the national agency and voluntary audits done by proponent.
Honduras	DECA is in charge of monitoring and oversight of the project's environmental performance through visits. The local municipality is responsible for supporting overall supervision.
Mexico	Responsible authorities must inspect and monitor compliance with regulations and environmental authorizations.
Nicaragua	The environmental permit defines monitoring requirements. Registered auditors paid by developer will perform environmental audits and report on compliance with environmental permits.

Source: Tiffer-Sotomayor et al., 2015.

Learn more: The List of Monitoring Indicators in section 3.8 provides 35 key indicators for monitoring environmental, sectoral and socioeconomic impacts of development projects. The case study in section 3.9 describes indicators, monitoring and pollution mitigation in the Red River Delta of Vietnam. The case study in section 3.10 describes indicators used in the China Hai Basin Integrated Water and Environmental Management project.

How to conduct monitoring?

Monitoring is usually carried out by the project proponent, under the supervision of independent agencies and/or government agencies. Key steps in creating a monitoring program:

- Identify the focus areas to be considered for the monitoring plan (based on the impacts, mitigation measures and other issues from the contingency plans).
- Select of a long list of indicators for the focus areas, such as those on population, health, and natural elements used by the population (soil, drinking water, etc.).
- Prioritize a core set of indicators based upon agreed criteria.
- Identify data collection protocols.
- Develop data interpretation methods and create a reporting template.
- Schedule activities, evaluate program and personnel costs, and define personnel responsibilities.

In Honduras, environmental monitoring is carried out during the stages of site preparation, construction, operation and closure (if applicable). It should aim to ensure the efficiency of the proposed actions, allowing regular assessment of the implementation, and the adoption of corrective measures if required. The frequency of monitoring activities is determined by the nature of the project. The proposed monitoring plan should be detailed by stages, according to the information specified in Table 19.

TABLE 19. ORGANIZATION MONITORING PROGRAM IMPLEMENTATION OF PLANNED MEASURES

Stage of Execution	Mitigation Measure	Settings of control	Monitoring	Frequency of monitoring	Method	Responsible for measuring	Interpretation	Feedback	Reference text of the description impact
Site preparation	Prevention								
	Attenuation								
	Compensation								
Construction	Prevention								
	Attenuation								
	Compensation								
Performance	Current stages								
	Previous								
Closing	Current stages								
	Previous								

According to Honduran regulations, SINEIA oversees the autoregulation of environmental projects and activities. Environmental licences may have different instruments and means for enforcement. Some of these tools are:

- An environmental policy/compliance with environmental regulation.
- A registration system and compliance with environmental measures.
- If necessary, with the development of periodic environmental reports MiAmbiente delivered or any other public, private, autonomous or semi-autonomous, empowered by law to do so.

The instruments and means of environmental regulation must be expressly requested by MiAmbiente or the appropriate authority as part the process of granting and renewing the environmental licence, inspection and audit.

3.0 Examples

3.1 EIA Case Studies

Energy – Nicaragua

This case study is drawn from Inter-American Development Bank (2010).

Project name: "Technical Reconversion in San Jacinto-Tizate (Nicaragua) to generate 72MW of electric energy"
Sector: Energy
Date: 2008
Location: San Jacinto-Tizate, Leon, Nicaragua

Project Information

This project was originally operationalized in 1994 under declaration no. 18-94, Public Utility of the Construction of the Project "San Jacinto-Tizate." Concessions were awarded for a 20-year period to run a geothermal energy plant. The purpose of this project is to increase energy generation capacity to sell energy to the National interconnected system by amplifying the installed capacity from 10MW to 72MW through changes to more efficient technology. A secondary purpose is to grow in the market of Certified Carbon Emissions promoted by the mechanism for clean development of the Kyoto protocol through increasing the capacity of geothermal energy production. The main activities to be carried out in this project are to perforate 13 new production and reinjection ponds and to increase the installed capacity and the technological reconversion of counter pressure units (BPUs) by switching to modular condensation turbines (MCT) which are more efficient and cleaner.

Project Area

The project is located near the community of San Jacinto-Tizate, in the department of Leon, 100 km to the northwest of the capital, Managua. The community has 558 houses and approximately 4,715 inhabitants. Census data from 2005 showed that in the municipality, there was 10% immigration and 29% emigration related to searching for employment. Also, 95 percent of the population over 10 years participated in either paid or unpaid labour. The principal employment opportunities are in construction, agriculture and day and seasonal workers.

The area where the geothermal turbines are to be installed is a dry tropical forest. The forest is used by locals for construction and fire wood. Much of the surrounding area has been altered for agriculture purposes but there are still many important tree species, both native and introduced. Deforestation and slash and burn agriculture practices have significantly decreased the amount and types of wild animals in the area. The project is found within the "El Chorro" water basin; this is the main surface water drainage basin and is fed by many localized springs. One third of this project is located within the Telica-Rota protected area which is threatened by seismic activity, volcanoes, falling rocks, landslides and in some areas, flash flooding.

Because this project is located within a protected area, an EIA study must be carried out.

Screening

As a requirement for the screening process in Nicaragua, it is necessary to fill out an environmental form to assess all projects, works, activities and industries. All projects are classified into four categories, three of which require an EIA:

1. Special projects considered for their national or regional importance and high impact on the economy, social activity and the environment. These are subject to an EIA.
2. All projects that pose a potential high impact on the environment. These are subject to an EIA.
3. All projects that may cause a moderate amount of impact to the environment but may generate cumulative effects and so therefore require an environmental assessment, but not a full-blown EIA.
4. All projects with low potential impact are regulated by article 25 of the General Law on the Environment and Natural Resources. An environmental form must be filled out and submitted to local authorities and permissions be obtained. No EIA is necessary.

This project falls under Category 2 and is also located within a protected area. Under Nicaraguan law, an EIA is necessary in protected areas regardless of the impact of the project.

Scoping

Assessment Method Used Throughout the EIA

The Rapid Impact Assessment Matrix (RIAM) is a systematic approach using qualitative data that can be expressed in a semi-quantitative way. The process that RIAM follows is to identify significant changes (positive and negative) caused by the project, establish a baseline for the monitoring plan, identify mitigation strategies and design a monitoring and evaluation system to determine the effectiveness of the mitigation strategies. Using the RIAM method, public participation is carried out at the data collection and mitigation stages of the process. Both of these stages are directly followed by quality control measures during the analysis and program monitoring stages. The multidisciplinary team which allows data from different sectors to be analyzed at the same time in one common matrix, thus allowing for a rapid and clear evaluation of the most important impacts the project may have. Such a matrix also allows the team to compare different development options according to how the four aspects of the environment may react to an action.

Potential Project Impacts

The following table displays all the potential impacts of the project, categorized by the type of impact (physio-chemical, biological-ecological, sociocultural and economic-operational), the phase of the project and the impact level.

TABLE 20. POTENTIAL PROJECT IMPACTS

Type of Impact	Phase	Impact level	Details
Physio-chemical	Construction	Negative/ Moderate	**Residual solids:** Generation of residual solids from construction of buildings (can control and mitigate, national standards to be followed).
		Moderate	**Residual Liquid:** All fluids coming from the project's reservoir after electricity is generated will not affect the surface environment as they will be reinjected into the subsoil.
		High	**Changes in soils and subsoils:** Wind and water erosion, and waste from the removal of vegetation, caused by the movement of soil for construction, contribute to the degradation of soils. Chemical elements that may be present include mercury, boron, and arsenic. This can cause problems for vegetation and agriculture in the area. The removal of trees and vegetation will increase the risk of erosion. Mitigation plan will be put in place.
		Moderate/ negative	**Changes in noise levels:** Due to the use of heavy machinery, noise levels in the area will increase. This may have a negative effect on workers and the local community.
		Moderate/ negative	**Changes in air quality:** An increased use of machinery and movement of soil will produce emissions.
		Positive	**Changes in quality and quantity of water:** There will be a temporary and localized change in the pattern of the stream surface drainage. However, as the work will be carried out during the dry season with strategic installations to improve drainage year round.
	Operation	Negative/ moderate	**Residual Solids:** Waste from the perforation of the geothermal pools will generate mud and small rock fragments that will need to be brought to the surface.
		Negative/ Moderate	**Residual Liquid:** Grey water will be produced from the temporary construction, brine water from electricity generation and leaking of oil/gas from heavy machinery and transformers.
			Changes in air quality: Geothermal generators produce far less CO2 than other thermal plants. The release of radon and mercury are estimated to be very minor based on the concentrations of vapour.
Biological-ecological		Positive	This project works within the Plan to Manage the Telica-Rota Protected Area and helps to reduce reliance on use of wood products for firewood and furniture.
			Most trees and vegetation have been altered by agricultural production. This project will not significantly impact the flora and fauna of the area.

Type of Impact	Phase	Impact level	Details
Sociocultural			There will not be any major differences in the sociocultural area at any stage of the project. While there are no negative impacts in this area: because the project is located within a risk zone, it will be integrated into the local plan of prevention, mitigation and attention to disasters.
		Positive	**Employment**: approximately 700 people will be employed in phases I and II of the project.
		Positive	**Access to basic services**: potable water is an issue in San Jacinto. The PRNSA helps part of the community by allowing them to use a tap on the outside of their offices and helped purchase tubes to install potable water in the rest of the community.
Economic-Operational		Negative/ low potential	**On-site Safety:** There is potential for work hazards if any tubes carrying vapour or reinjection water break. Potential for electrocution if individuals get too close to transmission lines

Impact Assessment and Mitigation

The RIAM methodology described above was used in the identification, prediction and analysis of all potential direct and indirect impacts connected to the project. Using this model, the four major impact areas are analyzed: Physio-chemical, biological-ecological, sociocultural and economic-operational.

Project Alternatives

A: Without the project

In the analysis where the project is *not undertaken*, the most significant impacts are found in the economic arena in the form of lost job opportunities, dependence on fossil fuels, lost opportunities for carbon credits and an alliance to help manage the Telica-Rota protected area.

B: With the project

The most significant impacts found in the analysis with the project in place are in the physical-chemical environment. Most impacts will be felt during the construction phase and will therefore be temporary. Mitigations strategies were identified for all impacts throughout all stages of the project. Magnitude is estimated using experts' judgment based on the information collected in most cases. The EIA provides a detailed description of all the elements that may be affected by the construction and operations phases. These elements range from houses, schools and health centres to roads, agriculture land, forests and water sources among others. The report shows the number of units directly and indirectly affected by the project and other important observations such as town names, or water sources.

Using the RIAM method both direct and indirect impacts are identified. The group uses GIS to estimate a radius around the project identifying areas of direct and indirect influence at each stage of the project. The areas of impact were estimated using the principal transmission line where the principal risk—the hydro cables—is found.

Areas of influence are most greatly impacted by:

- Noise and gas emissions in the construction zone.
- Activities involving removal of vegetation where the platforms and access roads are situated.
- Moving equipment and materials.
- Contracting construction workers and services.

In the case of this EIA, all impacts, no matter their significance, are monitored and mitigated when necessary in order to avoid negative cumulative impacts. Because this is a project seeking to expand operations, ongoing monitoring and analysis previous to this assessment allow for more reliable data and predictions, allowing for some margin of error.

Impact Management

The Socio-Environmental Management Plan laid out in this project was developed using observations and studies in the area of influence, site visits and public consultations within the municipality of Telica.

The impact management plan has five objectives:

- Strengthen all the components that make up the social and environmental areas of influences throughout all phases of the project.
- Establish mitigation measures and a monitoring plan to prevent and reduce any significant negative impacts to acceptable levels and strengthen all positive impacts caused as a result of the project.
- Define the responsibilities of all the different actors to properly implement the mitigation measures during all phases of the project.
- Comply with the established environmental and social regulations in order to obtain environmental licence.
- Protect the health and safety of all the workers and citizens living in the project area.

The plan includes sections to address mitigation measures, monitoring, a contingency plan, a waste management plan, a reforestation plan and an implementation plan.

TABLE 21. LIST OF MITIGATION MEASURES

Impact Details	Standards	Mitigation Methods	Residual Impact
Physio-chemical **Residual solids:** Generation of residual solids from construction of buildings can potentially cause erosion and loss of topsoil as well as possible ontamination. **Residual Liquid:** The project could be affected by its own activities, either by sediment or residual liquids and solids. **Changes in noise levels:** Due to the use of heavy machinery, noise levels in the area will increase. This may have a negative effect on workers and the local community. Changes in air quality: A minor amount of CO_2, radon and mercury may be emitted	None indicated Decree 33-95: Provisions for the control of pollution from domestic, industrial and agricultural discharges and wastewater None indicated None indicated	• Plant bushes on slopes and embankments to reduce erosion risk • Build gutters and energy sinks for storm and rain water • Build gabion walls for areas with moderate slopes • Irrigate the access roads in the dry season • Reforestation of native species • Monitor seismic activity • Continual lab analysis to test toxicity in muds • Muds will remain in an impermeable tank until total dry • Use water based chemicals mixed with the drilling sludge • Treat the sludge with bio-remediation • Build emergency pools to avoid overflow of sludge in the case of extreme storms • Implement a Toxic Waste Management Plan • Reinject the drilling fluids to maintain hydrothermal balance in the aquafer • Monitor pressure and temperature • Avoid overflow of residual waters into surface drainage by using reinjection methods • No run-off or dumping sites for final wastes within 200 m of any streams near the project • All maintenance done in shops, off-site • No dumping grey waters directly into water sources • Discharge and run-off from construction will be reduced using sediment traps • Residual waters reinjected directly into the reservoir for production ponds • Impermeable lagoons built to avoid seepage of waste water • Build drainage system able to capture and reinject water from vapour drainage lines and cooling towers into cold water • Hydrological study to determine the configuration of the aquafer to decide where the ponds will be drilled • Precautions will be taken during the drilling period to not contaminate the aquafer with chemicals • Monitoring of temperature and pressure in all production ponds • Reinject all residual waters into the reservoir • Build emergency run-off pools to avoid overflow of storm water • Build sewers to avoid residual water contact with soils while passing to the emergency lagoons • Ensure machinery is working properly • Install sound barriers to reduce noise around generating plants • Ensure use of safety equipment for all workers on site at all phases of the project • Use silencers for the blowers in the entrance of the turbine • H_2S detectors installed to detect 500 parts per billion (ppb) within 15 seconds • Periodically monitor CO_2 and H_2S emissions in the proximity of areas of emission potential • No burning wastes of any kind. All waste to be deposited in municipal garbage sites	*Impact Reduction* Along with reforestation, mitigation efforts for all physio-chemical impacts will help to control and reduce impacts to acceptable levels
Bio-Ecological Because of overall human interventions in the area, ecosystems are fragmented and vulnerable	None indicated	• Reforestation plan	*Positive impact*: increased numbers of migratory birds, improved connection of the Pacific Biological Corridor, positive changes in the migratory patterns of land and air fauna.

Impact Details	Standards	Mitigation Methods	Residual Impact
Sociocultural and Economic-Operational **Health issues**: contact with escaping vapour from pipes, accidents dealing with the transmission lines, fires that could affect the plant and infrastructure	None indicated	• Occupational health standards and risk mitigation on-site • Undertake studies to promote the economic production of some local species (i.e., iguana) to substitute hunting over harvesting • Finance forest rangers and co-manage a program with government agencies, the municipality, local communities • Control and preventive measures for all activities that are significantly damaging the potential in the area especially deforestation, fires and poaching	*Positive impact:* Reforestation efforts in the area will help the community qualify for carbon sequestration credits and government agencies can sell carbon credits for having reduced emissions. Part of the money raised will go to a conservation fund for wild flora and fauna and an environmental education plan for the area.

Contingency Plan

The Security and Emergency plan includes security policies, a plan for notification in case of an emergency, responsibilities for supervisors and workers, functions and duties for the health and safety committee, emergency training, rules and practices for workers relative to materials handling, transportation, work with electricity, soldering, using tools and machinery, anti-fire protection and handling chemicals. Here details are provided as to what each of these items entails, methodology for evaluation and follow-up of the contingency plan and recuperation activities for all parties and elements affected. Included within the contingency plan are:

- Occupational health and safety plan
- Plan for prevention, mitigation and attention to disasters
- Waste management plan
- Hydrocarbon management plan

All plans identify measures taken to date and all regulations they are obligated to follow under national and local law.

Reforestation plan

While the impact analysis does not emphasize any significant impact to the natural landscape, the project has dedicated an effort to reverse the negative effects of human interaction in the area. As such, a reforestation and management plan is included in this document. This is done to strengthen the positive impacts the project has on the area.

Implementation plan

This plan outlines who is responsible for all aspects of the Socio-Environmental Management Plan to ensure that all mitigation measures are being implemented. It states that MARENA and other authorized bodies are responsible for monitoring compliance with the environmental management and monitoring plan and that all people contracted under the company, PENSA, must follow all policies outlined in this document including:

- Environmental monitoring programs.
- Health and safety plans.
- A continuation with the process of public consultation and participation when needed.
- Depositing of residual wastes in an adequate manner, meeting the needs of local authorities.

Budget

A brief budget is included, in U.S. dollars, to outline the costs for the construction and operation phases and monitoring programs.

Monitoring Plan

Under the terms of the monitoring plan, experts are employed in their specific areas on a permanent basis: results are verified by a panel of consultants who convene every 18 months to ensure quality standards in data analysis. Detailed plans are in place to monitor air, water, soil, pH levels in rainwater, and geothermal activities as a result of all energy production operations. Each plan is written in detail, with specific elements being monitored, standards followed and how long monitoring has been carried out. As well, the existing baseline for all air, water and soil factors is updated on a regular basis. Because these monitoring plans have been in place for some time, a detailed description is not included in the report; however, some general information about what indicators are monitored is available:

TABLE 22. MONITORING PLAN

Monitoring Plan	Indicator
Air quality	H_2S levels 0-500 ppb
Water quality	Concentration level of liquid effluent in the water source- specifically boric acid, arsenic and chlorides
Soil	Presence of micro-seismic incidents
Thermo-hydraulic evaluation of ponds	Temperature Flow Pressure % gas in vapor state

EIA Reporting

The EIA report consists of the following main sections:

- Introduction
- Objectives and justification for the project
- Project description, including location orientation, characteristics of the existing structures, reconversion of technology, phases of the project in general and stages of this phase of the project
- Legal aspects including all existing environmental licences
- The initial diagnostic (Screening)
- Prediction and evaluation of impacts, including the assessment methodology used, comparison of the project with and without the project in place, impacts listed by category
- The Socio-Environmental Management program including, objectives, structure, mitigation measures for each impact category, monitoring plans, contingency plans, waste management plans, reforestation and implementation plans and the cost of the overall management plan
- Conclusions of the EIA
- Bibliography
- List of illustrations
- List of abbreviations
- Glossary

Mining – Colombia

Case study is based on the following sources: Anglogold Ashanti (2012); Anglogold Ashanti (2015); B2Gold (2014); Cornare (2014); Gramalote Performance 2012.

Project name: Open-pit Gold Mine Development- "Project Gramalote Mine TM 14292"
Sector: Mining
Date: 2015
Location: Municipality of San Roque, Antioquia, Colombia

Project Information

The Gramalote mining project proposes to develop an open-pit gold mine. The ore deposit covers an area of 7.221 km^2 within the central mountain range in the area. The mining potential for this mine ranges between 5 to 7 million ounces of materials, of which 3,651 million ounces are gold. The mineral exploration process undertaken prior to this EIA involved analysis of sediment samples, rocks and soils samples, use of geological maps, alteration and structural maps, geophysical maps, development of an exploratory tunnel, drilling exploration, metallurgic tests, as well as geo-technic and hydro-ecologic studies.

The purpose of this project is to develop and grow the local, regional and national economies in Colombia through large-scale mineral extraction. It is thought that the project will remove between 350 to 450 million ounces of gold per year. Construction is estimated to stimulate approximately 3,500 direct and 7,000 indirect jobs, decreasing to 700 direct and 2,000 indirect jobs during the production period. It is also thought that, because of the magnitude of the project, the mine will also stimulate other economic sectors such as the service industry, food, construction, education, transportation, local agriculture and financial among others.

The Gramalote mine project has developed a mining plan in four stages over a 25-year period;

1. Resettlement (3 years). This will involve land acquisition and easements.
2. Mine construction and assembling (2.5 years).
3. Operation (11 years).
4. Closing, decommission and post-decommission (7.5 years).

Project Area

This mining project is located in the municipality of San Roque, department of Antioquia, located approximately 125 km from the city of Medellin. Mining concessions for this project are connected to the mining title 14292.

As per the terms of reference, the analysis of the area of influence must include, abiotic, biotic and socioeconomic factors, and may incorporate larger or smaller areas depending on these elements. The direct social impact areas include areas of El Iris, La Linda, Peñas Azules, Manizales, La Trinidad, El Balsal, El Diluvio, Guacas Abajo and La Maria. The principal biophysical direct areas of influence include Ravine La Bella, Ravine Guacas and the Nus River. This project also includes an indirect social influence area, which encompasses the larger region and examines impacts of markets, trade, biological features such as vegetative cover, landscape and hydrology. This area includes the municipalities of Yolombo, Maceo, Cisneros and San Roque.

Screening

The screening process in Colombia requires the project developer to fill out a list of questions which helps to determine whether or not the project will require an EIA. EIAs are only required for projects that fall under the law and its regulations. In Colombia there is only one project category—and so only one type of environmental impact study—but the depth and content of the EIA are subject to terms of reference laid out by the administrative body governing the EIA process.

Because the scope of this project will involve large impacts to all aspects of the physical, biological, social and economic environments, an in-depth EIA was necessary to obtain an environmental licence.

Scoping

Once the screening process has taken place, the Colombian government issues terms of reference to carry out the scoping and impact assessment portions of the EIA process. These TOR are issued by the Ministry of the Environment. The TOR are specific to each project and industry. The following link provides the TOR for mining projects in the country (in Spanish). http://www.anla.gov.co/documentos/normativa/tdr_materiales_construccion.pdf.

Impact Assessment and Mitigation

The impact assessment was undertaken by a multidisciplinary team of consultants that included national and international private consulting firms and public institutions. The environmental baseline was started in 2010 in order to have sufficient quality data for the EIA. There are no protected or especially fragile ecosystems located within the area of influence, nor are there threatened or endangered flora or fauna.

Impact Evaluation Method

Multi-objective Analysis Framework

The impact evaluation process had three steps:

1. Identification of impacts. This includes identifying and defining environmental factors and aspects as well as identifying activities, interactions between activities and environmental factors and differentiating between direct and indirect impacts.
2. Prediction of impacts. This involves classifying impacts by assigning values, justification and elaboration of an impact/activities matrix.
3. Evaluation of impacts. Here a matrix of importance is developed and a general analysis of results from the environmental evaluation and an economic impact evaluation is done.

TABLE 23. POTENTIAL PROJECT IMPACTS OF THE GRAMALOTE MINE

Environment Impacted	Phase	Details
Abiotic	Construction Operation	**Air and noise quality:** 1) Construction activities will put dust and particles in the air. 2) Major particle emissions will be produced from machinery transporting materials within the mine. 3) Generation of gas emissions from smelting and electro-injection processes in the production facility. 4) Noise pollution. **Surface and underground water resources:** 1) Use and required availability of water resources for the project will be high. 2) Sediment may be found in surface water during the construction and operation phases. 3) Potential chemical contamination in surface water. **Diversion of Guacas Ravine:** 1) The ravine will be diverted for 15 years. When exploitation is finished, it will return to its natural flow.
Biotic	Construction	**Removal of vegetation:** 1) Project does not fall within a protected area, and most of the impact area has already been exploited for economic purposes. **Alteration of fauna:** 1) Animal habitat may be destroyed from removal of vegetation.
Socio-economic	Construction	**Forced displacement of people:** This project will inevitably require the forced physical and economic displacement. 173 households currently reside within the area of direct influence. Artisanal mining and agriculture (sugar cane) will need to be moved from the production area. Major emphasis is placed on the District of Providencia.

In Colombia, there are general requirements that must be met for the Diagnostic of Environmental Alternatives. They include: the objectives of the project; a project description; location alternatives; identification of special management issues and social and economic alternatives; a land-use study; comparison of potential environmental and natural resource risks and impacts for the different alternatives; identifying communities and mechanisms used for public participation; selection and justification of the best alternative; and a cost-benefit analysis of alternatives for the environment.

Identification of Alternatives

The criteria laid out to identify alternatives for project impacts include:

- Optimizing the use of natural resources.
- Minimizing the affected area.
- Co-existing with the activities currently taking place within the mining concession title.
- Minimization, reduction and control of environmental impacts using state-of-the-art technologies and innovation.
- Improvement of environmental capital in the region.
- Maximizing the use of residuals or by-products generated from the production process.

Project Alternatives

For this project, environmental, social and health baselines were undertaken to provide the project with insight and data in order to determine what significant impacts the mine may have on the region. These baselines have helped inform alternative scenarios, with and without the potential mining operations.

A: Without the project

In scenario A, within the abiotic environment, cattle ranching and artisanal mining would be the sectors that create the largest impacts in the area, as they both rely on the removal of vegetation for their development. These activities will result in the loss of flora and fauna in the area, making land more susceptible to wind and water erosion. In the biotic environment, both aquatic and terrain ecosystems will see a similar amount of deterioration. The socioeconomic sphere consists primarily of artisanal mining of subsoil which provides a portion of income for communities; however, they also affect air and water quality. Similarly, the extraction of wood, agriculture, cattle ranching, fishing and hunting are all livelihood strategies that enable locals to maintain a peasant lifestyle; however, these activities can also have an impact on the surrounding natural resources.

B: With the project

In scenario B, infrastructure construction as well as start-up and running equipment will have the highest impact on the abiotic and social environments—in particular, building a tunnel to divert the Guacas ravine and extraction of mineral deposits. In the biotic environment, the largest impact will be seen from construction. This will require removal of vegetative cover, which implies the loss of parts of forest, secondary vegetation or vegetation in transition, and vegetative cover that is substantially rich and diverse. The modification of the natural environment will result in the loss of flora and fauna species, fragmentation of habitats are a concern in for terrestrial environments. Within the aquatic environments, the water supply near various work sites and hydro-biological communities will be affected.

Water is of particular concern in this project because the region receives high rainfall, and surface water contamination from storm water overflow is a concern. Also, the mine requires large quantities of water to function. As the region is highly dependent on water for agriculture, the mine project has considered many alternatives for infrastructure placement in order to minimize impacts on critical water sources.

For the socioeconomic environment, the resettlement, and infrastructure construction phases will generate the most impacts, both positive and negative. In some cases, forced resettlement both physical (communities) and economic (artisanal mining) will have to happen within the scope of the project. The project will also impact this environment by contracting labour, goods and services. It will also affect local health conditions as people migrate to the region for employment. During the operation phase, the largest impacts will be effects from particulate matter, noise and vibrations, especially within the Providencia District. During the decommissioning phase, the largest impacts will be felt in the decrease of employment and funds to the local municipal administration.

Mitigation measures

As the project will require, affect and take advantage of a large amount of natural resources, they must provide a list of all the authorization and concessions necessary to support the EIA evaluation, monitoring, management and mitigation measures. The natural resources permits include: water concessions, industrial dumping permits and domestic dumping permits. Additional natural resources used or affected include: use of waterways, construction materials, atmospheric emissions, forest area, lifting bans on endangered species.

TABLE 24. MITIGATION MEASURES AT THE GRAMALOTE MINE

Impact Details	Mitigation Methods	Residual Impact
Abiotic		
Air and noise quality: 1) Construction activities will put dust and particles in the air. 2) Major particle emissions will be produced from machinery transporting materials within the mine. 3) Generation of gas emissions from smelting and electro-injection processes in the production facility. 4) Noise pollution. **Surface and underground water resources:** 1) use and availability of water resources for the project will be high. 2) Sediment may be found in surface water during the construction and operation phases. 3) Potential chemical contamination in surface water. **Diversion of Guacas Ravine:** 1) The ravine will be diverted for 15 years. When exploitation is finished, it will return to its natural flow.	• Dust to be controlled using water tank sprayers on dirt roads. • Models were developed to create control levels that do not exceed maximum allowable limits as stated by law. On the surface, irrigation with surfactants will control dust. • Gas will be controlled with filters and scrubbers to comply with levels of allowable emissions defined in legislation. • Models developed will consider all stationary and movable sources that may contribute to increased noise levels. • All machinery will be maintained and monitored to ensure it complies with levels set within the model. • Efficiency was built into all water use designs including water recirculation. Based on the models, 83% of the water used will be recirculated. • Driving, control and sediment treatment systems to keep within legal limits. • Quality control models developed to monitor the process and potential for rock acid to drain into the system. There was a low probability of this issue but control and monitoring will still take place. • Alternative water sources were considered; waters below the excavation and the San Antonio ravine. Guacas ravine was found to be the best alternative.	*Impact Reduction* *Impact Reduction* *Impact Reduction* *Impact Reduction* *Impact Reduction* *Impact Reduction* *Impact Reduction* *Impact Reduction*
Biotic **Removal of vegetation:** 1) project does not fall within a protected area and most of the impact area has already been exploited for economic purposes. **Alteration of fauna:** 1) animal habitat may be destroyed from removal of vegetation.	• Building a rescue and recovery centre to relocate species with low mobility and determining their need for protection in new areas identified.	*Improvement*: Some fragmented forests still exist. A plan to collect seeds and reforest areas will ensure that impacts larger than those authorized will not occur and will help to preserve native species.
Forced displacement of people: This project will inevitably require the forced physical and economic displacement. 173 households currently reside within the area of direct influence. Artisanal mining and agriculture (sugar cane) will need to be moved from the production area.	• Move families: a Resettlement Action Plan was developed to guarantee the best conditions possible for those affected. • Land acquisition was undertaken using international standards established by the World Bank and IMF. The process includes Restitution for Livelihoods and Family Life plans that will help to improve living standards from those the displaced currently experience. • **Providencia**: Particular attention has been taken for the District of Providencia, as it is situated close to the mine site. Seven studies and models were developed to determine the future health and safety of this community.	Compensation plan in place for resettlement outside the direct area of impact.

Impact Management

The environmental management plan provides an overarching set of activities aimed to prevent, mitigate and correct any significant impacts—both environmental and social—that may occur as a result of project activities. Each section of the plan can be implemented to allow for an integrated approach during the development of the project so that future impacts and changes to impacts can be forecast for each future stage of the project. Activities focus on the abiotic, biotic and socioeconomic areas of impact.

Environmental Management Plan

Because of the magnitude and impact this project will have on the surrounding environment, the environmental management plan contains a series of specific plans for the biotic (6), abiotic (10) and socioeconomic (13) aspects of the project. The management plan focuses on an integrated approach to all affected elements and will be implemented throughout the lifetime of the project.

Each of the following plans indicates in which stages of development the impacts will occur, the general objective of the plan, the impacts to be monitored, the type of mitigation measure (prevention, mitigation, correction or compensation), specific objectives, parameters for monitoring, methods for sampling and analysis, where the monitoring will occur, how often monitoring will occur, and indicators to be tracked and observations.

The Abiotic Plans:

- Soil management
- Sterile debris and waste management
- Hydrological resource management
- Air resource management
- Solid residue management
- Gas and chemical substance management
- Explosives and volatile materials management
- Signs management
- Landscape management
- Cyanide management

The Biotic Plans:

- Program and protocols for management of wild animal species
- Program for the removal of vegetative cover
- Program to conserve and rescue fish
- Program to restore, rehabilitate and recover impacted areas
- Program to protect and conserve endangered and protected flora and fauna species
- Program for conservation of natural ecosystems and those that offer environmental services

The Social Plans:

- Program for management of awareness, information and public participation
- Program for hiring local labour
- Program to manage contracting of local goods and services
- Program to train and educate the community
- Program to train and educate workers

- Program for resettlement
- Program to assist in public and private institutional management
- Program for land acquisition and easements
- Program to manage migration pressure
- Program for third parties affected by the project
- Program to support cultural patrimony
- Program for preventive health and health promotion
- Archaeological program

Compensation Plan

This plan was developed specifically to compensate for the removal of vegetative cover. It takes into consideration the activities and irreversible impacts of the mine within the area of influence in order to determine what actions should be taken to compensate for the environmental degradation. The compensation strategy applies best practices and financial schemes to pay for use of water resources. According to best practices, compensation for the loss of biodiversity means approximately 3,000 ha of natural area will be conserved. Because the compensation plan only addresses irreversible impacts, all impacts that have been mitigated or corrected are not addressed here.

Decommissioning Plan

The conceptual development for the decommissioning plan was established within the TOR set out by the Ministry of the Environment. This plan will help the project prepare to rehabilitate and recover all areas impacted by the mine project. This will involve dismantling all structures, physical and chemical stabilization and landscape, water and soil rehabilitation. The plan will include the initial decommissioning plan, a progressive decommissioning program, a temporary closing program, a final decommissioning plan and post-decommissioning activities. As per legislation, the plan will be updated every five years to ensure that governmental and company standards are met.

1% Investment Plan

The 1% investment plan required of all large-scale projects in Colombia, established by decree 1900 in 2006. Because this project proposes to revert large amounts of surface water supplies throughout different stages of operations, an investment plan is necessary. Investments must be undertaken within the affected watershed in order to obtain the environmental licence. It is estimated that 11,785 million Colombian pesos (approximately 3.84 million USD) will be invested through this project. The following activities are planned:

- Conservation and restoration of vegetative cover to facilitate natural succession over 21 years.
- Installation of septic tanks in houses that receive their water from the affected water source: 589 families benefit.
- Environmental promotion in line with the national program for Environmental Community Promotion: 21 years, the entire population within the area of direct influence will benefit.

The EIA Report

This EIA report includes the following sections

- Executive Summary
- Company overview
- Geographical orientation of the project including the area of influence
- Description of the project
- Description of the production process

- Environmental Impact including, team overview, social and environmental base line, evaluation method used
- Impacts from the project including an evaluation with and without the project
- Demand of natural resources and renewable natural resources and the environment
- Environmental management plan
- Compensation plan
- Decommissioning plan
- The 1% investment plan
- Chronology for project implementation

Review & Licensing

Colombian environmental law promotes public and private organizations to participate in activities necessary for a company or individual to obtain, modify or cancel an environmental licence. Under the law, authorities must issue an act to start the environmental licensing process which must be published in a bulletin, with updates periodically available and mailed to anyone who wants to receive them. Also, all local indigenous and Afro-descendent communities must be consulted before any decision making about natural resource use.

Stakeholder engagement

Public acceptance is an essential factor to the success of the Gramalote mine development project. In order to gain local support and understanding, public participation was planned throughout the lifetime of the project. During the EIA stage of the project, public meetings were held in all affected communities at a number of stages: introduction of the project and baseline data collection, presentation of the baseline data to the community, discussion about the EIA process, workshops to check the baseline data and introduce upcoming environmental and social impact workshops, identification of impacts and control measures with communities within the area of direct influence and finally, workshops to report results of potential impacts back to the community.

As this project will have a profound impact on the communities living within both the immediate vicinity and the region in general. Stakeholder engagement has been essential to the support of the communities going forward and ultimately to the success of the project. Within the Environmental Impact Assessment there are 13 social plans, a compensation plan, and a 1% investment plan which will all require stakeholder engagement strategies. As this is an ongoing project as of 2015, engagement within the scoping phase of the EIA has thus far focused on education about modern gold mining techniques, benefits of the project, mitigation strategies as well as possible negative impacts and compensation. Some of the stakeholders who have been engaged to date are local citizen groups, local and regional businesses and business associations, commercial enterprises, academic institutions and local and regional governments. Negotiations with 153 artisanal miners successfully formed an agreement to recruit 40 per cent of the group and helped to set up small businesses providing services to the community and the company.

Community investment program

Investment projects in health, education and infrastructure, strengthening economic activities, especially agriculture and animal husbandry practices. Three main projects are currently underway in the area immediately surrounding the project. These projects focus on food security, improved agriculture practices and higher-quality living conditions with a focus on social institutions such as schools, sanitation and health institutions.

3.2 Social Impact Assessment (SIA)

What is SIA?

A Social Impact Assessment is a process of research, planning and the management of social change or consequences (positive and negative, intended and unintended) arising from policies, plans, developments and projects (UNEP, 2007). The core focus of an SIA is on the important impacts of projects and developments beyond the impacts on natural resources. Examples of social impacts include (Vanclay, 2003):

- People's way of life – that is, how they live, work, play and interact with one another on a day-to-day basis.
- Their culture – that is, their shared beliefs, customs, values and language or dialect.
- Their community – its cohesion, stability, character, services and facilities.
- Their political systems – the extent to which people are able to participate in decisions that affect their lives, the level of democratization that is taking place, and the resources provided for this purpose.
- Their health and well-being – health is a state of complete physical, mental, social and spiritual well-being and not merely the absence of disease or infirmity.

From the listed examples above, it is clear that the SIA must look not only at social issues but also at the environmental impacts and their interactions. For example, if the planned project impacts the availability of water and land for local food production it also leads to social impacts, such as increases in food prices, the need to travel longer distances to buy and/or grow food.

In general, an SIA calls for close collaboration with community members, as well as other stakeholders and experts. This usually covers the following specific areas to identify impacts and mitigation measures (State of Queensland, 2013):

- Community and stakeholder engagement
- Workforce management
- Housing and accommodation
- Local business and industry content
- Health and community well-being.

During the SIA, the proponent is usually expected to (State of Queensland, 2013):

- Identify stakeholders' groups and communities impacted by the project.
- Collect baseline data covering key social issues of the impacted communities such as community history, indigenous communities, culture and key events that have shaped economic and social development, key industries presently and in the past (if relevant); pressures or vulnerabilities experienced by these industry sectors.
- Provide an overview of government legislation and policies that complement the mitigation measures for social impacts that are directly related to the project.
- Explain methods used to gather information, including a description of how the communities of interest were engaged during the development of the SIA.
- Identify potential direct social impacts and prediction of the significance of any impacts and duration and extent of each impact.
- List proposed mitigation measures.
- Describe the monitoring framework that informs stakeholders on the progress of implementing mitigation measures and overall project implementations.

SIA Case study: Tourism (Tanzania)

This case study summarizes parts of the developed EIA report by Zanzibar Environmental Consultancy (2006).

Project name: Zanzibar Beach Hotel and Resort Upgrade and Extension
Location: Matemwe Village, North "A" District Unguja Island, Zanzibar, Tanzania
Date: February, 2006

Zanzibar consists of two main islands approximately 30 km off the East African coast. The islands are part of the United Republic of Tanzania, but have their own independent government. Due to poor planning for tourism developments, the industry has suffered from inadequate infrastructure as well as environmental and social degradation. To address these issues, in 1996, the Commission for Land and Environment of the Government of Zanzibar enacted an Environmental Management for Sustainable Development Act.

Project Overview

The assessments done for this project focus on the environmental and social impacts that the upgrade to Zanzibar Beach Hotels and Resorts may have on the local area. The project is located close to the village of Matemwe, North "A" District, North Region of Unguja Island and is located on 10.7 ha, with 450 m of beachfront property. The hotel is 50 km away from Zanzibar Stone Town and is accessible by road. The main natural resources in the area include government plantation reserves, dryland natural forest and mangrove reserves, coral rag thicket forests and rubber plantations. The government plantation reserves specialize in growing exotic trees such as teak, acacias, pine and casuarinas. The marine environment includes sea grass-algae beds, sandy habitats and coral reefs.

The Environmental Impact Assessment (EIA) was developed using the terms of reference set out by the Department of Environment, Ministry of Agriculture, Livestock and Environment-Zanzibar in accordance with national laws. The approach taken for the EIA and the SIA focused on public participation, ecosystems, sustainability and indigenous knowledge and will incorporate capacity development into the process. The main tools used to collect and analyze data were:

- A literature review to collect information about key current and past trends in the community on key industries, housing, and livelihoods.
- A policy review relevant for impact assessment and social impacts.
- A Participatory Rural Appraisal (PRA) with both quantitative and qualitative surveys using field investigations for specimen collection to get stakeholders' input and feedback on key impacts, mitigation actions and monitoring measures.

Social Impact Assessment

Through the introduction of tourism into the area in the late 1990s the population of the area around the project has increased at a rate of about 5 per cent per year. In 2002, the population of nearby, Matemwe was 2,429, up from 728 inhabitants in 1998. Estimates for 2010 place the population at 3,085. Housing in the area consists of either thatched huts with no window or plumbing or cement block houses with thatched roofs made from coconut leaves or iron sheets. Approximately 44 per cent of the houses have and use toilets, which helps with sanitation.

Social services

There is one Primary Health Care Unit (PHCU) with six staff members. This unit—along with a dispensary—provides all general health services for the area. Common diseases include malaria, bronchitis, stomatitis, diarrhoea and dysentery. If seriously ill, individuals must travel outside the village to Kivunge Cottage Hospital or Zanzibar Town. The Zanzibar government recently achieved the goal of distributing educational facilities within a 5-km radius. A public primary school is available in Matemwe where local children (as well as children from surrounding villages) attend classes. There are no middle schools in the immediate area. There are also five Quran schools available, four mosques and four Madrasa in the community.

Local Economy

Shops and restaurants are located in both Matemwe and Kiwengwa Shehia. Here one can purchase basic goods, school supplies and souvenirs. Major economic activities in the area include fishing, seaweed farming, agriculture, petty trade and animal husbandry. Unfortunately over the years, fish stocks have been declining despite a poor economy based around the resource. The fishers rely on a single port in Matemwe to access current fishing grounds. Seaweed farming is primarily done by women. This is laborious work and demands between five to seven hours each day to tend the seaweed plots. Agriculture is also a very important part of the economy. It consists of cassava, mango, maize, sorghum and other annual crops that are grown for personal consumption, with a small portion being sold on the local market. Similarly, animals are raised for personal consumption only.

Social Impact Analysis

The PRA surveys found that while locals welcomed tourism in general, they felt that the increase in the industry did not match an increase in economic benefits to the area. The younger population wants to see more benefits distributed throughout the village, while the older generation wants to ensure that local customs, rules and regulation are followed. This includes the use of proper dress while tourists are off the hotel site.

Culture is an important part of local life in the area. Most of the residents are part of the majority cultural group on the island; they speak Kiswahili and are primarily Muslim. It was noted that the local Islamic Swahili group may be vulnerable to cultural pollution, especially the youth. Employment within the tourism industry was seen as unavailable to locals. While the industry was promoted as bringing in jobs, it was argued that most villagers were not skilled or experienced enough to fill intermediate and managerial positions. They argued, however, that many of the lower posts such as maintenance, cleaning and cooking should be reserved for locals instead of migrants from mainland Tanzania or Kenya. Spinoff income through trade and sale of products also seems minimal. There are few formal jobs available to local residents. Most work is informal, including hotel workers, carpenters, drivers, farmers, fishers and businessmen. Child labour is also an issue in the area. In some hotels in the area children engage in different activities. These children would not therefore be attending school or Quran classes regularly, which runs contrary to local norms and culture.

Analysis of the Social and Cultural Impacts

A tourism zone exists within Matemwe, within which there are several hotels and guesthouses. As such, the report stated that no major impacts would occur as a result of the hotel expansion.

The report also highlights several socioeconomic problems evident at the time the baseline data was collected.

- The decline of the *spinosum* prices due to a monopoly market
- Decline in shifting cultivation
- Decline in fish stocks

An increase in tourism, in part as a result of the hotel expansion, will have both positive and negative socioeconomic impacts. Potential positive impacts are:

- Rise in local community employment opportunities at the hotel.
- New outlets for agriculture and fish products available in the village.

Potential negative impacts may include:

- Increase cost of fish to villagers as hoteliers demand the product at higher prices for tourists.
- Overfishing of the already declining fish stock to meet tourist demand.

In order to mitigate the social impacts of this project, the following measures are proposed:

- Assist surrounding local communities in raising the education level of both students and teachers.
- Special efforts to train locals at the Institute of Hotel and Tourism Management in Maruhbi.
- Negotiations with locals to sell their commodities, giving experienced and competitive villagers priority.
- Improve health and education of surrounding communities by extending assistance to improve infrastructure and helping provide basic equipment.
- Establish rapport with local village leaders.
- All cultural norms of Zanzibaris should be addressed, all arrangements must be adopted to inform tourists of how to dress when visiting the village.
- Public access to and pass through of the beach should not be altered.

TABLE 25. SUMMARY OF IMPACT SEVERITY BASED ON INDICATOR MEASUREMENT AS A RESULT OF THE PROJECT

Indicators	Impact Details
Population demographics: size, age, ethnic groups, gender	Increase in population due to need to fill new higher level positions (management) within the growing tourism industry. Change in ethnic group as many people coming from mainland Africa for work.
Employment, unemployment rates	Employment rates raise slightly from tourism.
Median income according to sectors	Median income remains the same for local population as they are only qualified for low-paying jobs. Increase in sales from trade of local goods and services.
% of the population with access to social services (health, education, recreation, social support)	Population's access to adequate training for quality jobs in tourism is limited. Increase in population places stress on health sector and social support services.
% of the population with access adequate water, sanitation, electricity	Increase in population, and increased need for limited services from hotel mean higher stress on infrastructure system.
Number of community organizations/advocacy groups	Older, traditional population concerned about cultural differences of tourists in regards to appropriate dress and behaviour while visiting the community.
Housing quality and quantity	Increased population will place a strain on the current quantity of housing.
State of public safety services (fire/police)	Increased population and disparity between rich and poor increases the stress of safety services.
Location and quantity of farmlands	Local fishing ground access may be affected by increase of tourists using the beach area.
Local land-use patterns	Expansion of tourism may cause change in land-use patterns as more hotels, restaurants, parks, attractions are built.
Attitudes toward the project	Elders in the community dislike increase in tourism as it threatens their cultural autonomy. Youth welcome the change as it brings potential for new employment.

3.3 Protocols to Assess Impacts during the EIA

Protocols are standardized, official procedures. Environmental impact assessment (EIA) protocols aim to assist participants in different stages of the EIA process. EIA Protocols help assess activities or developments to prevent, minimize and repair any environmental damages they may cause and while assuming the costs that these effects may imply. The protocols thus set standards in terms of high-quality methods (and their implementation) that EIA developers/environmental service providers can (or must) use to complete the EIA.

One main advantage of using protocols in the EIA process is that they provide a useful guidance for EIA developers/environmental service providers on how the different parts of the EIA need to be implemented—such as how to assess impacts of the development on water quality and quantity, on endangered species and biodiversity in general,

and how to conduct social impact assessments. The protocols make it easier for any agency evaluating the EIA to assess the quality of the EIA developers' methodologies.

One potential disadvantage of setting protocols is that environmental service providers might not challenge themselves to advance the methodologies, and they will use the protocols as the minimum required. Another limitation is that it is very challenging to design protocols to cover diverse activities that may be included in different developments, as well as cover various possible ecosystems and social groups in one country/region. To address this limitation, countries often have large numbers of protocols for diverse sectors, activities, different components of the environment and types of social groups. This then leads to a substantial effort to develop and test many different protocols before their wider use.

Finally, we can conclude that, while EIA protocols have significant disadvantages in countries where agencies have low capacity to review EIA reports, protocols can help to set clear guidelines and streamline evaluation efforts while improving the quality of EIAs. In order to make protocols effective, it is critical that environmental service providers be aware of—and have access to—the protocols, and that the protocols remain the same so providers can learn how to implement them properly.

Role of EIA Protocols to Address Specific Challenges and Opportunities

The primary challenges facing the EIA licensing process include:

1. Capacity of both technicians and Environmental Service Providers to provide and evaluate EIAs
2. Poor quality of studies
3. Length of time necessary to review and approve the EIAs and grant the environmental licence

Often one of the most limiting factors in the EIA licensing process is the amount of time necessary to review and verify the information in an EIA report. While part of this time is used up through bureaucratic processes, times are often significantly lengthier when EIA reports do not meet the minimum standards set by government to ensure quality reporting. Here, EIA protocols can help in outline the required minimum standards to be followed during EIA preparation and that government agencies can use to assess the quality of the EIA report.

Opportunities

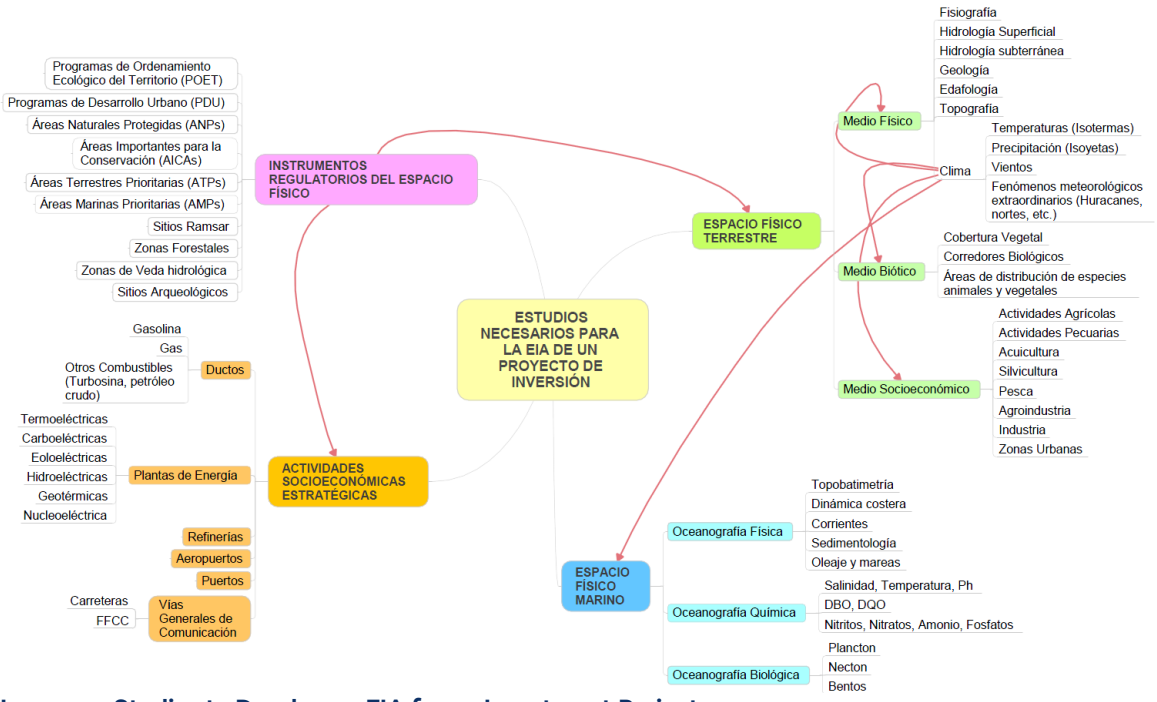
Opportunities to improve the EIA process lie within three key areas:

1. Strong administration
2. Legal congruency
3. Environmental compatibility

In the area of administration, there are several avenues that can help to improve the licensing system, some of which are already being taken in Honduras. These include an implementing an effective online licensing system, developing capacity for technicians and evaluators, streamlining environmental laws for transparency and clarity, and setting criteria and standards for EIA studies.

A computerized systemization of the first stages of an EIA evaluation should be developed to provide a more streamlined approach to the process. Honduras' new online licensing system is a good example of such a system.

It is important that there be specific criteria for environmental service providers and technicians to write and evaluate studies. In Mexico this is accomplished through a series of minimum standards or guidelines for each industry that all EIA studies must meet in order to be accepted by the governing authority. These can be considered as voluntary EIA protocols but will guide the environmental service providers on how to develop the EIA: at the same time they provide flexibility for adjustments based on specific local conditions and developments. A link to these guidelines is available in the box below.



Necessary Studies to Develop an EIA for an Investment Project

Source: Arriaga, R. (2016). Foro-Honduras-Canadá Capacitación en EIA. Tegucigalpa, Honduras.

Key Protocols in the Context of Specific Types of Projects and Their Natural and Social Impacts

During a two-day event held on March 2–3, 2016 in Tegucigalpa, Honduras, international experts gathered with Honduran government technicians and environmental service providers to discuss and share knowledge about environmental impact assessment development and assessment. Experts were invited from Chile and Mexico to facilitate group discussions and provide guidance in the areas of coastal and marine environments, green energy projects and mining and high-impact projects.

Groups were asked to:

1. Identify existing and potential projects that have major social and environmental impacts in each area of focus (mining, green energy and marine and costal environments).
2. Identify the natural, and sociocultural resources that could be potentially affected within these projects.
3. Explain what guides, methodologies and protocols are used in Chile, Mexico and other countries where the experts have experience.

List of Protocols, Guides, Standards and Resources for EIA Projects Prioritized during the Two-day Event; All protocols are in Spanish

General

- Criterio de Evaluación para EIAs SEMARNAT
- Listado de Publicaciones, Guías y Documentos EIA SEMARNAT
- Centro Nacional de Producción más Limpia de Honduras: Documentos técnicos
- Perfil Ambiental País de Honduras
- Código del Trabajo de Honduras
- Guía para las Mejores Prácticas de Ecoturismo en Áreas Protegidas

Coastal and Marine Environments

- Manejo Costero en México, Universidad de Campeche
- Guía de Campo: Identificación de los Manglares en México 2006
- Carta Nacional Pesquera
- Manual para determinar la calidad del agua para el riego agrícola (México)
- Guía de Buenas Prácticas Ambientales para el cultivo de Tilapia (Honduras)
- Manual de Cultivo de Camarón

Green Energy

- Listado de Publicaciones, Guías y Documentos EIA SEMARNAT

Mines and High Impact Projects

- Alianza Mundial de Derecho Ambiental (2010). Guía para Evaluar EIAs de Proyectos Mineros
- Guía para la Presentación de Manifestación de Impacto Ambiental Minero SEMARNAT
- Guía para la Presentación de Estudios EIA de Proyectos de Alto Riesgo SEMARNAT
- Guía de Buenas Practicas en las Relaciones entre los Actores Involucrados en Proyectos que se Presentan al SEIA (CHILE)
- Guía para la Evaluación de Impacto Ambiental Proyectos Desarrollo Minero de Petróleo y Gas (CHILE)
- Calidad del Aire en el Área de Influencia de Proyectos que Ingresan al SEIA (CHILE)
- Ley No. 19.300 Sobre Bases Generales del Medio Ambiente (CHILE)
- Reglamento del Sistema de Evaluación de Impacto Ambiental -D.S. No 40/2012 (CHILE)
- Reglamento de Seguridad Minera Decreto Supremo No 132 (CHILE)

3.4 Terms of References (TORs) for EIAs

Once a project or development has gone through the screening and scoping phases, the authority responsible for processing the EIA provides the client with a Terms of Reference (TOR) document. The TOR provides details of all the information required for the EIA review committee to make an informed decision about awarding the Environmental Licence. Depending on the country, TORs may be developed specifically for the project, or they may be a general set of guidelines that apply to all projects in a sector. The following are examples of TORs from several CAFTA countries.

They include:

- Example 1: Overview contents of the TOR (for EIA studies), general information
- Example 2: Terms of Reference for Hydroelectric Energy Projects, categories 2,3,4 in Honduras
- Example 3: Terms of Reference, General, categories A & B1 (high and moderate to high impact) in Guatemala

Example 1: Contents of the TOR (for EIA studies)

Source: FAO (n.d.). Environmental impact assessment of irrigation and drainage projects: Chapter 5, preparation of terms of reference. Online: http://www.fao.org/docrep/v8350e/v8350e0d.htm

Country/Organization: FAO Corporate Document Repository
Sector: general
Categories: general

The TOR should commence with a brief description of the programme or project. This should include a plan of the area that will be affected either indirectly or directly. Basic data should be given on existing and proposed irrigation and drainage in the area and the catchment characteristics. The institutions that are involved in the proposal should also be given.

An overview of the local environment should follow the general description. This will include socio-economic information, land use, land tenure, water use in the area and any particular aspect of the flora and fauna. If other studies have been completed a list of available reports should be given.

A brief description should be given of the most important institutions, including those responsible for the EIA, the project executing agency and future managers. This should be presented in the form of an organogram.

A description of the work to be undertaken should give a general set of requirements for determining the potential impacts of, and impacts on, the proposed project.

The TOR should require the consultants to cover the following points:

- Whether a range of proposals should be considered and if so whether they would be less environmentally damaging;
- The main environmental effects of the proposed project, both in the project area and in the surrounding area and the timescale of the impacts;
- The size and extent of the impacts based as much as possible on quantitative data rather than qualitative assessment. In some cases it may be necessary to highlight certain topics (such as waterlogging, resettlement, etc. as discussed in Chapter 4) when a particular issue is known to be of concern. In most cases, however, it may be preferable not to mention any specific topic and make the consultant responsible for a complete review of all topics;
- Those groups that will benefit and those disadvantaged by the project;
- The impact on any rare species of plant or animal in the area;
- The impact on human health;
- The control and management aspects of the project to determine if they will be effective;
- The need for further baseline data collection or other specialist studies;
- The present policy, institutional and legislative situation and future needs;
- The mitigating measures needed and how they should be incorporated into the project design;
- The monitoring and evaluation activities that are required to ensure that mitigating measures are implemented and future problems are avoided.

The TOR should give an indication of the team considered necessary for the study. Depending on the scope of the study this may include one or several of the following: an irrigation specialist, drainage specialist, rural sociologist, terrestrial ecologist (of various specializations), aquatic ecologist/fisheries expert, hydrologist, agronomist, soil chemist or physicist, economist and epidemiologist. However, as mentioned earlier the team should not be rigidly imposed on the consultant.

Example 2: TERMS OF REFERENCE (Tor) For Hydropower Generation Projects

Source: USAID (2009). Technical Review Guidelines: Energy Generation and Transmission. Vol 1, pt 2. P. 29-52

Country: Honduras
Sector: Energy
Categories: 2, 3, 4

A. OVERVIEW

These terms of reference (TOR) describe the minimum requirements for the development of the

Environmental Impact Assessment (EIA) for proposed hydropower generation projects, designed to generate and distribute electrical power. Both the TOR and the cross referenced "EIA Technical Review Guidelines for Energy Power Generation and Transmission Projects" should be used to establish minimally acceptable conditions for satisfying the requirement to submit an EIA. There are four different TORs for energy projects which are designed with a common overview and distinct TORs for different types of energy power generation and transmission. Part A, Overview, is common to all of them but Part B is tailored respectively to: 1. Thermal/Combustion Power Generation Projects, 2.

Hydropower Generation Projects, 3. Other Renewable Energy Generation Projects, and 4. Transmission

Lines. The four TORs are structured to facilitate mixing and matching as appropriate to the purpose and need for a proposed project and alternatives.

The basic format for the EIA document that should be followed is:

- Table of Contents
- Acronyms and Abbreviations
- Executive Summary
- General Information
- Project and Alternatives Description
- Environmental Setting
- Assessment of Impacts
- Mitigation and Monitoring Measures
- Environmental Management Plan
- Commitment Statement
- Annexes

In general, the EIA must identify and address:

- Applicable environmental standards, norms, and requirements set forth at the international, national, regional and/or local levels including those designed to meet the objectives of resource management and/or land use plans that may be in effect in and around the jurisdiction(s) in which you propose to develop the project and in which the proposed project might have a potential impact. In the absence of such standards, identify a set of benchmarks that can be used in the analysis and the basis for your selection. The guideline identifies standards in use by various countries and international organizations in Appendix C.
- Public/Stakeholder concerns related to impacts in and around the proposed project and alternatives at least for stakeholders within the geographic scope of potential impact. The project proponent should document specific steps taken to engage the public and other stakeholders, and engage these publics as early as possible before undertaking to prepare the EIA. Concerned publics include: local governments, persons living and

working in the vicinity of the project, those with interests in resources that may be affected i.e., indigenous peoples, and those concerned about protected areas and prime agricultural lands. A summary of public outreach activities, audience, number of persons, organizations involved, concerns raised, responses to comments and actual copies of written comments received should be included in the Annex.

- All relevant plans related to the proposed energy project, for example, engineering and site preparation plans, operations and decommissioning or closure, environmental management, and mitigation in whatever form these may take.
- All phases of the project from feasibility studies to site preparation to operations to closure and also plans to expand capacity at the current or adjacent sites.
- Alternative approaches to meeting the purpose and need for the proposed energy project include alternative siting, alternative configuration on the site, designing, constructing, operating and decommissioning the project firstly to avoid and prevent, or secondly to reduce or minimize adverse or improve beneficial environmental or socio-economic impacts. The EIA should assess as appropriate the impacts of a range of representative reasonable and technically feasible alternatives as well as the proposed project. The alternatives to the project must include a "no action" alternative, indicating what would happen in the absence of the proposed project as well as consideration of best practices that may not otherwise have been incorporated in the proposed project. Other alternatives should be developed as needed to address significant issues with the proposal.
- Direct, indirect and cumulative impacts and their significance level.
- Uncertainty and how that uncertainty will be addressed through monitoring and contingency plans as may be needed to reduce risk of adverse impacts in the future.
- Specific commitments, including who is responsible, what will be done, when and how it will be monitored, reported and audited to confirm that commitments are met.

Finally, a key part of the TOR is obtaining a legally binding commitment from the project proponent that the approved EIA will be implemented as presented. Such a commitment adds to the legal enforceability of the outcomes of the EIA process.

B. DETAILS FOR HYDROPOWER GENERATION PROJECTS (TOR)

0 Table of Contents

A general Table of Contents for the Environmental Impact Assessment (EIA) shall be provided. The Table of Contents shall be organized in such a manner as to facilitate the use of the EIA by reviewers and project implementers. EIAs for larger projects should have a more detailed Table of Contents than those for smaller projects. At a minimum, the Table of Contents shall include the following:

- Acronyms and Abbreviations
- Executive Summary
- General Information
  - Objectives and Justification
  - Project Proponents
  - Project Team
  - Legal and Regulatory Framework
- Project and Alternatives Description
- Environmental Setting
  - Physical Environment

    - Geologic Resources
    - Soil Resources
    - Water Resources
    - Air and Climate
    - Noise and Vibration
    - Aesthetic Resources
- Biological Environment
    - Vegetation/Flora
    - Aquatic and Terrestrial Wildlife/Fauna
    - Ecosystems: Terrestrial, Wetlands, Aquatic, Marine
    - Endangered or Threatened Species and Habitat
    - Protected Areas
- Social-Economic-Cultural Environment
    - Socio-Economic Conditions
    - Infrastructure
    - Cultural, Archeological, Ceremonial and Historic Resources
    - Land Use
- Assessment of Impacts to resources described in the Environmental Setting
- Mitigation and Monitoring Measures
- Environmental Management Plan
- Overview of Environmental Management Plan Organization and Policy
- Project-wide Mitigation Plan
- Project-wide Monitoring Plan
- Management of Other On- or Off-Site Pollution Controls and Infrastructure
- Contingency Plans
    - Performance-related Contingency Plan
    - Natural Disaster Risk Response Plan
    - Other Risk Response Plans
- Signed Commitment Statement
- Annexes
- Public Consultation
    - Public Consultation Plan
    - Summary of Public Outreach Activities
    - Summary of Responses to Comments
    - Copies of Written Comments
- Technical Supporting Materials
    - Maps and Plans, in the sequence mentioned in the EIA document
    - Charts and Figures
    - Details about predictive modeling used, calculations and assumptions
    - Special Studies
- References

1 Acronyms and Abbreviations

All acronyms and abbreviations used in the EIA must be clearly and succinctly defined and described in this section. This will relieve the reader of the need to search for the first occurrence of a word and the citing of the acronym or abbreviation in the text.

2 Executive Summary

A general summary of the EIA shall be provided in this section. The summary shall be written using a vocabulary that can be easily understood by the public. It shall include at least the following information about the project from the EIA:

- Objectives and Justification
- Location
- Project Proponents
- Project Description
- Other Project Alternatives
- Environmental Setting
- Evaluation of Impacts
- Mitigation and Monitoring Measures
- Environmental Management Plan
- Issues raised by stakeholders and any outstanding issues

3 General Information

3.1 Objectives of and Justification for the Proposed Project

3.1.1 Objectives: A statement of the general and specific objectives (purpose) of the proposed project, including whether it is a new project, an expansion of an existing project (e.g., increase in land area or increase in annual production) or modernization of an existing operation.

3.1.2 Justification for the Project: Provide a justification for the proposed project (need) highlighting the benefits to surrounding communities and economic development of the region and country.

3.2 Project Proponents

3.2.1 Names, addresses, telephone numbers, and applicable legal documentation of proponents (including developers, major equipment suppliers if part of project team, shareholders and providers of financing, and representatives).

3.2.2 Names and contact information for responsible parties within the organization.

3.2.3 Financial viability of the company (including a certified banking statement indicating that the company is financially stable and reputable).

3.2.4 Bonding requirements and proof of ability to meet bonding requirements sufficient to cover the anticipated costs of environmental management during all phases, as well as the costs, by a third party, of decommissioning and long-term post-closure liabilities associated with the project.

3.3 Project Team

This section shall provide information on the multidisciplinary team that prepares the EIA. The types of professionals included in the team shall be appropriate to the type of project and the type of environment in which the project is located and may include (but not be limited to) engineers, architects, biologists, geologists, hydrologists, air quality experts, archeologists, anthropologists, sociologists and economists. The information provided for each member of the EIA project team includes the following:

3.3.1 Names, addresses and registry numbers of contractors.

3.3.2 Names, contact information, qualifications and registry numbers of key personnel involved in the study; as well as an affidavit indicating their area of participation.

3.3.3 List of professionals/experts participating in the EIA, their areas of expertise, degrees, experience, professional registrations and stamps, seals and signatures.

3.4 Legal and Regulatory Framework

This section of the EIA shall define the legal framework under which the EIA is being completed listing and summarizing requirements or alternatives used as benchmarks, and evidence of non-applicability or compliance, including:

3.4.1 Information that demonstrates rights and access:

3.4.1.1 Ownership with written authorization

3.4.1.2 Governmental authorization (if required)

3.4.1.3 Period of lease/permit

3.4.1.4 Maps showing the lease/permit area

3.4.2 Applicable environmental standards, norms and requirements set forth at the international, national, regional and/or local levels

3.4.2.1 In the absence of such standards, identify a set of benchmarks used in the analysis

3.4.3 Required regulatory approvals and/or permits for all stages and their status

3.4.4 Applicable land use requirements (demonstrate conformity and compliance with applicable plans)

3.4.5 Applicable natural resource management or protected area management plans and responsible agency(ies) (demonstrate conformity and compliance with all applicable plans)

4 Project and Alternatives Description

The project proponent shall submit a full description and location of the proposed project and reasonable alternatives including ancillary facilities and operations such as the camp/housing for construction and operation phases, borrow and disposal areas, sanitary services, waste disposal and transportation infrastructure, etc. as addressed through 4.1 to 4.3 below. It shall include at a minimum:

4.1 Location

The general location of the project and associated activities in terms of:

4.1.1 Political-administrative location (region, district, town or other relevant political-administrative units) with accompanying location map

4.1.2 Means of site access – i.e., by air, river, road, train or vehicle

4.1.3 Latitude and longitude of project area

4.1.4 Maps of project area at a scale of no less than 1:50,000 or as required by the regulatory agency

4.1.4.1 Project plat plan and location on a fold-out 11” X 17” page.

4.1.4.2 Indicate the project area and the direct and indirect areas of influence for the physical, biological and social-economic-cultural impacts

4.1.4.3 All drawings should present scale and key coordinates or benchmarks as latitude/longitude, Universal Transverse Mercator (UTM) coordinates, or local survey plate that can be cross-referenced to latitude/longitude or UTM coordinates

4.2 Summary of Proposed Project and Alternatives

All project alternatives that are reasonable and feasible and meet the purpose and need for the proposed project shall be identified, summarized in this section, and evaluated in the EIA as appropriate. In addition to the proposed project, such alternatives include alternative locations, alternative fuels, alternative site configuration of elements of the project, alternative size and output capacity, and alternative plans for construction, operation and decommissioning of the power plant including best practices that may avoid and/or reduce the adverse impacts to the physical, biological or social-economic-cultural environments.

If the project area or the buffer zone of the project area for an alternative is in an ecologically fragile are, the description of the alternative must include a clear justification for not opting for another site. Identify which alternatives will be carried through the analysis in the EIA and the basis for that decision.

4.3 Project and Alternatives Details

The EIA shall provide specific project details for the proposed project and each alternative as identified in subsections 4.3.1 through 4.3.5. The level of detail presented shall be the same for the proposed project and each alternative evaluated. The following project details shall be provided:

4.3.1 Project facilities

4.3.1.1 Type and nature of the hydropower project

- Type (conventional, pump storage, dam/reservoir, diversion, run-of-river, marine, hydrokinetic, etc.)
- Capacity: maximum, minimum and average power output as MW, and as MWhrs by month and season

4.3.1.2 Project operations

- Description of how the project would operate (seasonally, monthly, daily, hourly, as appropriate)
- Mode of operation (peaking, base load, run-of-river, storage)

4.3.1.3 Design and engineering features of the main hydropower plant

Describe the composition, dimensions, and configuration of each of the following:

- Intake

Describe the water point of intake in terms of:

  - Peak level in m above mean sea level (AMSL)
  - Length in m
  - Operation mechanisms such as grids, gates, useful volume, dead volume etc.
- Dam (if applicable)
  - Type
  - Height, height of crown and length in m
  - Type and number of gates
- Reservoir (if applicable)
  - Surface area
  - Maximum and minimum operational pool level in m AMSL
  - Total volume in m3
  - Operational volume in m3
  - Information on reservoir strata and limnology
  - Sediment storage in m3
  - Retention time
  - Height-volume curve
  - Lining (if applicable)
- Power house
  - Number and type of turbines
  - Minimum and maximum hydraulic capacity of turbines
  - Cooling system
  - Generators
  - Other special equipment
- Tunnels and canals
  - Lengths in km
  - Cross sections indicating size in m and construction materials

- Penstocks and pipelines
  - Lengths in km
  - Cross sections indicating size in m and construction materials
- Transmission lines (any connections and new lines associated with the hydropower project)
  - Plans to connect to existing transmission lines
  - New transmission lines (making following bullets a lower order
- Line voltage
- Total length of line in km
- Minimum height of conductors over ground level
- Width of the right of way in meters
- Source
- Destination
- Number and types of towers
- Height of towers
- Number of circuits, stations and transformer yards
- Points of interconnection between existing and new
- Other works

  Describe additional works such as spillways, gates, fishways, oscillation tanks or balance shafts, flow protection works, infrastructure and flow metering equipment, water and power quality.
- For hydrokinetic projects, the description does not need to include any items listed above that are not pertinent, but should include the physical composition, dimension, and general configuration of the power generation facility, and any anchoring, mooring, transmission line, or other structures

4.3.1.4 Design Drawings for Project Facilities

- Plan (overhead view)
- Elevations (front view)
- Profiles (side view)
- Sections

4.3.1.5 Onsite Support Facilities

Location and design information – composition, dimensions, and configuration including site drawing (digitized) showing project layout of all project components and their relationship to each other for the following:

- Offices and onsite housing
- Laboratories
- Power generation
- Storage
- Repair shops
- Fuel stations
- Sanitary Facilities
- Water supply
  - Requirements (m^3/day)
  - Rights

    - Sources
    - Distribution
  - Waste handling and disposal
  - Fencing

4.3.2 Access

4.3.2.1 Roads

  - Identify all new and existing roads to be used (including closed roads that will be reopened, if applicable)
  - Detailed information on any roads to be constructed or upgraded
    - Traffic volume, operating speeds and trip times
    - Closed roads that will be reopened
    - Location
    - Timing of construction
    - Road surface and shoulder width and barriers
    - Grade
    - Construction methods including clearing and grubbing
    - Construction materials
    - Compaction
    - Stream crossings and associated designs
    - Animal crossings
    - Sedimentation and erosion prevention and control structures and practices
    - Stabilization methods for cuts and fills
    - Typical elevations for each type and situation of road displaying construction materials, levels of compaction and erosion and sedimentation features
    - Location and size (area and volume of material) of borrow pits
    - Operation
    - Closure plan
    - Traffic volume, operating speeds and trip times
  - Dust control for construction and operation
  - Maintenance
  - Roster for construction and maintenance equipment, specifying type and quantity by size, motor size, and fuel requirements

4.3.2.2 Other transport systems (if applicable)

  - Rail transport – Same as for Roads with the addition of:
    - Tightest curves
    - Track construction materials
    - Turnouts and sidings
    - Railroad communications and signaling
  - Waterways
    - Location, design, construction and operation of loading docks
    - Rosters of boats used to move barges, specifying type and quantity by: size, motor size, and fuel requirements
    - Maintenance

- Overland conveyors
  - Location, design, construction and operation of conveyors
  - Stream and road crossing designs to prevent falling debris
  - Dust control for construction and operation
  - Maintenance

4.3.3 Construction phase and timetable

4.3.3.1 Schedule for each phase of construction for all project and ancillary facilities including, but not limited to:

- Mobilization
- Road construction and improvements
- Land clearing
- Blasting
- Borrow and spoil disposal
- Erosion and sediment control
- Cofferdam construction and removal
- Dewatering wells
- Excavation and subgrade preparation
- Foundation preparation
- Concrete work
- Construction or installation of each project facility
- Embankment earthwork
- Stabilization of disturbed areas

4.3.3.2 A GANTT or critical path management chart for the entire project, from start to finish

4.3.3.3 Equipment

- Equipment Roster specifying type and quantity by size, weight, motor size, and fuel requirements for each piece of equipment or machinery used in each activity
- Transportation mobilization and mobilization frequency
- Machinery and equipment mobilization routes to be used, as well as the features of the ways on which they will be transported, including a map of routes, as applicable, and mobilization.

4.3.3.4 Labor during construction

- Number and type of employees (by local hire and non-local hire) by field of expertise
- Days per week
- Hours per day
- Shifts per day

4.3.3.5 Raw materials to be used for construction

- Give a complete list of the raw materials and construction materials to be used, indicating the amounts per day, month, and the storage means
- Include an inventory of chemical, toxic or hazardous substances, active elements, sites and storage means, safety aspects regarding transportation and handling and any other relevant information

4.3.3.6 Construction camp (if applicable)

Description of the camp including but not limited to:

- A map showing all facilities at a legible scale appropriate to the size of the project

- Buildings by type (use) and size
- Roads
- Electrical transmission lines and/or substation
- Drainage

- Water supply and distribution
  - Distribution system
  - Use (m^3/day)
  - Rights
  - Sources
- Waste handling and disposal components
  - Sewers
  - Wastewater treatment
  - Solid waste facilities
- Energy generation and use requirements
- Closure or transition from construction camp to final onsite housing

4.3.4 Operation phase

4.3.4.1 Pre-operation Phase: reservoir filling plan (if appropriate) including, but not limited to:

- Proposed filling rate with definite hold periods for observation
- Options to control filling
- Schedule for inspection and evaluation of structures and instrumentation

4.3.4.2 Operation information

- Roster of equipment and machinery to be used during operation, specifying type and quantity by size, weight, motor size, and fuel requirements for each activity
- Labor during operation
  - Number and type of employees (by local hire and non-local hire) by field of expertise
  - Days per week
  - Hours per day
  - Shifts per day
- Overall energy requirements and sources
- Raw materials to be used for operation
  - List of the raw materials to be used, indicating the amounts per day, month, and the storage means
  - Inventory of chemical, toxic or hazardous substances, active elements, sites and storage means, safety aspects regarding transportation and handling and any other relevant information

4.3.5 Closure and decommissioning plan

If it becomes clear that closure will be required, or when the project nears the end of its service life, the project operator shall contact the proper regulatory agency(ies) to obtain the environmental guidelines to carry out the closure or decommissioning.

4.3.5.1 The project description shall include at least a general Restoration and

Closure Plan, recognizing that terms of closure may be very different when this phase approaches.

4.3.5.2 The description of restoration measures should include the size of the area to be restored as well as concurrent, temporary and final restoration measures to be used and their schedules. For each measure include:

Area to be addressed

- Timing and schedule for executing measures
- Equipment and structure removal or conversion
- Remedial measures, including success indicators and contingency measures if initial efforts are unsuccessful

5 Environmental Setting

Based on information available from the literature, government and special studies or other sources, the EIA shall provide information on environmental setting for the different types of physical, biological and social-economic-cultural environments for the current situation, important trends and predicted situation in the absence of the proposed project. All sources of data must be cited in the EIA when and where they are used. Indicate the direct and indirect and cumulative impact areas of influence for physical, biological, and social-economic-cultural impacts and basis for defining area. This section shall include at a minimum, the following information:

Physical Environment

5.1 Geologic Resources and Hazards

5.1.1 Cross sections of the geology including soil horizons

5.1.1.1 Geologic characteristics at all project facility locations and in the area of influence.

5.1.1.2 Geological map of the project area and area of influence at a scale of 1:10,000. Submit a map of the area displaying all characteristics described. Include geological profiles and cuts, as well as stratigraphic columns.

5.1.2 Topography and slope conditions and geomorphology

5.1.3 Seismicity and stability characteristics

5.1.3.1 Indicate the general seismic and tectonic features of the surrounding areas:

- Seismic sources close to the project area
- Seismic history
- Maximum expected magnitudes intensity
- Period of seismic repetition
- Outcome of threats based on peak acceleration for the site
- Periods of vibration of the site
- Micro zoning in terms of the geological map

5.1.3.2 Volcanic activity (must be provided by all the projects that are located within a radius of 30 km from an active volcanic emission center)

- Indicate the general volcanic features of the area near the site
- Historical eruptions
- Period of recurrence
- Type of eruptions
- Affected areas and high risk areas

5.1.3.3 Describe project areas susceptible to soil liquefaction; planned, active, and abandoned mines; karst terrain; and areas of potential ground failure, such as subsidence, slumping, and landsliding

5.2 Soil Resources

The EIA shall describe baseline soil resources, and make use of maps, tables and accompanying narrative text to describe the soils upstream, downstream and in the area of the project.

5.2.1 Types, capacity and uses

5.2.2 Fertility and potential uses of the land for agriculture

5.2.3 Stability and permeability

5.2.4 Erosion and sedimentation potential

5.2.5 Quantity and quality available for revegetating and restoring the disturbed area at time of closure

5.3 Water Resources

5.3.1 Surface water

5.3.1.1 Names and locations on maps of all permanent and intermittent streams, rivers, wetlands, lakes and reservoirs within the area of influence

5.3.1.2 River mile designation or other reference point for the intake and discharge points of the project

5.3.1.3 Area covered by the basin to the dam in square kilometers (km2)

5.3.1.4 Area covered by the basin in km2 at the discharge area

5.3.1.5 Flow

- The monthly minimum, mean and maximum recorded flows in m3/s of the river at the diversion point or powerhouse intake (if no diversion), specifying any adjustments needed to account for evaporation, dam leakage, minimum flow releases, or other reductions in available flow
- A monthly flow duration curve (i.e., flow exceedance curve) indicating the period of record and location of gauging stations where data were gathered to derive the curves

5.3.1.6 For any proposed or existing project reservoirs or lakes, surface area, volume, maximum depth, mean depth, flushing rate, shoreline length, substrate composition

5.3.1.7 Seasonal fluctuations in area and volume of wetlands, lakes and reservoirs

5.3.1.8 Delineation of watersheds and water drainage pattern in the area of influence using cadastral/aerial/remote sensing satellite imageries (map)

- Runoff characteristics of watersheds

5.3.1.9 Inventories of consumptive and non-consumptive use, especially those who are in the floodplain between intake and discharge points and downstream of the discharge

5.3.1.10 Surface water balance (existing withdrawal of surface water)

- Existing uses by type and volume
- Capacity

5.3.1.11 Riverbed gradient for downstream reaches directly affected by the proposed project, including reaches bypassed by flow diversions

5.3.2 Groundwater

Provide a map and identify and describe aquifers and underground waters adjacent to the project, indicating the depth of the water table along with trend data:

5.3.2.1 Hydrogeologic characteristics of the area (vadose zone and aquifers)

- Flow regime
- Flow direction
- Influences of geologic structures (faults, contacts, bedrock fracturing, etc) and surface water bodies

5.3.2.2 Location and characteristics of all existing springs and wells in the area of influence (on topographic map)

- Flow/yield data for each spring and well (including water levels in wells)
- Depth and construction information for each well
- Existing uses by type and volume
- Capacity available

5.3.2.3 Groundwater recharge data

5.3.2.4 Groundwater potential yield

- Availability
- Water table levels (dry and rainy season)

5.3.3 Water quality

5.3.3.1 Existing water quality data

- Locations of all water quality monitoring stations in and around the project area (with direction and distance from the site)
- Water quality data for each station for those parameters likely to be affected by project construction, operation, or maintenance
- Physical, chemical and biological water quality characteristics, including water temperature and dissolved oxygen concentrations
- For any proposed or existing project reservoirs or lakes, water temperature and dissolved oxygen concentrations, including seasonal vertical profiles

5.3.3.2 Supplemental sampling and analysis (if existing data is not adequate to characterize water quality)

Sampling and Analysis Program in annex

- Water quality information upstream of the reservoir, within the reservoir, location of water intake, intermediary points between intake and discharge points, at the point of discharge, and downstream from discharge point
- Proposed locations of representative monitoring stations upstream and downstream of proposed project activities
- Monitoring program design with at least a year of baseline data being collected
  - Parameters (including as appropriate, physical, chemical, heavy metals, radiological and biological)
  - Frequency of collection
  - Analytic methods

5.3.3.3 Surface water and groundwater standards that apply to the project

- Current uses
- Standards for current uses (in the absence of such standards, identify a set of benchmarks used in the analysis)

5.4 Air and Climate

Baseline information for air resources shall be collected for at least one year or as required by the regulatory agency and shall include at a minimum the following:

5.4.1 Climate and meteorology

5.4.1.1 Source of data (meteorological station(s) from which climatological data have been obtained)

5.4.1.2 Temperature variations

5.4.1.3 Relative humidity

5.4.1.4 Solar radiation and evaporation rates

5.4.1.5 Rainfall (total precipitation, rainfall intensity and duration by month)

5.4.1.6 Wind rose (Wind direction and speed, 24 hourly data)

5.4.1.7 Statistical analysis of the data

5.5 Noise and Vibration

Present a description of the noise and vibration levels for receptors near where noise generating activities of the project may occur. The EIA shall include:

5.5.1 Location of monitoring stations

5.5.2 Daytime and night time noise levels (measured in decibels)

5.5.3 Inventory of existing noise sources

5.6 Aesthetic and Visual Resources

5.6.1 Photos presenting baseline panoramic views of the facility site from potential receptors

5.6.2 Viewsheds or other aesthetic or landscape resources

5.6.3 Existing sources of light contamination

Biological Environment

The EIA shall provide detailed information on the location and condition of ecosystems in and around the project area in the form of narrative, maps and tables, including the following:

5.7 Vegetation/Flora

5.7.1 Vegetative mapping of terrestrial and wetland habitats (aquatic and marine if appropriate) for project area, including in the area of transmission lines and any downstream area affected by the project

5.7.2 Species and structure (abundance, density, status, plant communities, presence of invasive species, etc.)

5.8 Aquatic and Terrestrial Wildlife/Fauna

5.8.1 Fish and Aquatic Resources

5.8.1.1 Identification of fish, mussel, macroinvertebrate and other aquatic species

- Spatial and temporal distribution
- Species life stage composition
- Standing crop
- Age and growth data
- Spawning run timing
- Extent and location of spawning, rearing, feeding and wintering habitat

5.8.2 Wildlife Resources

5.8.2.1 Species (including status, i.e., endemic, migratory, exotic, endangered, threatened, keystone, etc.), life history, and seasonal use

5.8.2.2 Breeding areas

5.8.2.3 Mating and brooding areas

5.8.2.4 Migratory corridors (if applicable)

5.8.2.5 Important wildlife use areas (roosts, clay licks, etc.)

5.9 Ecosystems: Terrestrial, Wetlands, Aquatic, Marine

Much if not all that will be needed to address the environmental setting for terrestrial, wetlands, aquatic and/or marine ecosystems will have been covered in Sections 5.7 and 5.8. This section is not intended to duplicate that information; rather, it should integrate the information to ensure that the structure and function of each ecosystem is adequately presented.

5.10 Endangered or Threatened Species and Habitats

Sections 5.7 and 5.8 should identify all species in the project area. This section should highlight all endangered and threatened species and critical habitat that potentially occur in the vicinity of the project.

5.11 Protected Areas

Identify on maps the specific locations and boundaries of relevant national parks, sanctuaries, reserves, etc., as well as any areas proposed for protection. Provide a brief narrative description of each area.

Social-Economic-Cultural Environment

5.12 Socio-Economic Conditions

Identify nearby human settlements including the following information for each settlement:

5.12.1 Population (size, gender and age distribution)

5.12.2 Cultural characteristics (religion, ethnic composition, languages spoken, etc.)

5.12.3 Economic activities (employers, employment and incomes)

5.12.4 Tax base

5.12.5 Crime rates

5.12.6 Literacy rates

5.12.7 Community organizations

5.12.8 Public Health and Safety

5.12.8.1 Diseases in the project area (including the sources of data and the methodology used to collect and analyze the data)

5.12.8.2 Level of emergency services and access to clinics, doctors and hospitals

5.12.8.3 Existing practice for assessment of occupational health

5.12.8.4 Existing electromagnetic fields

5.12.9 Skills, services and goods availability in the communities

5.13 Infrastructure

For each human settlement identified in subsection 5.12, describe the infrastructure in or serving the settlement, including the following information:

5.13.1 Transportation infrastructure

5.13.1.1 Roads

This section of the EIA addresses baseline conditions of transportation and traffic patterns on existing roads. The EIA shall provide information on following:

- Location and condition of all existing roads
  - Surface materials
  - Erosion and sediment control
  - Maintenance programs (what, when and whom)
- Description of anticipated third-party improvements (government or entity other than the proponent)
- Traffic patterns and densities on roads within affected project vicinity
- Safety levels and current circulation issues, and capacity

5.13.1.2 Airports or airstrips, and their capacity and trends in use

5.13.1.3 Other transportation infrastructure as applicable such as rail, pipelines, harbors etc.

5.13.2 Public health infrastructure

5.13.2.1 Drinking water supplies and treatment

5.13.2.2 Wastewater treatment and management

5.13.2.3 Solid and hazardous waste management and treatment

5.13.3 Communications Infrastructure

5.13.3.1 Types of communications systems

5.13.3.2 Types of transmission (wired or wireless)

5.13.3.3 Locations of transmission lines (if applicable)

5.13.3.4 Locations of microwave towers and/or antennae (if applicable)

5.13.4 Energy Infrastructure

5.13.4.1 Types of energy

5.13.4.2 Sources including location and description of generating facilities in the area of influence

5.13.4.3 Transmission lines and/or pipelines

5.13.4.4 Fuel storage facilities

5.14 Cultural, Archeological, Ceremonial and Historic Resources

Identify all cultural, archaeological, ceremonial and historic resources within the area of influence, including the following information:

5.14.1 Data and maps relating to archeological, cultural, ceremonial, and historic sites in the direct vicinity of the project

5.14.2 Information on indigenous people or other traditional cultures, if any

5.15 Land Use

Actual and potential showing location, size and proximity within and surrounding the project area, including land use maps, and to extent possible, integrated into one map.

5.15.1 Population centers, including information and locations of

5.15.1.1 Schools

5.15.1.2 Cemeteries

5.15.1.3 Churches

5.15.1.4 Other public buildings

5.15.1.5 Housing (including housing density)

5.15.1.6 Commercial areas

5.15.2 Agricultural lands

5.15.3 Forested lands

5.15.4 Protected areas (including but not limited to)

5.15.4.1 National parks

5.15.4.2 Wildlife refuges

5.15.5 Wetlands and Mangroves

5.15.6 Other environmentally sensitive areas

5.15.7 Tourism and recreation areas

5.15.7.1 Recreation facilities

5.15.7.2 Eco-cultural-tourist locations

5.15.8 Culturally sensitive areas

5.15.9 Flood plains and water bodies

5.15.10 Coastal zones

5.15.11 Other land uses as appropriate

6 Assessment of Impacts

The EIA shall provide information on potential impacts (direct, indirect and cumulative) and the magnitude and frequency of potential impacts on physical, biological, social-economic-cultural resources resulting from construction, operation and closure of the proposed project and alternatives.

The assessment shall use standardized predictive methods, such as models, to determine the specific range of impacts on environmental and socio-economic resources. The EIA shall identify which impacts are significant and the criteria used to

make this judgment. Critical data input from project description and environmental setting analysis projecting the conditions in the environmental setting in the absence of the proposed project shall be used as the baseline upon which potential impacts are forecast. The EIA shall also identify sources of data used in the analysis and the uncertainties associated with the outputs of each method used.

Physical Impacts

6.1 Geologic Resources and Hazards

Potential impacts to geologic resources and potential effects on facility shall be described including but not limited to the following:

6.1.1 Geologic hazards and potential effects on facility

6.1.2 Dam failure

6.1.3 Impacts on mineral resources (current/future mining)

6.1.4 Changes in topography and drainage patterns

6.1.5 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.2 Soil Resources

Potential impacts to soil resources shall be described including but not limited to the following:

6.2.1 Erosion, slope alteration, vegetation removal and drainage patterns

6.2.1.1 Models for soil erosion should be included using methods like USLE, defining the areas with high erosion potential

6.2.1.2 Sediment accumulation and transport

6.2.1.3 Sediment and hazardous waste removal and disposal

6.2.2 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.3 Water Resources

Potential impacts to surface water and groundwater shall be described including but not limited to the following:

6.3.1 Geomorphology

6.3.1.1 Location of all stream or wetland crossings by right-of-ways and access roads.

6.3.1.2 Modification/diversion in the existing drainage pattern

6.3.1.3 Downstream scouring and upstream head cutting

6.3.1.4 Bank erosion (surface water discharges, stream crossings and dredging)

6.3.1.5 Potential for increased flash flooding

6.3.2 Quantity

6.3.2.1 Water bodies likely to be created or dewatered (e.g., bypass stretches)

6.3.2.2 Impact of water diversion on surface water and groundwater, including specific uses

- Model results
- Water table levels
- Well production
- Spring and stream flows

6.3.2.3 Effects of dams on downstream seepage

6.3.3 Quality

6.3.3.1 Effects of project construction and operation on water quality parameters in the existing or newly formed reservoir, within any bypassed reaches, downstream areas and groundwater, including the results of any water quality modeling

- Description of effects due to runoff, erosion, and sedimentation from roads, disturbed areas, and stream crossings, including sources, receiving waters, and effects on physical, chemical, and biological parameters
- Description of impact from wastewater discharges (if applicable)
- Description of effects of project operations on dissolved oxygen and total dissolved gas concentrations, and other parameters

6.3.3.2 Spills and accidents, including hazardous waste and fuel spills

6.3.4 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.4 Air and Climate

Potential impacts to air resources shall be described including but not limited to the following:

6.4.1 Impacts on ambient air quality

6.4.1.1 Sources (e.g., windblown dust and fixed and mobile equipment emissions)

6.4.1.2 Concentrations

6.4.1.3 Receptors (e.g., communities, schools, water bodies, ecosystems)

6.4.1.4 Greenhouse gas generation.

6.4.2 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.5 Noise and Vibration

Potential impacts from noise shall be described including but not limited to the following:

6.5.1 Noise modeling

6.5.1.1 Basis for model selection

6.5.1.2 Input requirements

6.5.1.3 Modeling results

6.5.2 Potential noise levels at different representative sites in the project area and in communities near the project area

6.5.3 Potential vibration due to blasting and movement of heavy equipment, and related damage to materials and structures

6.5.4 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.6 Aesthetic and Visual Resources

Potential impacts to Aesthetic Resources, including light pollution, shall be described including but not limited to the following:

6.6.1 Impacts on visual resources and landscapes

6.6.2 Increases in light contamination

6.6.3 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

Biologic Impacts

Potential impacts to biological resources shall be described including but not limited to the following:

6.7 Vegetation/Flora and Associated Ecosystems

Describe and quantify alterations in vegetative cover due to:

6.7.1 Deforestation or wetlands destruction

6.7.2 Inundation of vegetated areas by reservoirs (if applicable)

6.7.3 Other vegetative type conversions

6.7.3.1 Direct vegetative removal

6.7.3.2 Indirect (e.g., poisoning by dust and air contaminants)

6.7.4 Operational effects on plant communities (reservoir fluctuations and changes in flow regime)

6.7.5 Wildfires

6.7.6 Increased road access in remote areas leading to destruction of existing vegetative cover (land use changes)

6.7.7 Spread of noxious or invasive species

6.7.8 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.8 Aquatic and Terrestrial Wildlife/Fauna and Associated Ecosystems

Describe and quantify alterations in aquatic and terrestrial wildlife populations due to:

6.8.1 Fish and Aquatic Resources

6.8.1.1 Loss or gains in habitat (e.g., spawning, rearing, juvenile, or adult habitats) from changes in flow releases, reservoir storage, and flow diversions, including the effects of any associated changes in water temperature and dissolved gas and dissolved oxygen concentrations

6.8.1.2 Disturbance of aquatic resources during construction, operations, or maintenance activities, including equipment noise, erosion and sedimentation, vehicular movements, or blasting

6.8.1.3 Entrainment and turbine mortality effects on fish populations in the project area

6.8.1.4 Entrapment of large woody debris and stream gravel in reservoirs and associated effects on downstream fish habitats

6.8.1.5 Effects of project-induced recreational activities on fish habitats and fish populations

- Competing flows (i.e., flows for recreation versus flows for fish habitat)
- Disturbance of spawning of spawning and other habitats (noise, vibration, direct contact of habitat from wading and other in-water activities, etc.)

6.8.2 Wildlife Resources

6.8.2.1 Loss of habitat, migratory routes/corridors, and breeding areas due to changes in vegetative cover/wetlands loss, reservoir fluctuations, and changes in flow regime

6.8.2.2 Disturbance of habitat, migratory routes/corridors and breeding areas due to project construction, operation, and maintenance, recreational use, and human settlement associated with the project (e.g., noise, vibration, illumination, vehicular movement)

6.8.2.3 Loss or contamination of drinking water for wildlife species

6.8.2.4 Poisoning (e.g., air emissions, direct contact with toxic water/substances)

6.8.2.5 Animals attracted to garbage and food waste at construction camps or onsite facilities

6.8.2.6 Electrocution of large birds

6.8.2.7 Increased hunting

6.8.3 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.9 Endangered or Threatened Species or Habitats

Describe and quantify impacts to endangered or threatened species or habitats

6.9.1 Biodiversity

6.9.2 Individual species (with special emphasis on endemic, rare, threatened and endangered species)

6.9.3 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.10 Protected Areas

Social-Economic-Cultural Impacts

The EIA shall assess potential positive and negative impacts to social-economic-cultural resources including but not limited to the following:

6.11 Socio-Economic Conditions

6.11.1 Increased individual incomes

6.11.1.1 Direct employment at the project

6.11.1.2 Indirect employment generated by project activities

6.11.1.3 Increased purchases from local businesses

6.11.1.4 Other economic activities stimulated in the community as a result of the project

6.11.2 Employment opportunities for local residents

6.11.3 Increased tax base

6.11.4 Displacement and relocation of current settlements, residents or community resources

6.11.5 Displacement or disruption of people's livelihoods (e.g., fishing, hunting, grazing, farming, forestry and tourism)

6.11.6 Public finance requirements – will more infrastructure need to be built and maintained to meet the demands of increased population in the areas of public education and public service (water, sanitation, roads, emergency services, etc.)

6.11.7 Reduction in quality of life for residents from visual and noise impacts

6.11.8 Change in crime rate (drugs, alcohol, prostitution, etc.)

6.11.9 Change in population (temporary or permanent)

6.11.10 Change in character of community

6.11.11 Potential hazard to the public from facility components resulting from accidents or natural catastrophes and how these events will affect reliability

6.11.12 Hazards, environmental impact and service interruptions which could reasonably ensure from failure of proposed facilities

6.11.13 Change in religious, ethnic or cultural makeup of community

6.11.14 Impacts on public health

6.11.14.1 Creation of new electromagnetic fields near residences, including their strength and extent

6.11.14.2 Water-related vector diseases (malaria, dengue, etc.)

6.11.14.3 Health impacts of pesticide and fertilizer use

6.11.15 Impacts on worker health and safety

6.11.15.1 Identification of hazardous jobs and number of workers exposed with duration of exposure

6.11.15.2 Occupational diseases due to exposure to dust and other project related activities such as handling of explosives, solvents, petroleum products, etc.

6.11.15.3 Identification of physical risks and safety aspects

6.11.16 Potential for fires

6.11.17 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.12 Infrastructure

6.12.1 Transportation infrastructure

This section of the EIA addresses impacts of transportation and traffic patterns on existing roads.

The impacts of new and existing roads on water quality, biological resources and land use should be addressed in those respective sections. The EIA shall assess potential impacts to transportation systems including but not limited to the following:

6.12.1.1 Potential changes to traffic patterns, densities, and traffic safety issues in area affected by project

- A determination of vehicular traffic density in the project area (before, during, and after the proposed activities)
- Potential for traffic accidents
- Congestion
- Noise

6.12.1.2 Potential impacts to previously inaccessible areas from improvement of roads

6.12.2 Public health infrastructure

6.12.2.1 Increased need for public health infrastructure

6.12.2.2 Alterations to public health infrastructure

6.12.3 Communications infrastructure

6.12.3.1 Increased need for communications infrastructure

6.12.3.2 Alterations to communications infrastructure

6.12.4 Energy infrastructure

6.12.4.1 Increased need for energy infrastructure

6.12.4.2 Alterations to energy infrastructure

6.12.5 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.13 Cultural, Archeological, Ceremonial and Historic and Resources

6.13.1 Destruction during construction

6.13.2 Damage and alteration

6.13.3 Removal from historic location

6.13.4 Introduction of visual or audible elements that diminish integrity

6.13.5 Neglect that causes deterioration

6.13.6 Loss of medicinal plants

6.13.7 Loss of access to traditional use areas

6.13.8 Impacts to previously inaccessible resources from development/improvement of roads

6.13.9 Overall assessment of significance of direct, indirect and cumulative impacts for all phases of the proposed project based upon analysis of magnitude, frequency, scope and duration in context

6.14 Land Use

6.14.1 Changes in land use by both area and location

7 Mitigation and Monitoring Measures

This section of the EIA must include measures designed to mitigate potential adverse impacts to physical, biological and social-economic-cultural resources from construction, operation and closure of the proposed project and alternatives.

These shall include measures to avoid and prevent, and if needed, to reduce or minimize adverse impacts. The project proponent must include measures considered to be "best practices" in the design of all alternatives.

Here and/or in the Environmental Management Plan section, proposed mitigation shall be described in auditable terms and at a level of detail sufficient to demonstrate its effectiveness in addressing the concern or performance criterion, including its anticipated level of effectiveness and/or measurable performance, and design specifications.

The monitoring plan must include monitoring throughout the life of the project for each potential mitigation to confirm the effectiveness of the measure and support contingency plans to provide assurance that the project, at the site preparation, construction, operation, expansion, and closure stages will meet applicable environmental requirements/standards by law, and fall within the limits of impacts deemed acceptable upon approval of the EIA. Some important items to address in the mitigation plan and associated monitoring plans include, but are not limited to the following:

Physical Impacts

7.1 Geologic Resources and Hazards

7.1.1 Pre-excavation, onsite geological inspection and geotechnical study protocols to determine slope stability and landslide risks

7.1.2 Slopes built and maintained to avoid landslides and favor revegetation and soils formation

7.1.3 Slope stabilization by constructing retaining walls, using vegetation, geotextile membranes, or other mechanical methods

7.1.4 Blasting Plan, if applicable (summary of relevant measures with full document in Annex)

7.1.5 Use of signage to mark areas where slopes are not stable as a preventive measure in the event of a landslide

7.1.6 Mitigation measures unique to specific alternatives

7.2 Soil Resources

7.2.1 Topsoil management measures including specifically future use for agriculture

7.2.2 Erosion and sediment temporary and permanent control measures including when each will be installed or implemented, how often it will be checked and the process for and timing of removal of temporary measures

7.2.3 Spoil and disposal measures

7.2.4 Best management practices to minimize soil disturbance

7.2.5 Decommissioning/Rehabilitation Plan-if needed (summary of relevant measures with full document in Annex)

7.2.6 Mitigation measures unique to specific alternatives

7.3 Water Resources

7.3.1 Quality

7.3.1.1 Water Quality Management Plan (summary of relevant measures with full document in Annex)

- Project operation measures including minimum flows, aeration, flow energy dissipation, or modification of the intake withdrawal depth
- Sewage and domestic wastewater
- Nonpoint sources – runoff, erosion and sediment control prevention measures

7.3.1.2 Spill Prevention and Containment Plan (summary of relevant measures with full document in Annex)

7.3.1.3 Solid Waste Management Plan (summary of relevant measures with full document in Annex)

7.3.1.4 Hazardous Waste Management Plan (summary of relevant measures with full document in Annex)

7.3.1.5 Transport system construction and maintenance to avoid erosion and sedimentation including:

- Elevation or rerouting
- Design for proper run-off control and catchment
- Provision of culverts to allow flow that might otherwise be impeded by roadways or other rights of way
- Appropriate traffic control

7.3.1.6 Off-road vehicle use restrictions

7.3.1.7 Waste minimization practices

7.3.2 Quantity

7.3.2.1 Operational measures, such minimum flows or reservoir level fluctuation limits, to protect important species

7.3.2.2 Use of guaranteed stream maintenance flow device to guarantee release of minimum agreed upon flow

7.3.2.3 Flow gauging to monitor water quantity

7.3.3 Mitigation measures unique to specific alternatives

7.4 Air and Climate Resources

7.4.1 Dust control measures

7.4.2 Emissions control measures

7.4.2.1 Emissions reduction equipment

7.4.2.2 Maintenance and inspection of equipment and vehicles using combustion engines to reduce emissions

7.4.3 Spill Prevention and Containment Plan (summary of relevant measures with full document in Annex)

7.4.4 Hazardous Materials Management Plan (summary of relevant measures with full document in Annex)

7.4.5 Mitigation measures unique to specific alternatives

7.5 Noise and Vibration

7.5.1 Noise control measures

7.5.1.1 Noise reduction technologies (suppression equipment, sound-absorbing structures, vibration dampening devices, berms, noise barriers, etc.)

7.5.1.2 Re-routing of traffic and other infrastructure related activities to minimize impacts of noise and vibration

7.5.1.3 Time of day limitations on blasting and movement of heavy equipment when in close proximity to houses not being operated during evening hours

7.5.2 Blasting Plan, if applicable (summary of relevant measures with full document in Annex)

7.5.3 Mitigation measures unique to specific alternatives

7.6 Aesthetic and Visual Resources

7.6.1 Relocation of facilities to another site

7.6.2 Redesign of placement of facilities on site

7.6.3 Redesign height and location of structures blocking view or light

7.6.4 Lighting minimization

7.6.5 Visual/Landscape Management Plan (summary of relevant measures with full document in Annex)

7.6.6 Mitigation measures unique to specific alternatives

Biological Impacts

7.7 Vegetation/Flora and Associated Ecosystems

7.7.1 Control of noxious and invasive weeds

7.7.2 Surface water diversion limitations to maintain in-stream values

7.7.3 Measures to compensate for loss or damage of forests, wetlands or other critical ecosystems, including establishment of new protected areas

7.7.4 Restoration/Rehabilitation Plan for disturbed areas (summary of relevant measures with full document in Annex)

7.7.5 Mitigation measures unique to specific alternatives

7.8 Aquatic and Terrestrial Wildlife/Fauna and Associated Ecosystems

7.8.1 Fish and Aquatic Resources

7.8.1.1 Control of instream flows, powerhouse discharge rates (i.e., ramping rates), and reservoir levels

7.8.1.2 Fish passage, intake screening, tailrace screens

7.8.1.3 Artificial propagation of fish and other aquatic species

7.8.1.4 Large woody debris or gravel management

7.8.1.5 Habitat enhancement (e.g., creation of pools)

7.8.1.6 Relocation of sensitive, threatened or endangered species

7.8.1.7 Scheduling construction to avoid critical or important fish life history periods (e.g., spawning)

7.8.1.8 Flow gauging and water quality monitoring

7.8.1.9 Recreation use and associated fish monitoring (e.g., evaluate the effects of boating releases on fish spawning)

7.8.1.10 Blasting Plan, if applicable (summary of relevant measures with full document in Annex)

7.8.1.11 Mitigation measures unique to specific alternatives

7.8.2 Wildlife Resources

7.8.2.1 Controls on hunting within the project area

7.8.2.2 Modify facility and activity locations and timing to avoid critical ecosystems, migratory routes and breeding areas

7.8.2.3 Scheduling construction to avoid critical or important wildlife history periods (e.g., breeding, nesting)

7.8.2.4 Transmission line design to minimize or avoid electrocution of raptors and other large birds

7.8.2.5 Relocation of sensitive, threatened or endangered species

7.8.2.6 Blasting plan, if applicable (summary of relevant measures with full document in Annex)

7.8.2.7 Mitigation measures unique to specific alternatives

Social-Economic-Cultural Impacts

7.9 Socio-Economic Conditions

7.9.1 Selection of an alternate site for the project, and if not possible then adhering to requirements of an internationally recognized Resettlement Action Plan (RAP)

7.9.2 Rehabilitation Program for people displaced by the project (summary of relevant measures with full document in Annex)

7.9.3 Training local residents for employment in the project

7.9.4 Development of a "Code of Conduct" (with associated training program) for workers to show respect to the local populations and their culture and social rules

7.9.5 Measures proposed to protect public from failure of proposed facilities

7.9.6 Design and operational measures to avoid or reduce risk

7.9.7 Measures to exclude public from hazardous areas

7.9.8 Public Health Program to protect local population from potential health problems caused by the project operation (summary of relevant measures with full document in Annex)

7.9.9 Development of an Occupational Health, Industrial Safety and Accidents

Prevention Program with appropriate accident prevention program, reporting and periodic review (summary of relevant measures with full document in Annex) including provision of routine training and testing, and proper safety equipment such as hearing protection, hardhats, steel-toed shoes, safety railings, fall arrestors, sensors for notification on reaching of warning and action limits for exposure to hazardous gases and liquids or impending catastrophic failures.

7.9.10 Spill Prevention and Containment Plan (summary of relevant measures with full document in Annex)

7.9.11 Hazardous Materials Management Plan (summary of relevant measures with full document in Annex)

7.9.12 Mitigation measures unique to specific alternatives

7.10 Infrastructure

7.10.1 Transportation infrastructure

This section of the EIA addresses mitigation measures for transportation and traffic patterns on existing roads. Mitigation of impacts of new and existing roads on water quality and biological resources and land use should be addressed in those respective sections.

7.10.1.1 Transportation Plan (summary of relevant measures with full document in Annex)

- Placement of traffic signals
- Establishing, posting and enforcing speed limits for the vehicles that transport material
- Training employees, contractors and subcontractors on measures to reduce or avoid potential accidents
- Hiring and training security personnel devoted exclusively to preventing accidents in the access road and controlling the speed of the vehicles transporting project material

7.10.2 Public health infrastructure

7.10.3 Communications infrastructure

7.10.4 Energy Infrastructure

7.10.5 Mitigation measures unique to specific alternatives

7.11 Cultural, Archeological, Ceremonial and Historic and Resources

7.11.1 Modify facility and activity locations to avoid significant archeological, cultural, ceremonial and historic sites

7.11.2 If avoidance is not possible, conduct appropriate resource recovery operations before disturbing the sites

7.11.3 Clearly delineate boundaries and post signs identifying existing archeological, cultural and historic sites on roadsides and within the project area boundaries so that they are easily recognized by the machinery operators and other workers

7.11.4 Development of a training program so that staff recognize and respect culturally and archeological sensitive areas

7.11.5 Development protocols for use during construction and operation stages for identifying and responding to archeological, cultural, ceremonial and historic sites not identified during the preliminary surveys

7.11.5.1 In the event that such a site is found, they will stop activities at the site and report to the government relocation of cultural or historical resources, for their physical protection.

7.11.6 Mitigation measures unique to specific alternatives

7.12 Land Use

7.12.1 Criteria and method for calculating compensation for loss of land and crops

7.12.2 Compensation to farmers and ranchers for crop or forage losses and restore lost agricultural lands at the end of the project.

7.12.3 Compensation to property owners for relocation of their homes in the event the relocation is unavoidable.

7.12.4 Mitigation measures unique to specific alternatives

8 Environmental Management Plan

The EIA shall include an Environmental Management Plan to prevent, mitigate and monitor each impact identified in the EIA. Plans will describe actions to be taken in sufficient detail to provide a basis for subsequent auditing of compliance with commitments made in the EIA process including who is responsible, how and when it will be implemented, what will be done

and what results will be achieved, why it is being done, and how to know whether it is effective in addressing the underlying concerns. The Environmental Management Plan shall have the following elements:

8.1 Overview of Environmental Management Plan Organization and Policy

8.1.1 Describe the project management and how environmental management and organization relates to overall project responsibility. Describe the personnel and performance accountability system for design, operation, maintenance and closure for implementation of mitigation and monitoring measures

8.1.2 Describe the environmental policy that will govern the Project throughout its implementation, including at least the objectives, scope, commitment to continuous improvement, control and environmental monitoring and good relationship with neighboring populations and countries, as well as the commitment to internal controls such as compliance and environmental monitoring and routine audits

8.1.3 Identify the persons responsible for the implementation of mitigation measures, in each phase

8.2 Project-wide Mitigation Plan including an implementation schedule. It has two elements:

8.2.1 Environmental resource mitigation (such as air, water)

8.2.2 Socio-economic-cultural mitigation (relocation, etc.)

8.3 Project-Wide Monitoring Plan (usually specific to monitoring of surface and ground water)

8.3.1 Short-term and long-term monitoring of resource condition, including but not limited to:

8.3.1.1 Slope stability

8.3.1.2 Water Quality Monitoring Program

- Where, how and when monitoring shall be conducted
- Parameters to be monitored
- Monitoring frequencies
- Sampling and analytical protocols to be used

8.3.1.3 Air Quality Monitoring Program

- Where, how and when monitoring shall be conducted
- The Parameters to be monitored
- The monitoring frequencies
- The sampling and analytical protocols to be used

8.3.1.4 Noise and Vibration

8.3.1.5 Cultural, ceremonial archeological and historic resources in the vicinity of the mine

8.3.2 Short-term and long-term monitoring to ensure that the mitigation measures are functioning as predicted and that rehabilitation is working

8.4 Management of Other On- or Off-Site Environmental Pollution Control and Infrastructure

This section should address management of critical elements of pollution control and infrastructure that are not otherwise included in the mitigation plan because they were considered an essential part of the proposed project.

8.5 Contingency Plans

Contingency plans shall be prepared and described to address a) failure to meet specific performance criteria established by law or necessary for the project to meet its commitments in the EIA and b) respond to natural and other risks previously identified and mitigated in the EIA in the event reasonable and feasible mitigation measures to address the risks are inadequate.

8.5.1 Performance-related Contingency Plans, indicating the steps that will be taken should monitoring indicate that:

8.5.1.1 Environmental standards are not being met

8.5.1.2 Impacts are greater than predicted

8.5.1.3 The mitigation measures and/or rehabilitation are not performing as predicted

8.5.2 Natural Disaster Risk Response Plan (assumes that risk identification and risk reduction have been addressed in other parts of the EIA)

8.5.3 Other Risks Response Plans (assumes that risk identification and risk reduction have been addressed in other parts of the EIA)

8.5.4 Contingency plans for maintaining service or reducing downtime in the event of accidents or natural catastrophes that disrupt facility operation

9 Signed Commitment Statement

The EIA shall contain a legally binding signed letter of commitment to meeting the terms of the EIA.

The statement must be signed by the authorized representative of the proponent company with assurance that all financial surety measures as required by the regulatory agency have been met.

10 Annexes

These shall be numbered and duly referenced in the text.

10.1 Public Consultation

10.1.1 Public consultation plan

10.1.2 A summary of public outreach activities including: audience, number of persons, organizations involved, concerns raised, responses to comments

10.1.3 Summary of response to comments

10.1.4 Actual copies of written comments

10.2 Technical Supporting Documents

10.2.1 Include maps, plans, charts and figures in the sequence mentioned in the EIA document

10.2.2 Zoning maps with resources and results of impacts

10.2.3 Special Studies if relevant but not readily accessible

10.2.4 Detailed materials on predictive tools/models and assumptions used for the assessment but too detailed for the body of the EIA

10.3 References

Submit a list of all references, (books, articles, technical reports and other information sources) cited in the various chapters of the EIA study with full biographic references, and the following conventional procedures cited in the literature: author, year, title, source, number of pages, and city of publication or issuance.

Example 3: Terms of Reference Guide for Studies in Environmental Impact Assessments

Source: Gobierno de Guatemala (2004). Guía de Términos de Referencia para la Elaboración de un estudio de Evaluación de Impacto Ambiental.

Country: Guatemala
Sector: General
Categories: A, B1 (High impact and moderate to high impact)

TABLE 26. GUATEMALA: TOR GUIDE FOR EIA

Categ.	No.	Theme	Explication
A, B1	1.	**Index**	Submit the complete contents or index indicating chapters, tables, figures maps, schedules, and other acronyms; noting page numbers.
A, B1	2.	**Executive Summary of the Study of Environmental Impact Assessment**	The executive summary includes: introduction (objectives, location, ownership entity, justification); Description of project, work or activity (phases, complementary works, etc.); environmental characteristics of the area of influence; impacts of the project, work or activity on the environment and vice versa; remediation or mitigation measures and a summary of environmental management plan summary thereof and environmental commitments.
A, B1	3.	**Introduction**	Introduction of the Environmental Impact Assessment Study by the professional responsible for the work. The main parts including a) description of the project b) scope, c) objectives, d) methodology e) duration in preparing the study, location and justification.
A, B1	4.	**General Information**	Submitting requirements included in the requirements sheet.
	4.1	Legal Documentation	Include legal documents according to requirements sheet.
	4.2	Information about the professional team to carry out the EIA	Include list of professional participants involved in the preparation of the EIA study and indicate the specialty of each person, the name of each active referee, name of Registration with the MARN and the respective Affidavit on the theme on which the person participated.
A, B1	5	**Project Description**	
A, B1	5.1	General project synthesis	Provide a brief description of the project.
A, B1	5.2	Geographical location and area of influence	Present location map of the land where the project will be developed, identifying access points so officials can access the project for the inspection. Include a portion of the map sheet area of influence (DAI), with their UTM coordinates.
A, B1	5.3	Political and administrative Location	Submit political administrative location indicating the city, state, municipality, village, hamlet, and indicate the most convenient way to get the project.
A	5.4	Project technical justification for the work, industry or activity and its alternatives	Description of the preferred alternative and other alternatives that were contemplated as part of the project, work, industry or activity or components. The alternative should be raised at the level of (strategic) solution Project (site) or activity (implementation). At the project level it should be determined by a) description of the issue or problem to be treated, b) analysis of the causes of that problem, c) the way in which the project will solve or reduce the problem d) the results of those steps, that is, their specific objectives.
A, B1	5.5	Estimated project area	Physically define the area of the project, work, industry or activity (PA), specifying in m2 or km2.
A, B1	5.6	Activities in each phases of project development and execution timelines	List the major activities to be carried out on the construction, operation and termination of the project, work, industry or business. Indicate the time of their execution.
A, B1	5.6.1	Flowchart of activities	Develop a flowchart with all the activities undertaken in each of the phases of project development.
A	5.6.2	Construction phase	
A, B1	5.6.2.1	Infrastructure to be developed	Detail all the infrastructure to be built in this phase that will occupy the same area (in m2 or km2).
A, B1	5.6.2.2	Equipment and machinery used	List of machinery and equipment used in the construction phase, in the above activities
A, B1	5.6.2.3	Mobilization of transportation and frequency of mobilization	Transportation routes of machinery and equipment used, and the characteristics of the ways that they will be mobilized, including a map with the routes when necessary and frequencies of movement.
A	5.6.3	Operation phase	Include a list of equipment and machinery to be used during the operation in the activities mentioned in paragraph 4.4.1.
	5.6.3.1	Infrastructure to be developed	Detail all infrastructure to be built in this phase that will occupy the same area (in m2 or km^2).
A, B1	5.6.3.2	Equipment and machinery used	List of machinery and equipment used in the construction phase, in the above activities.
A, B1	5.6.3.3	Traffic flow and expected frequency of movement	Indicate the routes to be used and frequency of mobilization of vehicles generated by the operation of the Project. Indicate whether emergency routes may be affected.

Categ.	No.	Theme	Explication
A, B1	5.7	Basic services	
A, B1	5.7.1	Water supply	Define the type of water supply; amount of water used (m3/day or m3/month), average flow rate, maximum daily and maximum time, the power supply and the use that will be given (industrial, irrigation, potable, other users etc.).
A	5.7.2	Drainage of wastewater and stormwater	Indicate the type of sewage and storm drainage (linear meters, volume or other) and the necessary connections, as well as the disposal of wastewater and rainwater. Explain briefly how the issue of the treatment of wastewater will be solved. Include description of treatment systems and the necessary plans signed by a qualified professional.
A, B1	5.7.3	Electrical energy	Define how much to use (Kw/hour or day or month), power supply and use will be given.
A, B1	5.7.4	Access routes	Detail the access roads to the project, work, industry or activity, and their current condition.
A, B1	5.7.5	Public transportation	Identify the public transport needs to be generated by the project, work, industry or activity and describe existing transport routes.
A, B1	5.7.6	Other services	Mention other services necessary for the project, work, industry or business.
A, B1	5.7.7	Labour	
A, B1	5.7.7.1	During construction	Submit an estimate of the direct employment generation (by specialty) as well as the origin of employees should there not be sufficient local labour.
A, B1	5.7.7.2	During operations	Submit an estimate of direct employment generated (by specialty) as well as the origin of employees should there not be sufficient local labour.
A, B1	5.7.8	Work camps	If the type of project warrants having a temporary camp, detail aspects such as: area to be occupied, number of occupants, services to install, location and others.
A, B1	5.8	Raw materials and materials to be used	
A, B1	5.8.1	Construction and operations stages	Submit a complete list of raw materials and construction materials to be used, indicating amounts per day, month, and methods of storage.
A, B1	5.8.2	Inventory and management of chemical, toxic and hazardous substances	Include an inventory of toxic or hazardous chemical substances, indicating the degree of danger, active elements, place and method of storage, security issues in the transport and handling and other relevant information, according to the project.
A, B1	5.9	Handling and disposal of waste (solid, liquid and gaseous)	
A, B1	5.9.1	Construction phase	
A, B1	5.9.1.1	Solid, liquid and gaseous wastes (including drainage)	Report an estimate of the amount, characteristics and expected quality of solid waste management and disposal. Include estimated amounts of recyclable and/or reusable materials, methods and where they will be processed,Including inventory, handling and disposal of hazardous waste generated as a result of the construction of the project, work, industry or business.
A, B1	5.9.1.2	Dangerous toxic waste	Include inventory, handling and disposal of hazardous waste generated as a result of the construction of the project, work, industry or business.
A, B1	5.9.2	Operations phase	(see construction phase)
	5.9.2.1	Solid, liquid and gaseous wastes (including drainage)	
A, B1	5.9.2.2	Dangerous toxic waste	
A, B1	5.10	Accordance with the land use plan	The project, work, industry or proposed activity, should be considered under the existing land-use plan for the area of development, and whether that plan is local (municipality), regional (group of municipalities or watershed) or national. Indicate if there is any development plan for the area.
A, B1	6	Description of the Legal Framework	Describe the legislation (regional, national and municipal) that was considered in the development of the project or applied according to the activity in question and necessary for the use of natural resources.
A, B1	7	**Total investment amount**	Record expenditures for land purchase, facilities construction, access roads, electrification works, and drinking water, purchase of machinery and equipment, qualified personnel and unskilled labour. This shall be included for the life of the project.
A, B1	8	**Description of the physical environment**	
A, B1	8.1	Geology	
A	8.1.1	Regional geological aspects	Describe aspects of interest to the regional location, (General description of the project, including geological maps) Present geological maps: a) geotectonic context; b) regional structural and stratigraphic context (the maps must be submitted to a scale of 1:10 000).

Categ.	No.	Theme	Explication
A, B1	8.1.2	Local geological aspects	Describe the geological units, including the rocky surface formations. Include basic technical description and fundamental geological attributes as well as levels of alteration and fracture systems.
A, B1	8.1.3	Structural analysis and evaluation	Present an analysis of the geological structure of local units and a basic geotectonic evaluation of the project area (geometry units, contacts, dips, faults, lines, folds and others). Present a map to a scale of 1:10 000.
A	8.1.4	Geotechnical characterization	Present a geotechnical characterization of soils and surface formations, depending on the susceptibility to erosion, stability characteristics, bearing capacity and permeability.
A, B1	8.1.5	Geological map of the project area (PA) and direct area of influence (DAI)	Provide a map of the area, indicating the factors mentioned (PA, IIA, DAI). Accompany these with explanatory geological profiles and cuts as well as stratigraphic columns that strengthen and clarify the geological model derived for the field study; also indicate the physical environment geological resources that are being used in the area (collection from springs, wells, pits, quarries and others).
A, B1	8.2	Geomorphology	
A, B1	8.2.1	Geomorphological description	Describe the relief and its dynamics in order to understand the processes of erosion, sedimentation and slope stability. Please indicate whether any relevant landscapes highly sensitive to impact.
A, B1	8.3	Soils	Characterization of soils for recovery and/or rehabilitation of degraded areas, to assess the potential for loss of fertile soil.
A, B1	8.4	Climate	Regional and local description of the climatic characteristics (wind, temperature, relative humidity, cloud cover, rainfall, etc.).
A, B1	8.5	Hydrology	Submit a regional or local hydrological study, according to the project, linked with the area of direct influence (the information will be presented in a hydrological map.
A, B1	8.5.1	Surface and ground waters	Provide a map locating nearby bodies of water that may be potentially affected by the project (water intakes, effluent channels or modification of bank, etc.) and identification and characterization of aquifers surrounding the project (AP) indicating the depth of the water table and the holding conditions.
A, B1	8.5.2	Water quality	Submit a bacteriological and physical-chemical characterization of surface and groundwater, which could be directly affected by the project, considering the parameters that can potentially become altered by the implementation of the project, work, industry or activity, such as: temperature, total electrical conductivity, solids- suspended and dissolved, COD, BOD, dissolved oxygen, oil and grease, heavy metals, nitrogen, sulphates, chlorine, fluorine, total coliforms, and others.
A	8.5.3	Flow (maximum, minimum and average)	Present data flows of water bodies that could be modified by the project activities.
A	8.5.4	Flood levels	Present the historical frequency of flooding in the Project site, based on local experience and reports from the relevant authorities. In case of any flood areas, these areas are presented graphically.
A	8.5.5	Currents, tides and waves	When the project is located in a coastal zone, it must submit data on the water dynamics of the area, including significant events. The information should be presented in graphical form and maps.
A, B1	8.5.6	Vulnerability to contamination of groundwater	Analyze the susceptibility of groundwater to contamination by project activities.
A, B1	8.6	Air quality	Provide a general characterization of air quality. In the case of urban areas, consider the parameters that can potentially become altered by the execution of the project, work, industry or activity.
A, B1	8.6.1	Noise and vibrations	Present a description of noise and vibration in the study area, compared to urban areas.
A, B1	8.6.2	Odours	Present a description of odours in the study area, characteristics related to wind and other factors.
A, B1	8.6.3	Radiation sources	Identify existing sources of radiation and permits for operation.
A, B1	8.7	Natural threats	
A, B1	8.7.1	Seismic threats	Indicate the generalities of the seismic and tectonic environment: seismic sources close to the project area, historical seismicity, expected maximum magnitudes, expected intensities, seismic recurrence period, a result of the threat based on the peak acceleration for the site, periods site vibration, micro zoning based on the geological map.
A, B1	8.7.2	Volcanic threats	Indicate the generalities of seismic and tectonic environment: seismic sources close to the project area, historical seismicity, expected maximum magnitudes, expected intensities, seismic recurrence period, a result of the threat based on the peak acceleration for the site, periods site vibration, micro zoning based on the geological map. This information shall be provided for all projects that are located within a radius of 30 km away from an active volcanic emission centre.
A, B1	8.7.3	Mass movements	Report chances of gravitational mass movements (landslides, landslides, landslides, creep, etc.). This information must be submitted by all projects, works, industries or activities that take place on land with slopes greater than 15%.
A, B1	8.7.4	Erosion	Indicate the susceptibility of the area to other phenomena of erosion (linear, laminar flow).
A, B1	8.7.5	Floods	Define vulnerability and susceptibility to flooding of coastal areas where hurricanes occur.
A, B1	8.7.6	Other	Report terrain susceptibility to phenomena of liquefaction, and subsidence induced naturally or potentially caused by the project. Report environmentally fragile areas present within the boundaries of the project.

Categ.	No.	Theme	Explication
A	8.7.7	Susceptibility	Present a map showing areas susceptible to natural hazards, or risk, including all the factors mentioned above.
A, B1	9	**Description of the biotic environment**	Present the biological characteristics of the study area based on the type of biological zone.
A, B1	9.1	Flora	Graphically indicate the area of vegetation cover of the site affected by the project, work, industry or activity, e.g., pasture, pasture with scattered trees, secondary forest, primary forest, mangrove swamps, crops and others. Indicate the general state of the plant associations, and attach a forest inventory. You can use the land-use change methodology.
A, B1	9.1.1	At-risk, endemic or endangered species	Present a list of endangered, endemic or endangered species in the project area and area of influence, according to the official species lists (CITES Listing).
A, B1	9.1.2	Indicator species	Propose a number of local species that can serve as indicators for environmental quality monitoring purposes during the operation and closure phases.
A, B1	9.2	Fauna	Refer to sections 9.1, 9.1.1, 9.1.2
A, B1	10	**Description of the socioeconomic and cultural environment**	
A, B1	10.1	Characteristics of the population	Include data about size, structure, level of education, economic activities, land tenure, employment, health indicators, population census, gender and other aspects of the population near the project area including trends, especially those that can be influenced by the implementation of the Project, construction, industry or activity.
A, B1	10.2	Road safety and traffic flow	Set the current characteristics of the road network, security levels and any ongoing problems with traffic circulation, to present an analysis in terms of the implementation and operation of the Project, construction, industry or activity.
A, B1	10.3	Emergency services	Indicate the existence and availability of emergency services such as fire stations, ambulances, police, hospitals, clinics and others.
A, B1	10.4	Basic services	Indicate the existence and availability of basic services such as potable water, sewage and drainage, electricity, public transportation, garbage collection, schools, and others that relate to the Project.
A, B1	10.5	Local perception of the project	Ask what the perceptions, attitudes and concerns of local residents are about the implementation of the Project, construction, industry or activity, and the transformations that it can generate (using an opinion poll). Report potential conflicts that may arise from implementation and the approach of the consulting team on the methodology used to present and discuss the project and its scope with regard to the social environment and in particular on nearby communities. Include the registration of such meetings in the EIA study.
A, B1	10.6	Communal infrastructure	Identify existing community infrastructure (roads, bridges, schools and health, parks, housing, historic sites, etc.), that may be affected by the project, work, industry or business.
A	10.7	Displacement and/ or movement of communities	Consider in a specific and detailed way if the project involves the displacement of individuals, families or communities. Conduct an inventory population and their views on the situation posed by the project.
A, B1	10.8	Description of cultural environment; historical, archaeological, anthropological, paleontological and religious value	Identify and characterize all sites in the area of direct influence and analyze the effect of the project, work, industry or activity thereon, in coordination with the relevant parties showing the respective authorization.
A, B1	10.9	Landscape	Make a description of the recreational, aesthetic and artistic values of the area (support with photographs showing the conditions of the area that may be affected by the project, work, industry or business proposal).
A	10.10	Socially sensitive and vulnerable areas	Present sociological data obtained by defining the areas that are socially sensitive and vulnerable to the effects of the Project (this information must be based on appropriate scale maps).
A, B1	11	**Selection of Alternatives**	
A, B1	11.1	Considered alternatives	Undertake an overview that integrates the alternatives considered as part of the preliminary design and comparison, describing briefly the methodology and steps leading up to the selected alternative.
A, B1	11.2	Selected alternatives	Include a technical description of the selected alternative.
A, B1	12	**Identification of environmental impacts and determining mitigation measures**	Include a matrix or set of matrices used for identification and quantification of impacts must be included. (Checklist Cause and Effect, etc.)
A, B1	12.1	Identification and evaluation of environmental impacts	Apply a standard methodology to assess project activities, work, industry or activity, with respect to environmental factors that could be affected, and values analyzing the different stages of the project (construction, operation and decommissioning).

Categ.	No.	Theme	Explication
A, B1	12.2	Analysys of Impacts	Analyze environmental impacts that could affect : a) air , b) ground c) underground, d) surface water, e) groundwater, f) wildlife g) aquatic and terrestrial biotopes, h) socioeconomic environment, i) cultural and historical resources, j) landscape, k) others. Report the source of the impact (description and analysis), and define the set of preventive, corrective, mitigation, and compensation measures (if the impact is negative), or steps taken to optimize (if positive).
A, B1	12.3	Social Impact Assessment	Undertake an assessment of social impact that considers the social consequences that disrupt the normal rhythm of life of the population and affect their quality of life.
A, B1	12.4	Summary of the Environmental Impact Assessment	Prepare a summary indicating all environmental impacts that the project will produce in its different stages and the outcome of the assessment of the importance of environmental impact, including those that generate cumulative impacts. Include a comparison of the rating of the environmental impacts, in particular the balance between negative and positive impacts; and summarize what project's most important impacts.
A, B1	13	**Environmental Management Plan (EMP)**	Submit an EMP that includes practices to be implemented to prevent, control or reduce negative environmental impacts and maximize significant positive impacts arising from the project, work or activity. Present a synthesis in an abstract describing the EMP, including: a) affected environmental variables, b) generating source of impact, c) environmental impact itself, d) appointment of environmental regulations related to the subject, e) environmental measures established, f) runtime of these measures, g) costs of measures, h) responsibility for implementing the measures, i) performance indicator set to monitor compliance, j) Synthesis of environmental commitment.
A, B1	13.1	Project organization and execution of mitigation measures	Describe the organization that the Project will have, both during construction and in operation phases, indicating at each phase the persons responsible for the implementation of mitigation measures.
A, B1	13.2	Environmental monitoring and surveillance (monitoring)	As part of the EMP, define the objectives and specific actions of monitoring and environmental monitoring progress under the project's action plan, clearly defining which environmental variables or factors will be tracked (showing methods, types of analysis, and location of sites, sampling points and the sampling frequency, and responsible institutions). Monitoring and follow up should be included at the construction, operation and closure or decommissioning stages, depending on the complexity and type of the project and the environmental sensitivity of its proposed location.
A, B1	13.3	Environmental Recovery Plan for abandonment or closure phase	Define the stages of decommissioning or closure, after fulfilling its objectives: present a plan that includes measures to be taken to restore the site of the project area, pinpointing its final state after completion of the operations, so that it can be corroborated.
A, B1	14	**Risk analysis and contingency plans**	Produce an analysis of the likelihood of exceeding the economic, social and environmental consequences at a particular site. Indicate vulnerability of the exposed elements and the risk may be caused by man or nature.
A, B1	14.1	Contingency plan	Introduce measures to take as contingency or emergency containment resulting from the development of the project, work, industry or activity, and/or natural disasters, if such projects, construction, industries or activities are in fragile areas or which by their nature represent danger to the environment or nearby towns. (Plans against earthquake risk, explosion, fire, flood or any other event.)
	15	**Environmental Scenarios modified for the development of the project, work, industry or activity**	Present a comprehensive analysis of the environmental situation of the project area prior to the completion of the Project and the area of influence as a result of development.
A, B1	15.1	Forecast of environmental quality of the area of influence	Based on the current environmental situation of the area of influence, an analysis of the environmental quality is required that will influence the area from the implementation of the Project, taking into account the measures to be applied both within the scope of the project, and their cumulative effects.
A, B1	15.2	Synthesis of environmental commitments, mitigation and contingency	Present (in a table) a summary of environmental commitments in the EMP, risk analysis and contingency plan, establishing environmental guidelines that will govern the project in its different phases, depending on environmental factors.
A, B1	15.3	Environmental Policy of the project	As a summary of the proposed mitigation measures, outline the Environmental Policy that will govern the Project throughout its implementation, including (at minimum) its purpose, scope, commitment to continuous improvement, environmental control and monitoring and good relationship with neighboring communities.
A, B1	16	**Bibliographical references**	Submit a list of all literature (books, articles, technical reports and other information sources) cited in the various chapters of the EIA study (complete, following standard procedures for cited references: i.e., author (s), year, title source, number of pages, and city of publication.
A, B1	17	**Annexes**	The annexes must be numbered and properly referenced in the text.

3.5 Climate Change Adaptation and EIA

What is climate change adaptation?

Climate change refers to shifts that can be attributed directly or indirectly to human activity that alter the composition of the global atmosphere, and which are in addition to natural climate variability observed over comparable time periods (Intergovernmental Panel on Climate Change [IPCC], 2001). Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC, 2001). Adaptation needs and actions are sector- and climate change impacts-specific. For example, in infrastructure, examples include raising river or coastal dikes, promoting flood-resistant roads, or improving the effectiveness and backup capacity in energy, water and sewage system capacities. Such actions could be highly relevant for developments and projects for which EIAs are developed.

TABLE 27. RELEVANT TYPES OF ADAPTATIONS, THEIR DEFINITIONS AND EXAMPLES WITH FOCUS ON AGRICULTURE

Type of adaptation		Definition	Examples
Reacitve		Actions that can be taken by farmers and communities independently of policy, based on a set of technology and management options available under current climate	Crop calendar shifts (planting, input schedules, harvesting) Cultivar changes Crop mix changes Wetland migration
Planned (non-reactive)		Actions that require concerted action from local, regional and/or national policy Early-warning systems	Land use incentives Pollution control form inputs Water costing Building codes
Two types of planned adaptations:	Public	Led by public institutions such as national and provincial governments	Subsidies/compensation payments Changes in insurance payments Changing standards, such as construction codes, limits per unit of production, or environmental standards to address changes in climate
	Private	Planned initiatives undertaken by companies and/or households to respond to climate change impacts	Water-metering to support water conservation Implementation of standards Purchasing insurance Small-scale water storage New ways of construction to limit flooding Expanding drainage infrastructure as a major way to accommodate heavy precipitation events

The key step in order to assess the potential adaptation needs and identify adaptation actions is to understand the potential climate change impacts on the planned project and the project area. This is critical, as the impacts of climate change are different for various locations; furthermore, not all impacts are important for the planned project. However, responding to climate change adaptation is not just a stand-alone activity presented in the form of specific climate change adaptation strategies and plans. Crucial to adaptation planning is ensuring that all necessary adaptation actions, policies and measures are effectively integrated into the mitigation actions, EMP and other plans and monitoring efforts within the EIA. Based on this, we can summarize the key steps in integrating climate change adaptation into the EIA process as follows:

- Based on the literature, develop an assessment of climate change impacts relevant for the project area and project activities; currently many countries and regions have developed climate change impact assessments, regional climate models and hazard maps—these can be used in the EIA process.

- Integrate the identified impacts into the impacts analyses.
- Assess the consequences of the impacts of the planned development and consider cumulative impacts (such as lower water levels due to droughts, which can put pressure on communities using the water for production and consumption; water needs to maintain biodiversity while the development also needs a certain amount of water).
- Identify mitigation measures to reduce impacts; in this context we consider mitigation measures as adaptation to climate change.
- During the development of the risk assessment and contingency plans, consider extreme weather impacts on planned development such as floods, heavy precipitation over short time, and droughts. Such extreme climate change impacts can provide additional risks compared to those usually considered, such as technological failures and natural disasters.
- When design the EMPs and monitoring plan, consider indicators on extreme weather events such as floods, droughts and their impacts on the environment, people and the development such as water levels, energy backups and others.

There is a great deal of information on adaptation measures in specific sectors such as agriculture, coastal development, mining and energy. Below, we discuss a case study on adaptation needs to protect biodiversity when planning projects and development. The case study is based on European Union (2013).

Case study: Integrating climate change adaptation and biodiversity protection into EIAs

Biodiversity loss is one of the largest environmental concerns of the 21st century. In light of this, a primary goal of all EIAs should be to take on a broader mandate to conserve and protect biodiversity. The connection between biodiversity and climate change is clear. As flora and fauna adapt differently and provide different services to the surrounding environment, a more robust number of species helps the environment adapt better to changes in weather. This diversity also helps to reduce the impact of natural disasters in an area by helping to increase storm water absorption, control erosion and help an area recover more quickly in the event a natural disaster does occur. Considering that climate change and biodiversity are interconnected in a cause and effect feedback loop, a negative effect in one factor creates a continual downward trend in both. While this downward trend can happen naturally, the influence of development projects can increase the speed at which this occurs. While all projects, through their environmental impacts, have potential negative effects on the environment, if implemented properly they can slow or stop this downward trend from occurring, helping to maintain balance in the ecosystem in the face of global climate change. In the end, identifying and integrating the relevant climate change issues and biodiversity factors into an EIA will result in a more resilient project and save valuable financial, human and natural resources in the event of any extreme events caused by climate change.

Identify climate change and biodiversity issues early on in the EIA

Identifying climate change and biodiversity challenges during the screening and scoping phases of an EIA will help to better inform the EIA moving forward. Where information is available, historical data to help identify trends to compare to the most current baseline data collected will provide a better idea of the rate of biodiversity loss as well as any extreme changes in climate that may otherwise be regarded as normal. This data may be available from technical reports from earlier EIAs or from government or scientific databases. Where quantitative data is unavailable, interviews and field observations with knowledgeable locals can help to provide a general idea of such trends.

Use trends instead of data at one point in time

As the nature of climate change is just that, change, using static data that provides a baseline for a single point in time leaves way for too much uncertainty in the future. Using trends will help to reduce uncertainty and provide a more informed EIA report. When indicators are chosen, thresholds or a maximum/minimum level should also be set to identify at what point a significant change in the ecosystem could occur.

TABLE 28. KEY INDICATORS TO FOLLOW AS DRIVERS OF CLIMATE CHANGE

Indicator	Measurement
Greenhouse Gas Emissions (GHG)	Quantity CO_2, NOS, CH_4, O_3- in the atmosphere
Extreme weather events	Frequency and severity of the events
Disaster risk	Factors contributing to environment vulnerability: risk of soil erosion/landslides, susceptibility to drought/floods, forest health in the face of invasive species and forest fires
Species at risk habitat	State of the habitat/health and population size of species

Collection and assessment of baseline survey data as climate changes

As the climate changes, so too will the baseline survey carried out during the screening section of the EIA. This means that baseline data must be continually updated—and potential impacts reassessed—based on the new information. This will require an evolution in how EIAs are used. Traditionally, EIAs have been undertaken with the intention of obtaining an environmental licence and ensuring impact mitigation. This has meant that once the document has been finished, it is archived. While impact monitoring still occurs, it is meant to address issues if acceptable standards are surpassed indicating an impact could occur. When accounting for climate change and biodiversity, the EIA becomes a living document that is revisited on a regular basis as new baseline data is collected and weighed against the project. Collection of data should be undertaken both for *climate* and *biodiversity* in the area. While it is not explicitly the responsibility of the project to mitigate biodiversity loss if it is not directly affecting this trend, it is part of a larger responsibility to helping maintain the environmental and social integrity within the area of impact, and the plants and animals therein. After all, once species become extinct, it is impossible to reclaim them.

Support ecosystem services to help reduce environmental damage

By using local natural resources that provide essential services to the environment, a project can reduce costs and help maintain more resilience in the face of climate change. Ecosystem services are geographical or ecological features in an area that help people benefit from the environment around them. This may include provisioning services such as wild foods, medicines and fresh water; regulating services like wetlands and forests; cultural services such as parks and green spaces; and supporting services that form soil, photosynthesize and cycle nutrients. All such environmental features help to maintain and keep the surrounding environment healthy.

Consider the adaptability and resilience of the impacted environment

All environments have limits to the amount of change they can absorb. Different factors, such as ecosystem services, biodiversity, amount of prior human development and cumulative environmental impacts from other projects all contribute to the ability of the environment to adapt to climate change. All ecosystems have limits that define their ability to cope with change without losing their primary attributes. While national and international standards are appropriate to use as benchmarks for a project, environmental limits specific to the impacted area's environment should be identified at the beginning of the EIA process, and standards made more rigid where deemed necessary. If adaptability and resilience of the environment are important factors in assessing impact severity, then the less adaptable and resilient the environment of the impact area is, the more severe the impact will be.

Remember that the more the climate changes, the more unpredictable it becomes. While weather patterns still follow general trends throughout the year, many places are experiencing changes in extreme weather conditions; temperature highs and lows, precipitation, storms and so on. It is now essential to incorporate disaster risk management into an EIA.

Considerations for biodiversity

We recognize the benefits of an environment with a diverse subset of flora and fauna species. Biodiverse environments are more resilient to natural disasters and changing weather patterns, and each plant and animal plays an essential role within the functioning of the ecosystem. Such diverse systems also provide many benefits to humans living within or near these natural environments, many of whom depend on the system for their livelihoods. This means that an Environmental Management Plan (EMP) should focus on avoiding irreversible biodiversity loss, seek alternative solutions that minimize such loss, use mitigation to restore biodiversity where loss is unavoidable, compensate for unavoidable loss, optimize environmental benefits and seek to revive declining species populations. There are many factors that contribute to a loss of biodiversity. When undertaking an EIA it should be understood how biodiversity loss occurs and ensure that EMPs prioritize a strategy of "no-net-loss." Biodiversity loss can result from:

- Habitat loss and degradation
- Changes to ecosystem services
- Habitat fragmentation
- Creating change in the natural environment that unbalances the natural order of the ecosystem
- Man-made structures that may directly impact species
- The spread of invasive alien species that can disrupt natural environments
- Changes in the environmental processes (river flow or levels, erosion control etc.)
- Pollution introduced into the ecosystem be it in the air, water or soil

Assessment of Project Resource Use

Many large-scale projects—such as mines, energy generation or large-scale agriculture—use large amounts of surrounding natural resources. As climate changes, the availability of these natural resources may be insufficient to sustain the project. If an area experiences extended periods of severe drought and water becomes scarce, a gold mine will need to adapt its processes and outputs based on the reduced availability of this resource. On the other hand, if a changing climate brings heavy or prolonged rains, overflow areas may need to be designed so that the floodwaters do not cause the tailings ponds to overflow, contaminating surrounding waterways.

Identifying vulnerable populations

While it is a common practice to identify which populations will be adversely affected by project impacts, this process should go further to determine what the cumulative effects of both project impacts and climate change will mean for such populations. Mitigation strategies should always account for cumulative effects. Finally, always work under the assumption that, if insufficient information is available, EIA mitigation measures must err on the side of caution. Where uncertainty does exist—in that quantitative data is unavailable or unreliable to help guide the EIA—qualitative data can be collected to help supplement what information is available.

3.6 Public Consultation and Participation

What is public consultation and participation?

The overall goal of public consultation is to engage key stakeholders' groups such as citizens, NGOs, agencies, authorities and interest groups to provide their input into the planned development and especially on those impacts that directly or indirectly affect people's livelihoods. Moreover, by involving key stakeholders' inputs in the EIA the planned project is strengthened by these inputs. Effective public participation requires that project planners (Aschemann, 2004):

- Inform and involve interested and affected actors like citizens, public authorities and interest groups.
- Explicitly address their comments, concerns and inputs, both, in documentation and decision making.
- Ensure that all relevant actors and parties are involved or at least represented.
- Safeguard sufficient access to all relevant documents and information concerning the project and the EIA documentation.

In most countries the EIA legislation often mandates the form and extent of public participation. The extent of participation mandated by legislation can vary from only informing stakeholders' groups to actually working with them to improve the EIA. Unfortunately, the legislation is sometimes ambiguous and allows the proponents to decide about the extent of their participation. Agencies, ministries, and project proponents then can take advantage of this ambiguity to minimize or even eliminate public participation in the decision-making process. However, in most cases EIA legislation requires that EIA documents must be made available for public review. There is likely to be at least one designated public place where an EIA will be made available. Some EIA laws require that the public have access to background information or supporting documents used to prepare the EIA. If it is not clear, citizens should insist that they have the right to access these documents. This can be done by laws on access to information that many countries have adopted.

Overall, it is important that engagement with stakeholders will start at the early stages of the planned project and the EIA process. But the specific stages of the EIA when participation is required include scoping and impact assessment and mitigation. During the scoping phase the focus is on the following list of activities (World Bank, 2010):

- Initial announcements about the scoping process in local or national newspapers.
- Posting notices announcing the scoping process at the site, in the neighbouring area and at the offices of local authorities.
- Preparing a leaflet or brochure about the project giving brief details of what is proposed with a plan or map, describing the EIA process and the purpose of scoping, and inviting comments.
- Distributing letters or questionnaires to potentially interested organizations.
- Telephone discussions or meetings with key organizations, groups or individuals.
- Articles in newspapers, on radio or on television.
- Public meetings (it may be helpful to invite an independent person to chair public meetings).
- Public exhibitions (an exhibition may be preferable to a public meeting as people are nervous about standing up and speaking at a public meeting).
- A Scoping Workshop at which participants work together through a structured program to identify matters to be addressed by the EIA process.
- Establishing an expert or community-based Scoping Group who will continue to oversee the environmental studies throughout the process.
- Collecting information, baseline data and other sources to gain deeper insights on the current situation of the stakeholders' and potential impacts of the development that would require further assessment.
- Publishing a draft Scoping Report for review and comment before completing the process.

During the impact assessment and mitigation phase, stakeholder participation has the following roles and contributions:

- To identify specific impacts relevant for the stakeholders' groups.
- To explore cumulative impacts on stakeholders' groups that are caused in conjunction with already ongoing other developments and projects in the area.

- To review, modify, add and remove mitigation measures that are not relevant or effective to address the impacts of the development based on the stakeholders' views.
- To review together with stakeholders the environmental management plans and other relevant plans.
- Agree on the follow-up in terms of regular review, sharing outcomes of monitoring and other means as agreed with the stakeholders.
- Finally, to document the outcomes of the conclusions and place them in the EIA.

To address stakeholder participation, the EIA often includes a consultation plans that outlines:

- Stakeholder groups that need to be consulted; when and how they will be reached out to and which ways of involvement will be considered during the EIA.
- Information dissemination about the project (and the aspects of the EIA) to the stakeholders.
- Summary of the initial interests from the stakeholders based on their input.
- Key steps and ways of consultation during the scoping phase and assistance provided to the stakeholders in establishing mechanisms for consulting with communities and representative groups.
- Key steps and ways of consultation during the scoping phase.
- Summary of the consultation outcomes and how they were integrated into the EIA.
- Summary of the follow-up and future engagement.

Overview of the legislative guidance on participation and consultation in the EIA

In accordance with regulation, in cases of projects, works or activities designated as Category 2, 3 and 4, the proponent is required to place a notification on the eighth page of local newspapers (if any) and provide other national coverage about the EIA process. Furthermore, an announcement must be made on a national and local radio stations. Additionally, a sign is to be placed on the land where the project is located, indicating the name of the project, work or activity, location, phone and the address of the proponent where the public can obtain more information. In cases of projects, high-impact works or activities in Category 4, the Proponent must also publish the complete research results of the EIA in the local and/or national newspaper.

In accordance with Article 52 of Regulation SINEIA, in cases of Category 4 EIS, the proponent shall submit the results of the EIA in open meetings, public forums and be open to all means of allowing discussion and the exchange of ideas. The proponent is also required to make a copy of the EIA available for public consultations. Members of the public have 30 working days after notification of completion of the EIA to present comments regarding the EIA report, e.g., if it did not address significant impacts, does not propose appropriate mitigation measures, or if they have questions, complaints or other objections. These must be submitted in writing to the MiAmbiente and will be part of the review report. In all cases, they must receive a response within no more than 30 working days. During the review:

a. The technical team responsible for the review of the EIA will review the observations submitted and verify whether they are unfounded or should be included as part of the technical report.
b. Where observations are consistent with the report, the team will consider including them as part of the technical opinion of the EIA.
c. In the event that the observations are not considered appropriate or have already been integrated on the initiative of the team's review, they will be classified as "un-included observations," with the reason for this noted as part of the annexes to the technical opinion.

Case study: Honduras: Participation and the Rights of Indigenous Communities in the EIAs

According to the national government, Honduras is a multilingual, multicultural and multiethnic state. Within the country there are nine indigenous and Afro-descendent groups dispersed across the country. These groups have cultural practices and traditional ways of life that are distinct from the majority of the population. This includes languages, food and traditions as well as social and daily customs, and laws unique to the community. Indigenous and Afro-descendent communities are found in about 50 per cent of Honduran territory. In 2007 there was an estimated population of about 1,200,000 indigenous people living in native communities on ancestral lands. There are an additional 300,000 indigenous and Afro-descendent people living in the country's major urban centres such as Tegucigalpa and San Pedro Sula (Camera de Turismo de Honduras de La Ceiba, n.d.,a).

Groups include:

- **Lenca**: Approximate population, 72,000, with 2,500 communities. Lenca are located primarily in the southwest part of Honduras in the Departments of Valle, Francisco Morazán, Intibucá, Lempira and Santa Barbara.
- **Miskitu**: Approximate population 76,000, with 420 communities. The Miskitu are located in the east of the country in the departments of La Mosquitia y Gracias a Dios.
- **Tawahka**: Approximate population 1,500 and seven communities. The Tawahka are located in the west centre of the country in the departments of Olancho and Gracias a Dios.
- **Chorti**: Approximate population 10,600 and 52 communities. This Mayan group is located in the west of the country in the department of Copan and Ocotepeque.
- **Tolupan**: Approximate population 18,000, with 10 tribes. The Tolupan—of whom the Xicaques are a tribe—are located in the north west of the country (inland), in the department of Yoro y Francisco Morazán.
- **Pech**: Approximate population, 3,800, with 10 tribes. The Pech are located in the west centre of the country in the departments of Olancho and Colon.
- **Nahua**: Approximate population, 19,800 with 18 communities. The Nahua live in the south centre of the country, near the board with Nicaragua in the department of Francisco Morazán.
- **Garifuna**: Approximate population 300,000, with 47 communities. This Afro-Honduran group is located on the Atlantic coast (north) in the departments of Atlántida, Colon, Cortez and parts of Misquitia and the Bay Islands.
- **Negro Creoles**: Approximate population, 80,000 with 46 communities. This Afro-descendent group is located in the Bay Islands off the Atlantic coast. This group is distinct in that they speak English.

In 1995, Honduras ratified International Convention 169 of the International Labour Organization's (ILO's), Indigenous and Tribal Peoples Convention (Camera de Turismo de Honduras de La Ceiba, n.d.,b). Under this Convention, these groups have the right to define what it means to be indigenous according to their personal worldviews, legal criteria, including political organizations, and possibly autonomous territories to recognize and define their group as an indigenous identity and the right to be explicitly recognized by the national government under law. Convention 169 of the International Labour Organization is listed below along with other international and national laws.

TABLE 29. LAWS AND REGULATIONS PERTAINING TO INDIGENOUS RIGHTS IN HONDURAS

Law	Article	Theme
ILO Convention 169	13 14 15 16 17 18 19	• Special relationship with land and territory • Right to property and land possession • Territories and natural resources • Relocation • Land trade (sale, movement, inheritance) • Sanctions against people how appropriate indigenous lands • Agriculture programs
Biodiversity Convention	8	• Traditional knowledge
UN declaration on the Rights of Indigenous peoples	25 26 27 28 32	• Spiritual relationship with the land • Possess, use, develop and control indigenous territories, legal acknowledgement of land rights • Land adjudication • Legal recognition and protection with respect to customs, traditions and tenancy systems • Additional components of land and, • Processes that are equal, independent, impartial, open and transparent for consultations in the case of exploration and exploitation projects
Law for modernization and development in the agriculture sector	34-37 50-53 54-58 64 65-70 68 70-72 108 125	• Agriculture credit • Disallowance of land redistribution • Leasing and co-investing • Adjudication with others and indigenous groups • Titles with others and indigenous groups • Municipal lands • Urban lands • Non-applicability of municipal goods and the prohibition of land titles in protected areas • Urban perimeters
General Law of Municipalities (1992)	68 70-72 108 125	• Municipal lands • Urban lands • Non-applicability of municipal property and a ban on titles to protected areas • Urban perimeters
General Regulations for the Law of Municipalities	65,66	• Procedure to define urban perimeters
Law of forests, protected areas and wildlife	45-50 51-62	• Forest property • Regularization of forested areas
Land use law	9 22 23-32	• Ethnic representation in CONOT • Scope for land use • Institutional competencies in land-use planning
General regulation of the Land-use law	26.2.c	• Opinions about creation and growth of urban perimeters
Property law, Cap III	All aicles	• Land under communal title is to be protected under law • It is the responsibility of the state to consult with indigenous and afro-Honduran communities prior to exploiting natural resources in their territories.
General law of the environment	48-50 70-73	• Forest and agriculture land use • Cultural patrimony and tourism resources

Law	Article	Theme
Law of cultural and natural patrimony of the nation	2-4 8 20 24	• Cultural patrimony • Who the law applies to • Ban on land ownership • The right to propose patrimonial items
Law of Cloud Forests	Entire law	• Administration and management of protected areas
Law for the declaration of tourism zones	02-14 15 16-18 19 20-22	• Generalities about tourism zones • Attributes of IHT • Use and ownership of land in tourism zones • Leasing land • Expropriation in tourism zones
Law for the protection of coffee production	1-3 4-6 6-9	• Inafectability of coffee • Ban on expropriating properties • Land titles for coffee properties
Constitution of the Republic	Cap III, Art 15-21, 346	• Inafectability of coffee

Source: Camera de Turismo de Honduras de La Ceiba (n.d.,b)

Participation and Consultation with Indigenous Groups

Consultation with indigenous groups is important because indigenous cultures are connected to their surrounding environment: this helps them sustain their way of life and is the focus of many important aspects of their cultural identity, social make up and livelihoods. Creating an impact on the environment can have negative consequences for the entire indigenous population in the affected area. Also, because the natural resources within traditional territories have often yet to be exploited, these lands have pressure placed on them from many parties. Many projects may be looking to exploit the same area which can place an unacceptable amount of pressure on the environment, local indigenous communities, their customs, traditions and ways of life.

Convention 169 of the ILO speaks of the need for consultation and participation in all matters that may affect an indigenous community; this may include all policy and development processes, including EIAs. Specifically, public consultations with indigenous groups prior to starting a project need to be initiated under the following circumstances. 1) Any changes in administrative or legislative laws or decrees that affect indigenous groups or their territories; 2) projects that affect the use, administration and conservation of the resources found within indigenous territories; 3) any impact, change or use of cultural patrimony including sacred and cultural sites, customs and protected areas and; 4) if any violations of rights occur, consultation with the affected groups to rectify and compensate is crucial. Lastly, a point of utmost importance is that free and informed consent must be given prior to relocating a community from their current location. Under the convention guidelines, consultations must include the following elements:

1. Be conducted in *good faith* through appropriate procedures, through the representative bodies of the various groups. Good faith refers to an open and genuine dialogue between all parties.
2. All groups should have the opportunity to *participate freely* at all levels of decision making, implementation and evaluation.
3. Information must be *timely* and *appropriate*.
4. Information must be *accurate*.
5. Issues and topics to be submitted under the consultation process must be *comprehensive*.

Just as importantly, the consultation must:

- Provide equal opportunity.
- Provide participation to all affected parties.
- Be transparent about information including but not limited to: potential impacts, activities information gaps, benefits, longevity of the project.
- Have territoriality, meaning that all indigenous peoples living within the affected area or who access resources in the area must be consulted.
- Autonomy and representation through appropriate Indigenous organizations.
- The location of the consultation must be accessible in terms of location and venue.
- Legality and enforceability of the consultation.
- Be culturally appropriate, following norms and customs of the indigenous group.
- Allow accountability for individuals responsible for bad faith.
- Provide freedom for all parties to speak and share opinions.

Agreement from communities must come from consensus, consent must be informed as per the stipulations in the consultation and be free from coercion from any third parties.

List of Indigenous Organizations in Honduras

CONIMCH- Consejo Nacional Indígena Maya Chorti
CONPAH- Confederación de Pueblos Autóctonos de Honduras
COPINH- Consejo Cívico de organizaciones Populares e Indígenas de Honduras
MASTA- Mosquitia Asla Takanka/ Unidad de la Mosquitia
OFRANEH- Organización Fraternal Negra Hondureña
ONILH- Organización Nacional Indígena Lenca de Honduras
FETRIPH- Federación de Tribus Indígenas PECH de Honduras
FETRIXY- La Federación de Tribus Xicaques de Yoro
FINAH- Federación Indígena Nauhas de Honduras
FITH- Federación Indígena Tawahka de Honduras

Source: Armando Cordoba, J., Barahona,A., Ecuceda, C. (2003).

Rights to Land and Natural Resources

The ILO Convention 169 makes a distinction between land and territory. Where land is a clear, delineated area where legal individual or collective titles are typically held, territory is a more diffuse area that indigenous groups rely on to carry out their livelihoods, cultural and spiritual practices. Under the Convention, any project to occur on land and/or in territories requires a consultation regardless of the legal status of the land. In Honduras, collective lands are held in common, especially within the Garifuna community. While Convention 169 does not explicitly protect this land from exploitation, there are many instruments—including the International Pact on Economic, Social and Cultural Rights and the International Pact on Civil and Political Rights—that order all signatory states to respect and protect the right to collective land to preserve the culture and well-being of indigenous groups. Further to this point, the United Nations Declaration of the Rights of Indigenous Peoples grants indigenous peoples the right to maintain, protect and reinvigorate their ancestral territories and to maintain their spiritual connection to the land. Under Convention 169 and other international agreements, it is the responsibility of the state to adjudicate any disputes over indigenous land, protect those lands from third parties infringing on indigenous land rights and provide sufficient resources to help indigenous people reclaim land in the case of violations or loss of land to third parties.

The question of land title and land rights in Honduras is one that needs to be handled delicately. Ongoing disputes over land between the Garifuna community of Vallecito in Bajo Aguan, Colon and those claiming the land have led to violent clashes, with casualties on both sides. Garifuna communities have collective land rights on their ancestral lands, as such no land title can be transferred, either purchased or sold, within these territories without the explicit agreement of the entire community. Through Presidential Agreement No. 035-2001, the inter-sectoral commission for the protection of the land rights for Garifuna and Miskitu populations enables the National Agriculture Institute (INA) to resolve any conflicts in regards to land.

As with land rights, under Convention 169, the government is obligated to legally recognize, protect and prohibit third parties from exploiting natural resources without prior informed and free consent from indigenous groups.

3.7 Key aspects of EIA legislation and EMP in Honduras

This section summarizes key aspects EIA legislation in Honduras and provides details on environmental management plans (EMP) in general and in Honduras.

Brief History

Through the General Law of the Environment (Decree 104-93), passed by the national congress in 1993, the Secretariat of Natural Resources and the Environment (Formerly SERNA, now MiAmbiente) was mandated with the responsibility of establishing and maintaining a National Environmental Impact Assessment Evaluation System (SINEIA). Further to this, Decree 189-2009 established that SINEIA was responsible for providing environmental assessment and control of all new human activities or operations that may potentially cause negative environmental impacts. In 1997, to undertake this task, SERNA created two sub-secretaries. The Department of Environmental Evaluation and Control (DECA) is charged to oversee the technical aspects of an EIA review and licensing, as well as ensure that environmental service providers adhere to the standards and protocols in place. The Environmental Units (UNA) assist with this regulatory and monitoring processes. Under the Law for the Registry of the National Environmental Service Providers (Agreement No. 1205-2002), only parties registered in MiAmbiente's Environmental Service Provider system are able to undertake and submit EIAs to be considered for an environmental licence.

In 2009, the environmental licensing process was decentralized. Articles 4.46, 7 and 19 of ED-189-2009 allow DECA and MiAmbiente to participate in the functions of SINEIA and, where possible, hand over duties to their Environmental Municipal Units (UMA) or other administrative institutions associated with the Environmental Management Units (UGA).

TABLE 30. LEGISLATION RELATED TO THE EIA PROCESS IN HONDURAS

EIA Process	Law	Description
Screening	Decree 189-2009, Article 24	All projects, construction or activity, public or private must have an environmental licence before execution.
	Decree 189-2009, Articles 32.2 and 33.3	All projects classified as Categories 1, 2 and 3 must present the necessary information to SINEA and fulfill all the outlined requirements.
	Decree 189-2009, Article 30	Projects categorized by SINEIA as Category 1, low environmental impact or risk project, will not be subject to a formal EIA to obtain an environmental licence but must still comply with existing environmental legislation and Honduran Good Environmental codes of best practice. The SINEA F-01 form must be completed (Article 4.19)
	Decree 189-2009, Articles 32, 33	Projects categorized by SINEIA as Category 2 and 3 are subject to a formal Environmental Assessment Plan or, based on SINEIA discretion, are subject to best practices of the corresponding sector.
	Decree 189-2009, Articles 4.19, and 4.20	SINEIA Form F-01 shall be completed for all Category 1 projects; Form F-02 is necessary for all Category 2 and 3 projects.
	Decree 189-2009, Article 30	An Environmentally Sensitive Area is rated due to its nature or special administrative condition and/or environmental sensitivity and which therefore needs special consideration if development is to take place.

EIA Process	Law	Description
Scoping	Decree 189-2009, Article 33	The *Manual of Environmental Assessment and Control* (of SINEIA) acts as a terms of reference for Category 2 and 3 projects for developing an Environmental Management Plan (EMP).
	Decree 189-2009, Article 34	All Category 4 projects must present to MiAmbiente one of the following: 1. An Environmental Impact Study based on information from the *Manual of Environmental Assessment and Control*. 2. A formal request for MiAmbiente to establish a specific terms of reference for the project.
Assessment and Reporting	Decree 189-2009, Article 38	Once the terms of reference are set for a project, the project coordinator must contract an Environmental Service provider to carry out the Environmental and Social Impact Assessment (EsIA) or EMP and report all information to DECA.
	Decree 189-2009, Articles 16 and 86	All Providers of Environmental Services must be accredited by a suitable legal and technical entity and be inscribed in the Providers' Record of Environmental Services of MiAmbiente in order to be able to assist with an EIA, EsIA, or Environmental Audit or Monitoring and Control.
Review	Decree 189-2009, Article 23 and 34	Once all legal and technical requirements for the project Report have been handed to MiAmbiente or SINEIA (including payment for the environmental assessment and publication in local/national newspapers), the Authority will proceed with the document review.
	Decree 189-2009, Article 55	The EsIA will be reviewed by a multidisciplinary team of processionals following a standardized review process found in the *Manual for Environmental Assessment and Control*.
Decision Making	Decree 189-2009, Article 56	Once all documents have been reviewed by the MiAmbiente/SINEIA team, a technical opinion will be issued that forms part of the project's profile and indicating whether or not modifications to the environmental plan are necessary.
	Decree 189-2009, Article 59	Once the project has been approved and an Environmental Licence granted for a two-year term with the understanding that the licence has been granted based on the environmental conditions reported in the documents provided.
Monitoring	Decree 189-2009, Article 71	Self-regulation is mandatory throughout the lifetime of the project once the licence has been granted. Monitoring can be carried out by the proponent, a qualified consultancy by DECA or the Environmental Units or a firm contracted by MiAmbiente
	Decree 189-2009, Article 72	If unexpected impacts arise during the life of the project, mitigation measures determined by DECA must be implemented
	Decree 189-2009, Article 4.7, 4.9 and 4.38	The person responsible for environmental monitoring must keep a record of fulfillment of environmental commitments pertinent to all current environmental legislation and practices of the Good Environmental Practices Code of Honduras.
	Decree 189-2009, Articles 75, and 4.12	All projects granted environmental licences and have been started will be subject to environmental inspection and audits. As part of the control and follow-up, SINEIA will issue a technical opinion.
Payments	Decree 189-2009, Article 24.3 and 109	Before any Environmental Licence request is considered by SINEIA, an expedition fee must be paid. The fee depends on the size of the project.
	Decree 189-2009, Article 41, 42 and 43	All Category 4 projects must pay a guarantee bond for potential environmental risks and impacts identified by the EIA. This guarantee can be made by depositing funds into a national guarantee fund (in the General Treasury of the Republic) or by buying environmental insurance through an insurance company.
Public Participation	Decree 189-2009, Article 88	Public participation in the EIA process is encouraged at all phases. Neighbouring populations to the project area of impact must be consulted about the project.
	Decree 189-2009, Article 37	All Category 2, 3 and 4 projects must notify NGOs and the public who can send suggestions about TORs to MiAmbiente for the EsIA.
	Decree 189-2009, Article 52 and 89	All Category 4 project EsIA information must be published and, if deemed necessary by MiAmbiente, be presented in public meetings, forums and discussions and published to allow for exchange of ideas.
	Decree 189-2009, Article 54	Anyone who thinks the EsIA has not addressed important impacts or proposed suitable mitigation measures can ask MiAmbiente to include amendments.

The Current Environmental Licensing Process in Honduras

In October of 2015, MiAmbiente and DECA launched a new online platform aimed to help streamline the EIA licensing process, effectively reducing waiting times for potential projects. MiAmbiente has put out a number of comprehensive information pamphlets and videos, clearly outlining the steps and documents that are required to progress through the system. The steps for the pre-licensing or "screening" portion of the EIA include:

Step 1: Register with the new online system, SINEACP.

Step 2: Verify the coordinates of the area of impact.

Step 3: Provide the following information to SINEACP:

a. Information about the company, amount of money to be invested and an estimate of jobs to be created.

b. Information about the type of project and its size. This information is provided through a matrix where it is required to check off the appropriate boxes to indicate the sector, subsector, activity and size of the project.

Step 4: Once the necessary information is provided, the system will analyze the information. Geospatial maps are used that will indicate if the area where the project is located has any restrictions—i.e., being protected, indigenous lands, or coastal—that may automatically disqualify the licence or require the project to undertake a full EIA. The project is also categorized using an algorithm that weighs the information based on project viability, magnitude and environmental impact.

Once the initial documents for the project have been completed, SINEIA will review and determine the project category based on potential environmental risk or impact. These standards are set based on the *Uniform International Industry Classification of all Economic Activities-CIIU* (ED 189-2009, Article 24 and 4.43. For reference see Table 30, above).

Step 5: SINEACP runs an analysis of the information and provides an official report with the case number of the project.

Step 6: At this point an Environmental Service Provider registered with MiAmbiente must provide an official opinion about the project to verify the location of the project along with the results of the SINEACP official report.

Step 7: The final step to starting the licensing process requires the project coordinator to present all the required documents and receipt of payment for a DECA field inspection to an Environmental Licensing Window in *MiAmbiente*. The project lead must then sign a contract and instructions regarding Measures of Environmental Control that must be followed—this includes a legal document accepting responsibility in the event that environmental controls are not followed. This will allow MiAmbiente to fine the company or individual responsible for negligence.

For more information, *MiAmbiente* has the following video posted on their website as well as brochures and other Frequently Asked Questions to help with the pre-licensing process: http://www.miambiente.gob.hn/

Sources: SINEIA (2009a), SERNA (2009b), World Bank (2009), Government of Honduras (2010)

Environmental Management Plan (EMP)

An EMP is the part of the EIA that outlines how the environmental and social impacts documented in the EIA will be managed and monitored. Even when a project does not require a full IEA, the proponent is still required to develop an EMP. In different countries, the detailed requirements for the EMP content may differ but the generic content can be listed as follows:

- Summary of mitigation measures to minimise identified adverse impacts in the previous steps.
- Linkages to the national and subnational legislation to set environmental commitments thresholds for acceptable impacts and to frame the mitigation and monitoring measures.
- Description of the recommended mitigation measures.

- Statement of their compliance with relevant standards.
- Allocation of resources and responsibilities for plan implementation.
- Schedule of the actions to be taken.
- Program for monitoring and auditing.
- Contingency plan to address additional risks and emergencies.

In Honduras, once a project's impacts have been rated using the SINEIA F-01 and F-02 forms, SINEIA will determine whether or not a complete EIA is necessary or if an Environmental Management Plan (EMP) is sufficient to ensure safe environmental practices. This EMP is guided by the Honduran Good Environmental Codes of Practice. These practices are modelled after the ISO 14000 standard.

If a project is evaluated as a Category 1, or low-impact/low-risk project, an EIA is not required. However, under Article 30 of ED 189-2009, the project must still comply with national and state environmental legislation and Good Environmental Codes of Practice for each sector.

An environmental Management Plan is a "set of technical operations and proposed actions, whose objectives ensure that the operation of a human activity remains within the legal technical and environmental norms that prevent, correct and mitigate negative environmental impacts or risks and ensure that improvements continue and are compatible with the environment."(Environmental Evaluation and Control Manual for Honduras, 2009, p. 42).

In the EMP, an evaluation process must be implemented that considers environmental mitigation measures to ensure the lowest possible impact to the environment. In essence, the EMP is an assessment that complements and builds on the information provided in SINEIA form F-01 and F-02.

The following must be included in an EMP:

1. Environmental terms of reference—how air, water, soil etc. will be protected.
2. Which environmental aspects are linked to the project? This may be emissions, water consumption, land use, distance from communities and more.
3. Identified environmental impacts—what environmental elements will be affected and how.
4. Rating of an assessment of the identified environmental impacts; low, moderate, or high.
5. Legal frameworks (laws, regulations or best practices) that apply to the environmental impacts in question within the sector.
6. In the case that there is no legal framework, the standards or environmental parameters should be identified.
7. Environmental measures—any orders or regulations dealing with the identified environmental impact must be noted and complied with.
8. Deadlines to implement the environmental measures for the project.
9. The necessary human and financial resources to implement environmental measures.
10. Identification of the persons responsible for carrying out the environmental measures.
11. Summary of the environmental commitment which includes the deadlines and a description of how the measures to improve the environmental situation will be carried out.

It is suggested in the Environmental Evaluation and Control Manual for Honduras (2009) that a summary table be developed to assist SINEIA to review the EMP thoroughly and in a timely manner.

Monitoring for this plan is based on self-regulation and the notion that environmental responsibility is shared by everyone, not only the authorities. Sources: SINEIA (2009a), SERNA (2009b), World Bank (2009), Government of Honduras (2010), Environmental Evaluation and Control Manual for Honduras (2009).

3.8 List of Monitoring Indicators

TABLE 31. EXAMPLES OF POTENTIAL INDICATORS TO ASSESS THE STATE OF THE ENVIRONMENT

Environmental Impact	Indicator Cause of the Impact	Indicator State of the Environment
Pollution	• Heavy metal emissions • Organic compound emissions	• Concentration of heavy metals and organic compounds in the environment and animals
Water pollution	• Intensive use of water resources • Annual extraction of surface water/ground water • Household water consumption per capita • Household/industrial discharges in water bodies	• Frequency, duration, extension of water shortage periods • Concentrations of Pb, Cd, Hg and pesticides in fresh water • Concentration of fecal coliforms (e-coli) in water • Water temperature
Nutrient overload	• Emissions of N and P in water and soil • Use of N and P in aquatic crop food • Use of N and P in fertilizers and animal feed	• Biological oxygen demand and dissolved oxygen demand • Concentrations of N and P in continental and marine waters
Water and soil acidification	• Index of acid substances • Emissions of SO and NO-	• Excess of critical pH values in water and soil • Concentration of acid rainfall
Air pollution	• Inventory of stationary and mobile sources • Number and rate of increase of industries and cars	• Concentration of particles, micro-particles and gas in the air • Levels of soil, water and forest pollution by emission and deposit
Conservation of biodiversity and landscape	• Alteration of habitats • Annual rate of wood production • Annual rate of firewood consumption • Annual rate of export of endemic species	• Percentage of threatened or endangered species with regard to the total of known species • Changes in biomass • Extinction rate of protected species • Deforestation rate
Earth and soil degradation	• Erosion risk • Current and potential use of soil for agriculture • Loading capacity (head cattle per unit area)	• Area affected according to degree and type of erosion • Erosion index (sediment production) • % of loss of horizon A from the soil • Surface area affected by desertification

Socioeconomic Indicators

Communities are often located within a project's impact area. The impacts the project will have on the socioeconomic factors need to be determined through a baseline. After that, impacts can be determined through a change in the indicator.

TABLE 32. INDICATORS OF SOCIOECONOMIC IMPACTS

Indicators	Details
Population demographics: size, age, ethnic groups, gender	Indicates impact the project has based on migration patterns and needs to correspond to the ability of a community to meet the needs of a growing/declining population.
Employment/unemployment rates	Determine in part how large an impact the project will have on quality of life and contribution to household financial stability.
Median income according to sectors	Determines in part how large an impact the project will have on quality of life and contribution to household financial stability.
% of the population with access to social services (health, education, recreation, social support etc.)	Indicates the type of pressure the project and influx of workers may have on local services and the ability of a community to meet the needs of a growing/declining population.
% of the population with access adequate water, sanitation, electricity	Indicates the type of pressure the project and influx of workers may have on local services and the ability of a community to meet the needs of a growing/declining population.
Number of community organizations/ advocacy groups	Shows the ability and need for communities to advocate for themselves for or against a cause.
Housing quality and quantity	This is particularly important where relocation is necessary. While not all people will want to relocate, providing the affected population with improved quality housing helps to improve living standards.
State of public safety services (fire/ police)	Larger populations can cause a strain on the public safety system. If the services are inadequate or become inadequate as a result of the population shift it can negatively affect the social fabric of the population.
Location and quantity of farmlands	Arable land is essential to both access to food and economic activity in an area. As such, a project should always consider the impact the project may have on agricultural systems.
Local land-use patterns	Land is often used in a wide variety of ways; agriculture, forestry, hunting/fishing, natural and protected areas. A project must be clear about the impact it will have on local land-use patterns because it can directly affect the livelihood activities of the local population.
Attitudes toward the project	General content or discontent toward a project is important, not only in project success but also in ensuring the project can co-exist with the population.

TABLE 33. SECTORAL INDICATORS EXAMPLE

Environmental Impact	Indicator	Standard
Tourism		
Water consumption	• Volume of water consumed per month/day/time period	Standard set by individual water use licences issued by the state.
Water quality	• % Residual water (m3) of total water use per area • Water quality of individual sample testing based on: temperature, colour, Ph, discharge volume, amount oil/grease • Water quality accumulation temperature, colour, Ph, discharge volume, oils/grease over time	Standards to be set by the technical norms for Residual Waters discharging into receiving bodies.
Energy	• Monthly kwh use • *For service provision*: Kwh used/month; monthly gas consumption(L/mo); % of services provided	
Maintenance for Machines	• Frequency of machine tuneups including: Oil changes, belt changes, spark plug changes, lubrication	
Waste	• Quantity of solid waste produced/month • Quantity of organic waste produced/month	

Environmental Impact	Indicator	Standard
Mining		
Mercury	• Quantity of mercury captured • Quantity of mercury released into air/water by mine operations each year	
Cyanide	• Compliance with requirements of the International Cyanide Management code for manufacture, transport and use	Publication of the compliance code and monitoring data is suggested.
Biodiversity and Protected Areas	• Extent and condition of areas identified as containing or likely to have high levels of biodiversity or provide environmental services which may be affected (positive/negative) by the mine project • % of protected area that may be impacted/threatened by the mine	
Greenhouse Gas Emission	• Mine complies with GHG emissions standards based on ISO 14064-1:2006 and ISO 14064-2:2006	
Noise	• Mine meeting acceptable noise emission standards based on government/international standards	Standards may be set either through national legislation or taken from international bodies,
Air quality	• Mine meeting acceptable air quality standards determined by government/international regulating bodies	Standards may be set either through national legislation or taken from International bodies.
Waste management	• % tailings facilities with liners adequately designed to minimize the seepage of contamination to the environment over time • % of tailings dams and waste rock dumps that are judged to be able to withstand large seismic and hydrologic events • % tailings facilities and waste rock dumps with closure covers that will minimize the generation of contamination and best meet re-vegetation and visual reclamation objectives	Acceptable threshold for seepage is 10−6 cm/sec with a thickness of 33 cm, taking about 1 year for seepage to move through the liner The probable maximum seismic activity and amount of precipitation should be modelled based on past local weather patterns, accounting for climate change.
Water Quantity	• % of rivers and streams potentially affected by mining projects whose environmental flow is maintained over time • Groundwater levels in areas potentially affected by mining projects	Baseline to be determined, benchmarks or limits set to indicate at what point irreversible impact will occur.
Water Quality	• Water quality based on set standards, tested against the baseline for ground and surface water (Ph, temperature, sediment amounts, presence of arsenic, mercury, lead, cyanide etc.)	Water quality standards set by state or followed from international bodies such as World Health Organization.
Resettlement	• Number of unlawful forced evictions associated with the project • % of displaced persons associated with the project who are satisfied with the resettlement/compensation process • % of displaced persons associated with the mining projects whose standard of living has improved/deteriorated post-settlement	
Cultural Heritage	• Number of complaints raised by the communities in relation to the project regarding the protection of culture	Regulations for cultural heritage laid out in national legislation.
Reclamation/ closure	• Existence of an up-to-date, satisfactory closure/reclamation plan • Annual cost to public and third parties other than mine beneficiaries of site closure and reclamation	

Source: Conservation International (n.d.), IRMA (2015), USAID (2011).

3.9 Monitoring and pollution mitigation – Vietnam

This case study is based on the following sources: Alaerts, Khouri, & Kabir (2001); EAWAG (2008); Jessen (2009); Luzi, Berg, Trang, Viet, & Schertenbeib (2004); Jakariya & Deeble (2008); World Bank (2004)

Project name: Monitoring and mitigation of inorganic arsenic in the Red River Delta
Location: Vietnam
Date: 2002–2008

Project Information

In the Red River Delta of Vietnam, the arsenic levels are >1000 micrograms per litre of water. The geology structure is such that the alluvial deposits in the Delta contain high levels of iron, a substance to which arsenic attaches. It is estimated that 17% of the country's population accesses their water from private tube wells. The main sources of water in rural areas of the Red River Delta include groundwater supplies such as dug wells, settling tanks, sand filters and tap water and other supplies such as surface water and rain water. From tests done, approximately 6.6 million people live within the affected zone and 1 million people are at risk for arsenic poisoning.

Arsenic is a naturally occurring substance often found in sediment in rivers, streams, lakes and aquifers. Arsenic can be released from sediments in the subsurface and enter ground water supplies when waters are stirred by large changes or shifts in the water patterns, as can occur naturally with flooding. This process is often intensified by developments such as mining operations, hydroelectric dams or even large-scale irrigated agriculture developments. Safety limits for arsenic in drinking water are typically 10 or 50 micrograms per litre. If these chemicals are released due to disturbances or changes in water levels, groundwater concentrations can reach upwards of 1000 micrograms per litre of water.

Chronic poisoning can occur if arsenic is ingested in small doses regularly over a period of 10 or more years. This buildup can eventually lead to serious health problems such as kidney lesions, high blood pressure, melanosis and neurological dysfunction as well as skin, kidney, lung and bladder cancer. Arsenic has been found in the drinking water of many countries such as Argentina, Mexico, China, New Zealand and the United States and is a severe problem in Vietnam and many parts of Southern Asia. Arsenic release into the water system is dependent on the level of dissolved oxygen in the water. The less oxygen in the water, the more easily arsenic is released. When flooding occurs, large amounts of vegetation are typically buried. As this vegetation rots, it depletes oxygen in the water, creating ideal conditions for arsenic to leech into the groundwater.

Data Collection

Testing and database development

One of the most important steps in mitigation is testing tube wells. Through this process, the extent of the problem in affected communities can be determined. Testing methods included conducting an analysis to determine the geological characteristics in the area and then taking samples of tube wells where it was probably that arsenic would be present. In total, 187,000 wells were tested across the country in 2006 and 2008. Under Vietnamese law, drinking water standards were set at 50 ppb as the maximum limit for water sources used by fewer than 500 people and a 10 ppb maximum limit for water sources used by more than 500 people.

Arsenic field testing kits were standardized (specifically for test tube wells, the most common type of well in the field). Accuracy of measurement is essential for communities to have confidence in the data. Because there are several manufacturers of arsenic testing field kits, determining which kit to use was based on previous experience. The factors considered were ease of use and accuracy of results compared to laboratory tests. In Vietnam a field test kit with a sensitivity range of 0–500 ppb was chosen. It was recommended to use only one test kit during the data collection and monitoring processes in order to maintain consistency in testing results.

The testing process involved two main phases. In the first phase 24 samples from field kits were taken from 6,900 communes, or communities distributed across the country. To verify data findings, 1,368 samples were cross-checked in a laboratory with specialized equipment. In the second phase, 150 tube wells were tested randomly in communities where at least one tested well was found to contain >50 ppb. Approximately five per cent of all phase two test samples were also tested in laboratories to check for accuracy. While there was no cross-checking mechanism to validate field testers' results from the field, supervisors helps to increase confidence in this process and reduce the number of samples that needed to be sent to the laboratory.

GIS coordinates were also collected for each well test site so that a risk map could be developed using GIS mapping software. Such a map shows the results from the water tests on a map of the region to determine where water with unacceptable arsenic levels is being consumed.

TABLE 34. LIST OF INDICATORS TO DETERMINE POTENTIAL RISK TO HUMAN HEALTH FROM ARSENIC CONTAMINATION IN VIETNAM

Indicator	Sample type	Standard	Details
Arsenic level- population >500	Groundwater	10 ppb max limit (WHO)	International standard followed for human health
Arsenic level- population <500	Groundwater	50ppb max limit (WHO)	International standard followed for human health
Total arsenic level	Sediment cores	No standard	Indicator of potential arsenic that could leech into the water system
Presence of Sulfide	Sediment cores	No standard	Some sulfide based minerals are arsenic sinks and therefore hold potential for arsenic leeching
Presence of Iron	Sediment cores	No standard	Presence of iron indicates potential for arsenic leeching into water during the iron oxidation process
Manganese level	Sediment cores	400 ppb max limit (WHO)	International standard set, mineral dangerous to child developmental growth

Mitigation

Because there is no cure or treatment for arsenicosis (arsenic poisoning), prevention (and water treatment) is essential. There are several key factors that need to be considered in order to mitigate the potential of the public drinking arsenic-contaminated water.

The hydrogeological factor: This refers to the natural conditions under which arsenic is leached into the water supply. It includes the variability of arsenic contamination in water within an area and the availability of alternative, clean water sources.

The water supply technology: There are two options to mitigate consumption of contaminated water; remove the arsenic from the source or provide an alternative clean source of drinking water to the public. The ability to remove arsenic from the water supply is dependent on the cost and effectiveness and availability of technology options. Likewise, the availability and feasibility of cost effectiveness affects uptake and use of alternatives by the public.

Health: Because arsenic poisoning symptoms take approximately 10 years to appear in an adult, there are many uncertainties about the long-term effects to human health. As such, there is typically less priority placed on this issue over other more immediate and apparent health crises in the public health system.

Economy and Institutions: In order to develop a strong mitigation plan, sufficient finances and institutional capacity are necessary to promote and coordinate the logistics. This type of project requires support at all levels, from setting policies and standards to operationalizing testing and education campaigns in the field.

A quality mitigation plan would include the following elements:

- Testing of water supplies to determine the extent and seriousness of the contamination.
- Public should be informed as soon as possible about the situation and potential risk to health.
- Both emergency and long-term mitigation plans should be developed.
- Reduction of arsenic levels in drinking water should be a priority.
- A diverse group of stakeholders (government, NGOs, health authorities, community members) should be involved.

In Vietnam several strategies were implemented: awareness raising, promotion of alternative safe water options and removal of arsenic from the water where possible.

Awareness Raising

In order to raise awareness about arsenic contamination on a broad scale, a communication strategy was developed. Pre-testing of the strategy in a small area was important to evaluate the effectiveness of the message, take into consideration the sociocultural context and ensure the target group was reached. In the case of Vietnam, there were two expected outcomes 1) there would be increased awareness about the consequences of arsenic contamination on health and, 2) the target population would know how to avoid contaminated water sources or how to treat water to reduce arsenic to acceptable levels. As part of the communication strategy, Provincial Centre of Preventive Medicine has become involved in areas where people are at high risk. Here the respective offices coordinate, implement and monitor Comprehensive Arsenic Mitigation Plans. The plans use media and community mobilizers to look at safe alternatives to contaminated wells. Through public consultation, pamphlets, bulletins and a DVD have been developed to promote the message.

To evaluate the communication strategy, a Knowledge, Attitude and Practice Survey (KAP) was done to review the effectiveness of messaging midway through the project. In some areas it found that negative messaging was scaring the public, so they would not drink well water even with acceptable arsenic levels (i.e., below 10 ppb). Thereafter, a more moderate campaign was adapted to compensate for this issue.

Alternative safe water options

In some Southeast Asian countries—such as Cambodia, Laos and Myanmar—alternative safe water options were provided to the public. In Vietnam, alternative safe water options were promoted, but not provided to the public. This was due in part to the amount of funding the program had. Harvesting rainwater was seen as a viable short-term solution, while household treatment through the community level was considered the better long-term option. It was important that alternatives at the household level be cost-effective and not too labour-intensive. In some areas sand filters were already being used to help remove iron from the groundwater. In these areas the filters could be modified to remove arsenic as well. A final strategy included the introduction of Water Safety Plans. In five communities with piped water supply systems, plans were developed to ensure water was free of arsenic.

Monitoring

National Database

As part of the monitoring process, a centralized database was set up to house ongoing results from data collection. Training was provided to staff on sampling procedures and surveying methods and data entry for the central database. Because the database was built based on the arsenic risk classification study and development of the arsenic risk maps, only test sample and corresponding geospatial data are currently collected. This system could be expanded to include additional information about natural disasters, well conditions and when it was drilled. Currently, the following information is collected. International standards set by the World Health Organization (WHO) were adopted by Vietnam.

TABLE 35. LIST OF INDICATORS TO DETERMINE POTENTIAL RISK TO HUMAN HEALTH FROM ARSENIC CONTAMINATION

Indicator	Standard
Arsenic level- population >500	10 ppb max limit (WHO)
Arsenic level- population <500	50 ppb max limit (WHO)
Manganese level	400 ppb max limit (WHO)

Ongoing monitoring

One risk of this program is that it develops a large area of impact and affects a very large population. As such, it was questionable as to whether the program would be robust enough to work as effectively in the field as in the piloted communities. Two methods to ensure the mitigation strategies are working were ongoing field testing of water after it has been treated by an alternative safe water option and administering KAP surveys to determine knowledge, attitudes and actions toward use of safe drinking water are necessary to ensure the effectiveness of the program over time. The final monitoring scheme should involve an annual health promotion campaign for families to have health checks to look for signs and symptoms of arsenic poisoning. Such ongoing data will help inform whether or not new mitigation measures need to be implemented and in which areas of the country.

3.10 Indicators for Monitoring – China Hai Basin Integrated Water and Environment Management Project

This case study is based on following sources: GEF Hai Basin Project Office (2003);World Bank (2003);World Bank (2008).

Project name: Hai Basin Integrated Water and Environment Management Project
Date: 2003
Sector: Water

Project Information

The objective of this project is to form an integrated approach to water resource management and pollution control in the Hai River Basin with the intent to improve the environment in the Bohai Sea area. This will include reducing the pollution of the Bohai Bay and reversing the trend of water quality deterioration and overuse of surface and groundwater resources from the basin. As approximately half of the wastewater pollution in the Hai River Basin comes from small and medium-sized cities, the project will also aim to resolve the issue of wastewater pollution and pollution from such communities within the project area.

The project aims to improve the water environment in the Hai River Basin. To achieve this goal:

- Demonstration projects will be undertaken and studied in order to inform the development of environmental management plans.
- Personnel will be trained in carrying out a pollution source control plan, wastewater recycling and water saving in irrigation agriculture.

An integrated management system for water resources and the aquatic environment adapted to the specific circumstances of the project areas will be developed.

TABLE 36. KEY PERFORMANCE INDICATORS

Indicator	Measurement
Decrease water pollution	Tonnes of reduction
Reduce groundwater overdraft	Rate of water table lowering reduced
Reduced pollution loading to Bohai Sea from coastal countries	
Formulated Integrated Water and Environmental Management Plans	Ten plans developed in total for pilot countries
Produce Strategic studies at central and Hai Basin levels	Seven studies to be produced
Carry out demonstration projects	Four projects to be carried out
Formulate strategic action plans for Zhangweian sub-basin and Hai River Basin	Action Plans
Establish river research data management system	Data management system
Give technical support to Tianjin coastal wastewater management	Technical support provided

Methods used in scoping and assessment of impacts

For this project, a mixed methods approach was taken, and the assessment focused on the natural and ecological environments. This includes examining how wastewater treatment and recycling and scientific management of surface water and groundwater resources impact soil conservation, forestry and vegetation and the ecological environment of wetlands.

The assessment involved four main components: assessments of the current situations of water resources and environmental quality in the project areas, an assessment of the environmental impact of the implementation of the project and conclusions and suggestions to move forward.

In order to carry out these assessments, four main activities were carried out:

- Determine the scale, assessment criteria, standards to be adopted, scope, project contents and the environmental protection objectives.
- Investigate and assess the natural geographical, hydrological and meteorological characteristics as well as the socioeconomic status of the population in the project areas.
- Assess the environmental status of the surface and groundwater.
- Assess the environmental problems in the project area prior to construction and project implementation impacts.

Assessing and Monitoring Water Resource Use

TABLE 37. BASELINE ASSESSMENT OF THE WATER RESOURCES IN THE PROJECT AREAS

Indicator	Measurement
Total water supply (not including wastewater) in the basin: groundwater, surface water and diverted water from Yellow River, slightly salty and sea water	Amount water m^3
Volume of water used in urban areas	Amount water m^3
Volume of water used in rural areas	Amount water m^3
Volume industry-used water: agricultural irrigation, forestry, animal husbandry, fisheries	Amount water m^3
Exploitation/utilization ratio for water resources	Amount water used/total water available

Monitoring the balance of water resources in the project areas

This will include the establishment of a Water Knowledge Management System for the Hai Basin as well as an Evapotranspiration Management system. Evapotranspiration is essential for surface energy balance and water balance in the ecosystem. By estimating the Evapotranspiration Management system within the ecosystem helps to determine ecosystem productivity and water balance as well as guide agriculture water use. This project uses a method called the Eddy Covariance which measures the exchange of water vapor, energy and carbon dioxide between the earth's surface and the atmosphere (Ziwei, Shaomin, Minggang, n.d). Through the project, long-term monitoring sites were set up in the Hai River Basin. Three sites were chosen for testing based on their unique geographies and agriculture production; mountain (orchards, maize/bare soil), plains (maize/winter wheat, cotton) and suburbs (maize/winter wheat, vegetables and fruit).

The primary indicators that the ET management system monitored were:

- Air temperature humidity
- Wind speed/direction
- Infrared temperature
- Net radiation

- Soil heat flux
- Soil temperature
- Soil moisture
- Precipitation
- Air pressure

While there is no specific standard that must be met, these indicators help to set guidelines for limits on how much water can safely be extracted from the water basin at any given time. By monitoring ET in the river basin, the local administration can help limit the amount of groundwater overdraft occurring, especially in dry seasons where water sources are not quickly replenished.

Assessing and Monitoring Water Quality

TABLE 38. BASELINE ASSESSMENT OF ENVIRONMENTAL QUALITY IN THE PROJECT AREAS

Indicator	Measurement
Wastewater discharge volume running into the Hai River Basin	Volume in tonnes
Municipal sewage discharge volume running into the Hai River Basin	Volume in tonnes
Percentage of rivers meeting Class III of Surface Water Environmental Quality Standards (GB3 838-2002)	Standard categories based on pollutant levels: ammonia, nitrogen, potassium permanganate index, volatile phenol and biochemical oxygen demand

The demonstration projects include:

- Polluted water body remediation project in the Zhangweixin River.
- Wastewater emission control in the Zangweinan sub-canal basin.
- Study report on sufficient management of water authority and permission of digging wells in the Hebei province.
- Study on the technical system of sufficient use of water in agriculture and actual water-saving technologies in Beijing city.

In assessing the impacts of these projects, noise pollution during the project implementation period, air pollution, effects on surface and groundwater quality, effects on loss of soil and water, temporary effects on region ecology, potential effects on land occupancy and possible effects on cultural resources will all be taken into consideration.

TABLE 39. ASSESSMENT OF THE ENVIRONMENTAL IMPACT OF THE IMPLEMENTATION OF THE PROJECT'S CONTENTS

Type of Impact	Impact Severity	Details
Wastewater, waste gas and solid waste produced during the construction phase	Minimal	Most construction is manual, so minimal wastewater and gas will be produced. Solid waste will be managed and removed from the site as per regulations.
Noise pollution	Minimal	Most projects located far away from residential areas.
Effect on surface and groundwater quality	Medium	Surface water monitored through: flowrate, turbidity, sediment concentration.
Effects on loss of water and soil	Medium/ high	Ditch and canal construction may cause soil erosion, damage soil and plants, destroy landscape in soil and rock quarry areas. Increase in suspended solids and sediment deposits in rivers due to construction will decrease water quality,
Temporary effects on regional ecology	minimal	Fluctuation in water quality may effect local animal populations causing temporary emigration. Local plant species may also be temporarily affected by water fluctuation.
Effects on Environmental Hygiene	minimal	Accumulation of stagnant water in quarries and pits may cause mosquito and other pest problems. These areas must be backfilled or designed to drain easily.

Monitoring

The Integrated Water and Environmental Management Action Plan will evaluate the quality and quantity of surface and groundwater conditions, establish targets objectives for improvement of water management quantity and quality, including defining the monitoring indicators and monitoring and evaluation requirements for tracking improvements, preparing the plants for reaching targets using a 10–15 year horizon.

Within this, monitoring sites, parameters and targets will be set. These will include baseline surveys/inventories of surface and groundwater quantity and quality conditions, uses and trends and establish specific objectives, timelines and indicators for IWEMPs and demonstration project implementation during the life of the overall project and beyond. Standards adopted include:

- Surface Water Environmental Quality Standards (GB3 838-2002)
- Integrated Wastewater Discharge Standards (GB8978-1996)
- Groundwater Quality Standards (GB/T14848-93)
- National Soil Quality Standards (GB1 583 8-95)
- Soil Environmental Quality Standards (GB 1 5618-95)
- Irrigation Canal Systems Design Standards (SDJ-78)
- Beijing Municipal Water Pollutants Discharge Standards (Issued by the Beijing City People's Government on October 15, 1985)

3.11 Criteria and questions for Reviewers

The list below provides a series of typical questions that reviews use to assess the submitted EIA.

1. Formal and administrative aspects

1.1. Does it comply with the format specified in the regulations or specific guidelines?

1.2. Does it comply with basic requirements established in laws, regulations, or guidelines with regard to extension, index, etc.?

1.3. Are the classical components of an environmental impact study included?

1.4. Is the language simple, direct, and easy to understand?

1.5. Does it include an executive summary?

1.6. Are the public involved or affected by the project identified?

1.7. Are the working teams and those responsible for the study identified?

1.8. Are the modifications made to the document during the formal review easily identified?

1.9. Is the document easy for the public to read?

1.10. Are sources of information and bibliographical references specified?

Global Qualification:

Complete _____

Incomplete _____

Deficient _____

2. Technical and content aspects

2.1. Are project objectives clearly described?

2.2. Is the project clearly justified?

2.3. Are possible project alternatives analyzed and described?

2.4. Are there enough background data to describe the project and its characteristics, including economic and social aspects during the different stages of design, construction, operation, and abandonment?

2.5. Is the legislation governing the project clearly identified, as well as the framework for decisions?

2.6. Are the duration of the project's construction, operation, and abandonment stages, and its connections with other activities or projects indicated?

2.7. Are the project's relationships with the population's activities described and its implications for such activities, including the indication of individuals who will be displaced?

2.8. Are the project location and its connections properly described and presented?

2.9. Are legal restrictions regarding the project's location indicated, such as development plans, protected areas, national monument areas, etc.?

2.10. Are the reasons for, and scope of, the environmental impact study clearly justified?

Global Qualification:

Complete _____

Incomplete _____

Deficient _____

2.11. Is the affected area or area of influence of the project beyond the location area clearly identified?

2.12. Are the project's effects on the environment included, as well as the most significant changes that it will cause?

2.13. Is there a detailed description of relevant environmental components of the site selected for project location and its surroundings, including maps?

2.14 Are environmental elements directly and indirectly associated with the project identified and adequately covered in the baseline?

2.15. Have inventories and surveys descriptive of the current situation (baseline) of the environment that will be affected been consulted (or prepared if none currently exist)?

2.16. Is the physical environment described adequately?

2.17. Is the biological environment described adequately (flora, fauna, ecosystem)?

2.18. Is the human environment, including cultural aspects and habits, described adequately?

2.19. Is the landscape described adequately?

2.20. Is environmental quality (pollution) described adequately?

2.21. Is the environmental value of the affected area described adequately?

2.22. Are methodologies for the baseline described adequately? Are they applied correctly?

2.23. Have the significant project impacts on the environment been indicated and described, and established from the baseline (pre-project situation)?

2.24. Does it clearly indicate whether impacts are positive or negative; cumulative; of short, medium, or long term; permanent or temporary; direct or indirect; etc.?

2.25. Does it explain how impacts and methodologies were identified?

2.26. Are significant project impacts adequately ranked and appraised and are methodologies described correctly?

2.27. Are impact characteristics and patterns adequately described?

2.28. Are prediction methods described and are they appropriate for the expected environmental disturbances?

3.1. Does the document present a well-structured environmental management plan with a description of the proposed measures?

3.2. Does the document include a program of applicable and sufficiently detailed mitigating measures?

Global Qualification:

Complete _____

Incomplete _____

Deficient _____

3.3. Are mitigation actions and management measures justified?

3.4. Is there an adequate, sufficiently detailed risk-prevention and contingency program in case of accidents?

3.5. Have alternatives been considered for the installation of the project? Have the advantages and disadvantages of each alternative been discussed in terms of unexpected impacts? Have the reasons for the final choice been specified?

3.6. Have pertinent actions for processes, design, technology, and operation been considered in terms of their environmental effects, and have the reasons for the final decision been specified?

3.7. Have adverse impacts been taken into account in defining mitigating, risk-prevention, contingency and compensatory measures and is any evidence offered that such measures will be effective?

3.8. Has significant impact prevention been addressed adequately?

3.9. Are environmental improvements with the project's EIA clearly identified?

3.10. Are control measures considered for impacts, as well as a schedule for their application?

3.11. Is a budget included for mitigating and compensatory measures?

3.12. Is there a commitment on the part of the project coordinator to carry out the indicated control measures, and are detailed implementation plans included?

3.13. Is a follow-up program proposed for major impacts during the construction, operation, and abandonment?

3.14. Is there a budget to finance the follow-up program?

3.15. Is there a participation plan which explains how the public have been involved in the project?

3.16. Has there been sufficient public consultation, and is there evidence of the public's participation in the environmental impact study

Source: UNU, UNEP, RMIT (2007)

4.0 Teaching Tools

4.1 The EIA Accreditation Process

This section provides a brief overview of options for environmental impact assessment (EIA) certification in the Americas. While there is only one EIA certification body—The Qualified Environmental Professional (QEP)—universities in most countries provide comprehensive courses at the undergraduate and master's levels. The following provides information for education and accreditation in Canada and the United States in North America, and Costa Rica and Panama in Central America.

General

While there is limited information about an international system of accreditation, one organization, The Institute of Professional Environmental Practice, does have such a program. This organization is based in the United States but is international in stature with members representing countries such as Bahrain, Canada, Mexico and the United Kingdom, among others. According to their website, the Qualified Environmental Professional (QEP) credential—which requires all professionals to follow a strict code of ethics in their work—is a "multi-media, multi-disciplinary, board-certified credential, which requires environmental professionals to see the big picture and to have the skills and knowledge to solve real world problems." To apply for the certification, a minimum of a bachelor's degree or equivalent in physical, earth or natural sciences, engineering, or mathematics, combined with five subsequent years of environmental work is required. For candidates with more than 15 years of experience there is a 90-minute oral exam to obtain the certification. For professionals with between 5 to 15 years of experience, a two-part written exam is required that consists of:

1. A general environmental science exam, and
2. A specific practice areas exam focusing on one of four areas; air quality, water quality, waste management and environmental science, management and policy.

The original cost of the certification is USD 150.00. An annual renewal fee of the same amount is also necessary along with a document stating ongoing professional development and involvement in the field.

The International Association for Impact Assessment (IAIA) is an international body that links people to training programs (IAIA courses, courses offered by others, training resources, webinars, etc.), but does not maintain an accreditation program, though it has a page devoted to training opportunities: http://www.iaia.org/training/training-network.aspx

North America

Canada

Certification is not required in Canada. The federal government is responsible for the scope and accuracy of the analysis.

Although no certification is required of EIA practitioners, a wide range of programs and courses are available. A few examples:

1. Concordia University has a graduate program in environmental assessment that includes both a course-based Diploma in Environmental Assessment, and a Master of Environment program.
    a. Required courses include environmental assessment (EA) concepts, principles and practices, data collection and analysis for EA, and GIS for EA. Other courses include: economics, environmental law and policy, environmental standards, Indigenous resource management, environmental governance, environmental modelling, community-based conservation, etc.
    b. Hours: 30 credits, which represents approximately 1350 hours of academic activity anticipated (lectures, exams, personal work, etc.).

   c. Experience: The Master of Environment program requires an additional 15-credit internship.

2. Niagara College program on Environmental management and assessment (post graduate certificate)
   a. Topics covered: Environmental laws and regulations, environmental site assessment, waste management systems, hazardous materials management, environmental impact and risk assessment, etc.
   b. Length: 43 credits over one year.
   c. Experience: 12-day internship (one day per week for 12 weeks).
3. Dalhousie University offers a Certificate in Environmental Impact Assessment.
   a. Required courses include a course on EIA, introductory courses on the environment, theory-based classes (e.g., conservation biology, geomorphology and landscape evolution), field- and method-based classes (e.g., agroforestry, practical hydrogeology), and higher-level supplementary classes (e.g., Law and policy for resource and environmental management, Economics for resource and environmental management).

In addition to courses provided by post-secondary institutions, the Canadian Environmental Assessment Agency provides training opportunities regarding environmental assessment (the currently posted courses are all one or two days in duration).

United States

Certification is not required in the United States. The federal government is responsible for preparation of the environmental impact study (and therefore scope and accuracy of the analysis). Outside firms are sometimes hired to prepare the environmental impact study on behalf of federal agencies.

Since no certification is required of EIA practitioners, a wide range of programs and courses are available. A few examples:

1. North Carolina State University Master of Environmental Assessment.
   a. Required courses include environmental risk assessment, environmental exposure assessment, environmental monitoring and analysis, environmental stressors, intro to GIS, Environmental Assessment Law and Policy. A wide range of electives covering diverse topics are available (e.g., soil microbiology, agricultural waste management, project management). A professional project is also required.
   b. Length: 30 credit hours.
2. American University: Graduate certificate in Environmental Assessment.
   a. Required courses include an intro to GIS, two environmental science courses, environmental risk assessment, and a graduate course on statistical methods.
   b. Length: 15 credit hours
3. Anne Arundel Community College Certificate in Environmental Monitoring and Assessment. Designed to provide students "with the knowledge base and skills needed to evaluate the condition and environmental status of the diverse types of ecosystems found in Maryland for the purpose of environmental assessment or compliance."
   a. Required courses include general botany, zoology, chemistry, microbiology, environmental science, plus restoration ecology, geology of Maryland, and Ecological Principles and Environmental Assessment.
   b. Length: 35 credit hours

Central America

In most countries in Central America, the ministries of the environment have legislation regarding who can perform an environmental consultation, EIA or environmental audit. For instance, in Guatemala multidisciplinary teams of

registered consultants must develop environmental studies. In Nicaragua EIAs must be developed by individuals or corporations certified and registered by the Ministry of the Environment. However, there are no EIA professional associations or bodies in the country. In Honduras, all environmental service providers must be registered with MiAmbiente. While certification is necessary in most countries, few programs specific to Environmental Impact Assessments are available for training purposes.

Throughout much of Latin America, Fundacion Universitaria Iberoamericana (FUNIBER) provides an on-line distance specialization program in Environmental Impact Assessment. This program has flexible start and end dates, but does require that the program be finished in no less than one month and no more than three months. The program requires 10 credits and approximately 100 hours of class time. This program is oriented toward people with no formal university education who would like training in this field as well as those with formal post-secondary education who would like a specialization in EIA. The program covers the following topics.

1. Definitions and basic concepts of EIA
2. Typology and characterization of impacts
3. Contents and methods for identification and assessing impacts
4. EIA in different countries
5. Practical cases

FUNIBER also offers a specialization on EIA and Environmental Auditing, which focuses generally on EIA, environmental management and ISO standards, as well as a Masters of Environmental Management and Auditing. FUNIBER has campuses across Latin America, Africa and Europe and is located throughout Central America in Costa Rica, Honduras, Guatemala, El Salvador, Panama and Nicaragua.

Costa Rica

Certification is not required in Costa Rica, but the national environmental secretariat (*Secretaría Técnica Nacional Ambiental*, or SETENA) defines team composition required to prepare studies, which must be conducted by consultants who have been registered by SETENA.

While no specific certification is required, several universities offer courses and programs focusing on EIA.

1. The Universidad Nacional de Costa Rica (UNA) offers a course on environmental impact assessment within their Environmental Management Program. Through these diploma and degree program students "will improve and optimize different environmental aspects in productive processes and design and implement systems and technologies that help to solve environmental problems."
   a. Required courses include all courses listed under this program. They focus on the fundamentals of biology, chemistry, laboratory work, cartography and GIS, toxicology and research methods among others. The course on EIA is offered in the fourth year, semester 1 of the program. An additional course on managing social/environmental conflicts is also available during the last semester.
   b. Length: Eight semesters and a total of 93 credit hours for the degree and two semesters and 68 credit hours for the diploma.
2. Universidad Autónoma de Monterrey, Costa Rica offers a Master's program in Environmental Management.
   a. Requirements: To enter the program you must have a degree in law, economics or natural sciences; otherwise a qualifying exam is necessary. This program covers the principles of ecology, pollution and contamination management, law, planning and natural disasters and includes a course on environmental impact assessment in the final semester.
   b. Length: This is a two- year program that requires a total of 68 credit hours.

Panama

In Panama, studies must be conducted by a multidisciplinary team of qualified professionals who are registered and certified by the Ministry of the Environment (*Ministerio de Ambiente*, or MINAM). The team must consist of five experts, registered in the ministry's environmental auditing list, with experience in the fields of water quality, noise, soil, air, waste, residuals, clean production methods, environmental risk, flora and fauna, environmental management, industrial security and hygiene, civil works, technological processes and sociology. To be registered as an environmental consultant with the Ministry of the Environment, professionals must have a university education in environmental sciences and a certificate indicating a minimum of 120 hours of EIA-specific courses have been taken. They must also have developed at least one EIA in each of three categories and received acknowledgement by the ministry's EIA department that the consultant has participated as an evaluator for at least one year. All registered environmental consultants must submit documents proving that they are keeping their skills up-to-date.

There are several options available for EIA training in Panama. These include:

1. The *Universidad Latina de Panama* has an Environmental Engineering Program. This is a five-year program that includes courses in Environmental Impact Assessment, Environmental Auditing, Environmental legislation, ethics, biodiversity management and water quality among others.
2. *Universidad Latinoamericana de Comercio Exterior* (ULACEX) has a post-graduate program for Environmental Management, Risk Assessment and Industrial Safety.
3. The *Universidad Tecnologica de Panama* provides EIA and environmental management courses within its five-year Civil Engineering program. In addition to this, it holds occasional workshops and lectures for Environmental consultants to update their skills.

4.2 Sample Lesson Plan and Curriculum focusing on the LAC region

Overview

This document presents a basic Environmental Impact Assessment (EIA) curriculum accompanied by 40 test questions and a lesson plan to teach the material over the period of a four-day workshop.[2] The curriculum is based on globally relevant case studies and examples of EIA definitions, legislation and procedures applied by major development banks and selected Central American countries. Because environmental licensing is largely a national process, many of the learning activities are centred on national procedures. Honduras has been selected to provide a more detailed national example throughout; however, teachers from other countries can substitute Honduran-specific activities for ones relevant to their own country.

Learning Objectives

After taking this workshop, learners will:

- Understand the concept, historical context and wider importance of EIA (beyond being an environmental licensing process).
- Be familiar with EIA legislation.
- Know the key steps in the EIA process.
- Understand the importance of Social Impact Assessments and public participation in the EIA process.
- Gain an overview of methods and instruments that are commonly used to develop an EIA.
- Improve collaborative skills and thus gain skills relevant for collaborative EIA development.

The learning objectives will be achieved by drawing upon best practices from global initiatives, including those led by development banks such as the World Bank, the Inter-American Development Bank and others, and using specific case studies and examples from selected Central American countries.

[2] While the lesson plan is designed to be covered during a 4-day workshop, the curriculum can be adapted to different purposes, such as a 13-week semester course bolstered by individual and group work, or as an online self-paced course.

Curriculum Access and Organization

All learning materials and tests are available on the EIA online learning platform (http://www.iisd.org/learning/eia). An offline version is also available for download.

The curriculum is organized into three main sections:

1. Broad introduction to EIA. This includes a global timeline of EIA and one specific to Honduras.
2. Learners are guided through the seven steps to conducting an EIA: Screening, Scoping, Impact Assessment and Mitigation, Impact Management, The EIA Report, Review of the EIA report and licensing, and Monitoring. Each step is presented within the framework of four guiding questions: What is it? Why is it needed? What are the different approaches? How is it carried out? Throughout, generalized examples are provided from international development banks and selected Central American countries. More detailed information is provided on Honduras.
3. Examples – This is a compilation of downloadable, detailed information that is important for deepening learning, including: real-world cases to serve as practical examples; explanations of Social Impact Assessment (SIA) and how to carry out public consultation; examples of Terms of Reference (TORs); key aspects of EIA legislation, among others.

The agenda below is designed to be implemented over a series of four days with topics ranging from one quarter of a day to whole-day sessions. All assignments and activities can be completed in groups and/or individually. It is up to the teachers to decide what will work best for the specific group of students. The fourth column in the table below identifies how each lesson addresses the criteria for Honduran EIA accreditation.

Preparation

Before the workshop, teacher should scan local and international media to select current development projects that are receiving attention in the area of EIA (examples are provided but teachers should be familiar with the most recent high-profile nationally relevant EIA).

Lesson title	General focus of the lesson	Specific focus of the lesson and relevant sections of the platform	Corresponding EIA Accreditation criteria – Honduras *
Learning about EIA Approx. ½ day	*Most common definitions and objectives of EIAs* *Brief history and examples to illustrate why EIAs are important. This will help students gain a basic* understanding of the purpose of EIAs to guide the next steps. Key steps and components of EIA globally and in Honduras.	**EIA What? Why? How?** (Section 1) - Definitions, essentials and basic legislation of EIA globally, in Central America and Honduras. - Assessments related to EIAs. - Timeline of EIA globally and in Honduras. <u>Activities and Assignments</u> - Discuss why EIA is needed and how it is more than an environmental licensing process. - Discuss differences between SEA, IEA and EIA. - Review local and international media publications to identify what aspects of EIA and projects/developments are most commonly discussed. - Compare the development of the EIA legislation globally and in Honduras. - Complete the five "Introduction to EIA" test questions listed in section 4.3	1,2,4,7, 14
EIA Steps 1. Screening Approx. ¼ day	*Methods of conducting a quick assessment of the planned projects and developments to decide if their impacts on the environment and well-being are significant enough to develop a full EIA.*	**Step 1: Screening** (section 2.1) - Key definitions and examples of Screening. - Key types of projects and the categories that require screening. - Approaches to screening in selected countries in Central America. - Review of the forms used for screening in Honduras. - Summary of the categories of projects, works or activities in Honduras. <u>Activities and Assignments</u> - Identify five project/development examples that would require an EIA, five that would only require an Environmental Management Plan (EMP), and five that wouldn't require EIA nor EMP and discuss the reasons. - Compare categories for projects that require EIA from selected Central American countries and from the analyzed development banks. - Explore the general process required by project/development proponents to request an environmental license in your country (For Honduras, see Annex 1). - Complete the five test questions for Step 1: Screening (listed in section 4.3).	2,7,8,14

Lesson title	General focus of the lesson	Specific focus of the lesson and relevant sections of the platform	Corresponding EIA Accreditation criteria – Honduras *
EIA Steps: 2. Scoping Approx. ½ day	*How to specify and narrow down the focus of the EIA, define the project area, alternatives and baseline data.*	**Step 2. Scoping** (section 2.2) - Overview of the types of activities undertaken during Scoping. - Overview of the general scoping process in selected Central American countries, and the specific scoping process in Honduras. - Check how scoping is done in the case study examples (section 3.1). - Review of the examples of TORs (section 3.4) - Review materials on public consultation and participation (section 3.6). Activities and Assignments - List key elements of the TOR based on the provided examples. - List and define key decisions/methods used during scoping step in the case studies. - Complete the five test questions for Step 2. Scoping (listed in section 4.3).	2,3,8,13
EIA Steps 3. Impact Assessment and Mitigation Approx. one day	*How to assess the impacts of the planned project and its alternatives on the environment and socioeconomic conditions and livelihoods* *How to identify mitigation measures to reduce impacts and/or provide positive contributions.*	**Step 3. Impact Assessment and Mitigation** (section 2.3) - Review list of categories and subcategories included in the impact assessment. - Review the examples of different types of impact assessment and mitigation actions by major development banks and Central American countries. - Review methods used in impact assessment and discuss their potential advantages and challenges. - Review the Leopold matrix for a chosen project example. - Review impact assessments in the case studies (section 3.1). - Review the material on Social Impact Assessment (section 3.2). - Review the material on Climate change and EIA (section 3.5). Activities and Assignments - Identify and discuss key methods and their implementation during impact assessment in the EIA case studies. - Identify major impacts and mitigation measures identified in the provided case studies. - Discuss the importance and implementation of Social Impact Assessment and discuss its relevance for your country/region/project example. - Discuss the relevance of climate change and EIA your country/region/project example. - Create your own Leopold matrix for a selected potential development (individual or group activity). - Complete the five test questions in Step 3. Impact Assessment and Mitigation (listed in section 4.3).	3,4,5,6,9, 11, 14
EIA Steps 4. Impact Management Approx. ½ day	*Plans that need to be developed to specify, implement and monitor the identified mitigation measures and address other risks that the project could present, such as technological failures and other emergencies.*	**Step 4. Impact Management** (section 2.4) - Review the content of the environmental management Plan (EMP) - Review the legislation on impact management in the selected Latin American countries. - Review the EMP and other means of the impact management in the case studies (section 3.1). - Review approaches to developing EMPs in Honduras (section 3.7) Activities and Assignments - List the key elements of the EMP and provide examples based on the listed case studies. - Compare the purpose and content of the different types of plans that project proponents need to develop during the EIA. - Complete the five test questions for Step 4. Impact Management (listed in section 4.3)	1,4,5,6,8,9,10,11
EIA Steps 5. The EIA report Approx. ¼ day	*Key components of an EIA report and how to put together all the research and work done during the previous steps in a comprehensive report.*	**Step 5. The EIA report** (section 2.5) - Review key features and common shortcomings/deficiencies of EIA reports - Review overview of TORs for the major development banks and selected Central American countries, and consult detailed TOR examples (section 3.4). Activities and Assignments - List key components of the EIA report, specifying what project proponents should be aware of. - Compare the content and quality of each EIA component in the provided case studies, listing things that were included and those that require improvements, specifying what type of improvements are needed. - Complete the five test questions for Step 5. The EIA Report (listed in section 4.3).	8,2,13

Lesson title	General focus of the lesson	Specific focus of the lesson and relevant sections of the platform	Corresponding EIA Accreditation criteria – Honduras *
EIA Steps 6. Review and Licensing Approx. ¼ day	*Criteria for EIA assessment* *How the licence to operate is issued to the proponent/ developer.*	**Step 6. Review and Licensing** (section 2.6) - Explore the types of review used. - Go over the review and licensing process used in Honduras. - Examine the detailed list of criteria and questions for reviewers (section 3.11) Activities and Assignments - Use the reviewer questions listed in the examples section to review the EIAs listed in the case studies. - Prepare a reviewer report based on the reviewed EIAs following the format of the reviewer questions. - Complete the test questions for Step 6 (listed in section 4.3).	8,10,12,13
EIA Steps 7. Monitoring Approx. ¼ day	*How to identify key indicators and develop a monitoring protocol.*	**Step 7. Monitoring** (section 2.7) - Review how Environmental Assessment follow-up, monitoring and enforcement is done by the major development banks. - Review the approaches to monitoring in the selected countries in Central America. - Review the approach to monitoring in Honduras and how monitoring program is organized. - Review the list of monitoring indicators (section 3.8) as well as the indicators for monitoring used in the case studies in sections 3.9 and 3.10) Activities and Assignments - Identify a set of indicators that can be used to monitor the planned projects listed in the EIA case studies. - Compare the list of indicators for diverse case studies and discuss similarities and differences. - Create a monitoring protocol for a sub-set of indicators. - Complete the five test questions for Step 7 (listed in section 4.3).	1,5,7,8,9,12,14
8.Review **and testing** Approx. 1/2 day	*Review key EIA steps, legislation in Honduras* *Test the students' knowledge.*	- Review the definition and implementation of each key EIA step. - Review in detail the each steps of the EIA based on the provided case studies (3.1). - Select a development project and develop each step of the EIA; literature can be used to illustrate impacts and mitigation options. - Complete again all 40 of the test questions (listed in section 4.3) previously taken as a knowledge review exercise. - Discuss in a whole group activity any outstanding questions/points of confusion	12,13,14

4.3 Sample Test Questions and Answer Key

Introduction to EIA questions

1.1 EIA is defined as (select one):

a. A process of identifying, predicting, and evaluating the likely impacts of a proposed project or development to define mitigation actions to reduce negative impacts and to provide positive contributions to the natural environment and well-being

b. A report written by government representatives on the planned development impacts of environment, socio-economic issues and culture

c. Project life-cycle assessment

1.2 True or False? More than 100 countries have legislation on EIA.

1.3 What is essential in an EIA? (select all that apply):

a. That it allows decision makers to assess a project's impacts in all its phases

b. That it allows the public and other stakeholders to present their views and inputs on the planned development

c. That it contributes to and improve the project design, so that environmental as well as socioeconomic measures are core parts of it

1.4 Other assessments similar to EIA include (select all that apply):
   a. SEA – strategic environmental assessment
   b. SIA – strategic impact assessment
   c. IEA – integrated environmental assessment

1.5 True or False? Honduras is currently in the process of revising its legislation on EIA.

Screening questions

2.1 What is the purpose of the "screening" step of EIA? (Select all that apply)
   a. To assess the quality of the project design
   b. To facilitate informed decision making by providing clear, well-structured, factual analysis of the effects and consequences of proposed actions
   c. To determine whether a full EIA needed

2.2 Which type of project usually requires an EIA? (Select all that apply):
   a. Small housing building
   b. Dams and reservoirs
   c. Industrial plants (large scale)
   d. Community garden development
   e. Irrigation, drainage, and flood control (large scale)
   f. Mining and mineral development (including oil and gas)
   g. Port and harbour development
   h. Development of wells in the community
   i. Reclamation, resettlement and new land development;
   j. Thermal and hydropower development
   k. Outdoor recreation

2.3 EIA is usually required for a development project when (select all that apply):
   a. Large changes are expected in the environment
   b. Limited impacts are expected in the environment
   c. A small area is expected to be affected by the project
   d. There are potentials for transboundary impact
   e. Many people are likely to be affected by the project
   f. No cumulative impacts are expected
   g. There are protected areas in the project area of influence

2.4 True or False? Typically, the project proponents carry out the screening process by assessing their project based upon a set of criteria determined by a designated agency.

2.5 True or False? In Honduras, screening is carried out via an online system for development projects only classified under category 1 (low impact).

Scoping questions

3.1 What is true of the Scoping step? (select all that apply)
   a. It is a systematic exercise that establishes the boundaries of an EIA
   b. It clearly indicates what is relevant and what is not relevant within an EIA
   c. It serves as a work plan for the entire EIA process

3.2 Which one of the steps below is NOT included in the scoping process? (select one)

- Set up the team of experts that will conduct the EIA.
- Describe the project area and the area of the project influence.
- Outline project alternative for preparation, implementation and closure.
- Conduct public meetings and stakeholder consultations; integrate comments and collected feedback into project planning and alternatives.
- Create a set of environmental, biological and socioeconomic areas that will be used in the assessment.
- Define a set of criteria to assess the project.
- Identify and describe the environmental impacts and create a contingency plan
- Identify a set of data for baseline descriptions and potential additional data collection needs.
- Start inserting this information in the appropriate section of the TOR.

3.3 True or False? Public consultation is a critical part of the EIA, and in some Central American countries it is mandated by legislation.

3.4 True or False? TORs are always prescribed in national EIA legislation

3.5 In Honduras, what is meant by the development project's Areas of Influence? (select one)

a. The project environment that is located outside the area of the overall project and extends from its boundaries to a distance of 500 metres.
b. The sector within which the EIA will be developed (Mining, Tourism, etc.)
c. The environmental impacts that will occur outside of the project due to water flow, migratory species, etc.

Impact Assessment and Mitigation questions

4.1 What is included in an Impact assessment? (select all that apply)

a. a detailed assessment of the planned project and selected alternatives compared to the baseline conditions
b. Qualitative descriptions measuring high, medium and low impacts
c. Quantitative descriptions such as indicating the cubic metres of water withdrawn, sewage produced, and pollutants released
d. All the data collection, analyses, and developed plans summarized together in a well-structured and concise document

4.2 True or False? Impact assessment is done for the planned project and the identified alternatives.

4.3 The key focus areas of Mitigation measures should include (select all that apply):

a. Preventive measures that avoid the occurrence of impacts and thus avoid harm or even produce positive outcomes.
b. Measures that focus on limiting or lessening the severity and the duration of the impacts.
c. The identification of compensation mechanisms for those impacts that are unavoidable and cannot be reduced further.

4.4 Please select the one item from the list below that is NOT an example of an approach to impact assessment:

a. Expert judgment
b. Quantitative physical and mathematical models
c. Social impact assessment
d. One-off impact assessment

e. Matrices and interaction diagrams
f. Rapid Impact Assessment Matrix (RIAM)
g. Battelle Environmental Evaluation System

4.4 True or False? In a Leopold Matrix, the rows cover the key aspects of the environment and society, while the columns list the project's activities during all stages of the project.

Impact Management questions

5.1 A core part of Impact Management is developing an EMP – environmental management plan. Please indicate which items from the list below are contents of the EMP (select all that apply)

a. Mitigation
b. Monitoring
c. Capacity Development
d. Implementation Schedule and Cost Estimates
e. Contingency plans
f. TOR

5.2 True or False? Impact Management plans are often compulsory.

5.3 What is NOT a key step in developing an EMP?

a. Summary of the potential impacts of the proposal.
b. A review of EIA legislation in 5 different countries
c. Description of the recommended mitigation measures.
d. Statement of their compliance with relevant standards.
e. Allocation of resources and responsibilities for plan implementation.
f. Schedule of the actions to be taken.
g. Program for monitoring and auditing.

5.4 What is a contingency plan? (select the best answer)

a. A set of guidelines ensuring that the development project will remain within its boundaries.
b. A plan of actions to prevent an emergency and to be taken when emergencies occur.
c. A plan describing the measures that will be taken to contain or treat any waste produced by the development project.

5.5 True or False? In Honduras, an EMP is only requested for project in category 4 (High impact).

EIA Report questions

6.1 What specific aspects does a good EIA report and review include? (select all that apply)

a. Assessment, mitigation measures and related plans
b. A terms of reference (TOR)
c. A generalized set of assumptions about the project benefits described in highly technical terms.
d. A satisfactory prediction of the adverse effects of proposed actions and their mitigation using conventional and customized techniques.
e. Information that is helpful and relevant to decision making.

6.2 True or False? The EIA Report is compiled by the designated government agency.

6.3 There are many known shortcomings in EIA reports. Which is NOT a known shortcoming? (Select one)

a. The description of the proposal does not cover key features.
b. Appropriate mitigating measures are not considered.
c. Insufficient or outdated prediction models are used.
d. All relevant stakeholder's concerns are incorporated.

6.4 True or False? The EIA report development is the last step in terms of conducting the impact assessment done by the project team and the involved consultants.

6.5 Below is a detailed overview of the TOR in Honduras. Two of the items do not belong. Can you find them? (select two)

- Proponent details and Index
- Executive Summary of the EIA
- Project description and alternatives
- Legal considerations and environmental regulations applicable
- Summary of similar environmental regulations in neighboring countries
- Description of physical environment
- Description of biological environment
- Description of Socioeconomic environment
- Identification and prioritization of environmental impacts
- Identification of any stakeholders who are against the project
- Environmental Management Plan
- Risk Analysis and Contingency Plan
- Cost Analysis - Environmental Benefit
- Environmental Policy for the project and its regulations
- Environmental monitoring plan

Review of the EIA report and licensing

7.1 What are the key objectives of EIA review? (select all that apply)

a. Confirm the quality of the information and methods used in an EIA.
b. Ensure that it that it addresses all the critical and cumulative impacts and identified relevant mitigation measures
c. Take into account inputs from public comment.

7.2 True or false? A good quality EIA might still lead to the planned development not being permitted to go ahead based on the identified impacts.

7.3 There is often a formal review and licensing procedure in EIA systems. Who would carry out such a procedure?

a. The proponent of the development project
b. The government authority ultimately responsible for licensing development projects (i.e government infrastructure department)
c. Another government agency or committee
d. an independent body

7.4 Experience with EIA review in a number of countries has shown that public comment is a critical part of the EIA review process. What are common methods to ensure the public can comment on the project? (Select all that apply)

a. Public hearing(s)
b. Written comments submitted to the proponent or government department
c. Creation of TV shows and/or magazine articles to describe the project

7.5 Who carries out the technical review procedure of the EIA in Honduras?
a. MiAmbiente through the Office of Evaluation and Environmental Control (DECA)
b. A Non-governmental Organization called "Transparency in Honduran Development Projects"
c. The Honduran infrastructure and planning department.

Monitoring

8.1 What kind of monitoring is referred to when we speak of monitoring a development project (select all that apply)
a. Monitoring indicators that measure the impacts on the environment and communities as a result of the development project
b. Ensuring the fulfillment of all the commitments made in the approved EIA.
c. Keeping track of changes that may happen in the environment and communities because of the project and other local and/or global changes, such as changes in livelihoods due to economic crisis or migration, differences in water availability due to drought, etc.
d. Keeping track of the political context, to ensure that the project retains its licence.

8.2 From the list below, please select which item does NOT require any indictors in order to monitor identified environmental and social impacts and mitigation measures: (Select one):
a. The amount and range of stakeholders who participated in the scoping stage
b. The most important impacts
c. The effectiveness of the mitigation measures to make sure that they indeed reduce the impacts.
d. The actions proposed in the contingency plans

8.3 Who carries out the data collection for monitoring indicators? (select all that apply)
a. The project's implementers
b. National governments or independent agencies.
c. International development banks or aid agencies

8.4 True or false? Frequency of monitoring will be determined by the nature of the project

8.5 Who is responsible for monitoring an EIA in Honduras? (select all that apply)
a. The World Bank ensures that all Honduran development projects comply with international standards
b. SINEIA is part of the actions of autoregulation environmental projects, works or activities.
c. DECA is in charge of monitoring and oversight of the project's environmental performance through visits.
d. The local municipality is responsible for supporting overall supervision

Answer Key

Question	Right answer(s)	Feedback (if applicable)
1.1	a	
1.2	true	
1.3	a,b,c	
1.4	a, b	Strategic Impact Assessment does not exist
1.5	false	Honduras modernized its EIA legislation in 2009.
2.1	b,c	At the screening step, the project design is not considered because it may not even require an EIA.
2.2	b,c,e,f,g,i,j	
2.3	a,d,e,g	
2.4	true	
2.5	false	Projects under the categories 1 (low), 2 (low-moderate) and 3 (moderate-high) are screened using the online system. Only the projects classified as category 4 (High environmental impact) are not screened using the online system.
3.1	a,b,c	
3.2	g	A contingency plan is created only during the Impact Management step. During the Scoping step, it is only necessary to identify the project impacts, during its all stages and create a list of significant and non-significant impacts and explain why.
3.3	true	
3.4	false	In some countries, the proponent prepares its own TOR guided legislations and in others the TOR is prescribed in the legislation
3.5	a	
4.1	a,b,c	D is incorrect – this refers to compiling the EIA Report, which is carried out in the next step.
4.2	true	
4.3	a,b,c	
4.4	d	'One-off impact assessment' does not exist
4.5	true	
5.1	a,b,c,d,e	The TOR is not part of the EMP. TORs give guidelines for the EIA report content and they are created during the scoping phase.
5.2	true	
5.3	b	
5.4	b	
5.5	false	In Honduras, EMP can be requested for projects, activities, and works in Category 2, 3, or 4.
6.1	a,b,d,e	
6.2	false	
6.3	d	
6.4	true	
6.5	e,j	
7.1	a,b,c	
7.2	true	
7.3	b,c,d	
7.4	a,b	
7.5	a	
8.1	a,b,c	
8.2	a	
8.3	a	
8.4	true	
8.5	b,c,d	

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5.1 Glossary/Definitions

The United Nations Environment Program (UNEP) defines an Environmental Impact Assessment (EIA) as "a tool used to identify the environmental, social and economic impacts of a project prior to decision making" (UNEP, 2003). The European Union Council defines an EIA more specifically as "the identification, description and assessment of the direct and indirect effects of a project on: human beings, fauna and flora, soil, water, air, climate and the landscape, the interaction of these factors, and on material assets, and the cultural heritage" (Gilpin, 1995, pp. 4–5). More to the point, an EIA is a process that involves identifying, describing and assessing the potential direct and indirect effects of an activity on humans and the natural environment before the project begins. The purpose of an EIA is identify and describe key impacts that need mitigation, management and/or monitoring to reduce them to acceptable impact levels (World Bank, n.d., p. 1). While this definition provides a general idea of what an EIA is, further clarification of key concepts within this definition can better outline what is required.

Environment

The term environment refers to "the conditions or influences under which an individual or thing exists, lives or develops." This definition has expanded from its traditional sense, from focusing more on the natural environment (i.e., biophysical and ecological features), to incorporating cultural, social and health aspects. It now encompasses (Gilpin, 1995, pp. 1–2):

- All aspects of the surroundings of human beings, whether affecting human beings as individuals or in social groupings.
- Natural resources including air, land and water.
- Ecosystems and biological diversity.
- Flora and fauna.

- Social, economic and cultural circumstances.
- Infrastructure and associated equipment.
- Any solid, liquid, gas, odour, heat noise, vibration, or radiation resulting directly or indirectly from the activities of human beings.
- Identified natural assets such as natural beauty, outlooks and scenic routes.
- Identified historical and heritage assets.
- Identified cultural and religious assets.
- Aesthetic assets.
- Public health characteristics.
- Identifiable environmental planning, environmental protection, environmental management, pollution control, nature conservation and other mitigation measure

Impact

The United Nations Convention on Environmental Impact Assessment in a Transboundary Context (2003) refers to *impact*, or *effect* as "any effect on the environment, including human health, flora, fauna, biodiversity, soil, climate, air, water, landscape, natural sites, material assets, cultural heritage and the interaction among these factors" (Article 2-7). In the context of EIA, impact refers to the effect of one thing upon another (Gilpin, 1995, pp. 4–5). Impacts can be classified as positive, negative, reversible, irreversible, short- or long-term (World Bank, n.d.). Some examples of pollution and ecological impacts may include those on air, water, noise, vibration levels and flora and fauna. Impacts on natural resources may include effects on agriculture, forest resources, water supplies or minerals (Gilpin 1995, pp. 4–5). Some social impacts may include effects on community health and well-being, employment, displacement of communities, and changes in public access to land and resources.

Assessment

Assessment refers to the process that is undertaken in an EIA. While these steps may vary depending on government legislation, the following process is typically followed in developing an EIA. Depending on the severity of the impact, these steps could be more or less detailed. Public participation and consultation is crucial throughout all phases of the EA process.

a. Screening – Determine if the project needs a full or partial assessment.
b. Scoping – Determine what information is relevant and needs to be included in the EIA report.
c. Assessment and evaluation of impacts and alternatives.
d. Reporting the environmental impact statement or EIA report.
e. Review of the EIA Report- this is done by the government agency.
f. Decision making – government agency passes the final decision.
g. Monitoring, compliance, enforcement and environmental auditing.

Basic concepts from Evaluation and Control Manual Honduras 2009

Code of Best Environmental Practices of Honduras (CBPAH): A document that contains all environmental practices (both general and specific) that must be complied with. This document is a complement to environmental laws and regulations in the country and should be used by all professionals undertaking the environmental licensing of any project.

Compensation measures: Measures taken to compensate for negative environmental impacts resulting from a project that are impossible to avoid. These measures can be applied in the project's impact area or in other jurisdictions as long as it is justified and agreed upon by MiAmbiente.

Cumulative effects evaluation: Systematic evaluation of combined environmental changes caused by the sum of various effects of human actions within a defined geographic area.

Environment: Biotic, abiotic, socioeconomic, cultural and aesthetic elements that together are permanently altered by human and natural activities and that affect and influence quality of life for all organisms.

Environmental audit: The site verification of a project or activities in operation by SINEIA or other authorized units with the objective to verify that the activities taking place are not causing irreversible environmental damage.

Environmental categorization table: The ordered enumeration and classification of activities according to any potential environmental impact or risk and/or the introduction of harmful modifications to the landscape or to cultural and national patrimony. This table is based on a standard based on the Industrial Classification of International Standards of all Economic Activities (ISIC).

Environmental commitment: Environmental measures that place a project within a range of environmental equilibrium, prevention and correction of contamination. These measures are obligatory when they form the environmental licensing process. Not following them can result in a penalty.

Environmental damage: A negative environmental impact, created as a direct or indirect result of the project, that is neither foreseen, controlled nor planned for in the environmental impact assessment.

Ecological equilibrium: The balance of the interdependent relationship between elements that make up the environment and make human life, transformation and development possible.

Environmental Guide: Technical document from MiAmbiente including a group of environmental methods that must be carried out in a project as part of the development cycle and that are divided by sectors. They include a) Environmental Impact Evaluation, b) Environmental best practices, c) environmental control and certification.

Environmental impact: Any significant change, positive or negative in any part of the environment caused by human actions or natural phenomena in a defined area.

Environmental impact evaluation (EIE): The analysis process that identifies, prescribes and describes the possible positive and negative impacts of a proposed project as well as the mitigation methods and monitoring plan.

Environmental impact study: Technical instrument used for environmental impact assessments, undertaken by a multidisciplinary team that will provide an in-depth analysis of the impacts of the project on the environment and society. (Description includes parts of the study as well)

Environmental Impact Study final report: Final report developed by an environmental service provider who has brought together, analyzed and interpreted all the information needed in the EIA based on the terms of reference set out at the beginning of the environmental licensing process.

Environmental insurance or guarantee: The amount the owner pays as security in the event that the activities of the project cause environmental damage.

Environmental Licence: Extended permission by MiAmbiente, facilitated by law that proves that the project owner has complied satisfactorily that all the steps and requirements necessary by law to start the project.

Environmental logbook: A book where the environmental manager tracks activities in the monitoring process to ensure compliance with environmental legislation and Environmental Best Practices for the country.

Environmental management: A group of technical operations and management activities whose objective is to ensure all activities fall within the environmental legal and technical norms in place.

Environmental management, control and improvement plan: A group of technical operations and proposed actions that intend to secure any human activities, within the legal, technical and environmental norms that help to prevent, correct or mitigate negative impacts or risks to the environment. This is an integral part of the environmental evaluation.

Environmental Management Unit (UGA): Technical branch that operates within the Secretariat and other Executive Power institutions that assists with technical support through MiAmbiente within SINEIA, as well as environmental management within the organization, specifically with environmental strategic evaluations.

Environmental responsibility: The Environmental Service provider contracted by the owner, who has the obligation to follow all environmental obligations for the project outlined in the guide of Best Practices for Honduras and which are applicable by law. They are also obligated to officially inform the Environmental Authority of all monitoring and control results for the duration of the Environmental Licence.

Environmental Service Providers: Certified individual consultants, consulting companies or analysis laboratories that carry out the field work portion of environmental evaluation or control that needs to be presented to MiAmbiente.

Environmentally fragile areas: Areas that, because of their specific conditions (i.e., soil use capacity, specialized ecosystem or uniqueness of the sociocultural characteristics) limit the magnitude of impact in the zone.

Execution of the project on site: The moment when a new human activity is started. After it has obtained an Environmental Licence, the project can formally start.

Inversion amount: The quantity of economic inversion that needs to be invested to start the project, including the cost of the land. This should be established in local Honduran currency (lempiras).

Manual of Environmental Evaluation and Control: Technical document developed by MiAmbiente that brings together all the methodological process guides for environmental evaluation, control and monitoring.

Megaproject: A group of activities that, in the local area or at a national level, create direct environmental, economic, social and/or cultural damage. While the aspects of a megaproject are similar to those of an EIA process if viewed individually, the size and correlation of activities place it in this category. This category includes hydropower, metallic mining, oil exploration and major infrastructure projects.

Mitigation Measures: Strategies and actions that are undertaken to reduce negative impacts caused by human action. These do not necessarily neutralize the impact—they only reduce it to a level that is acceptable within the environmental norms of the country.

Monitoring and Control: Actions undertaken by MiAmbiente or other legally authorized institutions, during the execution and/or operation of the project, to ensure that the environmental obligations established during the licensing process are put into practice and that no new impacts have occurred during project operations.

National System of Environmental Impact Assessment (SINEIA): A harmonized group of institutional elements, natural and legal, norms and legal and technical regulations that determine the relationships.

Potential Environmental Impact: The latent positive or negative effect that a human action could have on any part of the environment; physical, biological or social.

Prevention Measures: The actions directed at avoiding negative environmental impacts identified by the EIA. These typically mean changes within the design of the project to help maintain environmental balance.

Project area: All terrain directly affected by project activities at all stages of development.

Project Cycle: All the phases or steps involved in the development of a project from conception to the close of the project.

Proponent: The legal or natural person who will develop the project or activity and who solicits the Environmental Licence from MiAmbiente or any other legally authorized body.

Protected area: An area that is defined by law to be an area of conservation and protection of natural and cultural resources.

Resolution: The decision made by MiAmbiente or any other legally authorized body, to accept or reject the Environmental Licence based on the information presented to them required in the project's terms of reference developed at the beginning of the licensing process.

Significance of environmental impact: The qualitative assessment of an environmental impact because in the context of a process of criteria harmonization such as the environmental regulatory framework in force, in order to plan for land use and environmental considerations—taking into account the fragility of the environment, the level of potential public controversy and the relationship of environmental parameters of the action causing the environmental effect.

SINEIA F-01 document: Environmental evaluation instrument that must be presented with a sworn declaration by the lead of the project for projects with low environmental impact potential. Here the project is described and situated, and best environmental practices are followed.

SINEIA F-02 document: Environmental evaluation instrument that must be presented with sworn declaration, by the lead and the environmental consultant of the project for projects with moderate and high environmental impact potential. Here the project is described and situated, and an environmental screening is carried out to determine if a full EIA is necessary.

Strategic environmental evaluation: A process that introduces strategic environmental planning within strategic decision making for the development of a region or country.

Technical norms: Numerical values of those physical, chemical or biological perimeters which, if surpassed, would cause harm to human health, the ecosystem or cultural patrimony.

Technical opinion: Document created for MiAmbiente that conforms to national and regional laws, which accepts or rejects the Environmental Licence application based on technical norms and best environmental practices.

Terms of Reference: The document written by DECA in which all references and important background information for a Category 4 project are indicated. Terms of reference are clear and outline specific activities that are required in order to satisfactorily undertake the Environmental Impact Study.

Titular: The person who has been issued an Environmental Licence.

Annex 1: Screen shots of the MiAmbiente online licensing system (Honduras)

(http://miambiente.prohonduras.hn/MiAmbiente/login.html).

In order to obtain an environmental licence in Honduras, project proponents must register on the online system, enter contact and legal information about their business (Figure 1 below), as well as provide a description of the proposed project and its geographic coordinates. An Environmental Service provider must be selected to verify the project information (Figure 2). The system will automatically generate certain reports according to the information provided by the project proponent (Figure 3, top of following page), but several other documents must be uploaded into the system as well (Figure 4, bottom of following page).

FIGURE 3. MIAMBIENTE ENVIRONMENTAL LICENSING SYSTEM – SCREEN TO PROVIDE PRELIMINARY BUSINESS AND PROJECT INFORMATION

FIGURE 4. MIAMBIENTE ENVIRONMENTAL LICENSING SYSTEM – POP-UP SCREEN WITHIN THE SYSTEM THAT ALLOWS THE PROJECT PROPONENT TO SEARCH FOR AND SELECT AN ENVIRONMENTAL SERVICE PROVIDER (PSA) TO ACCOMPANY THEIR LICENSING PROCESS

FIGURE 5. MIAMBIENTE ENVIRONMENTAL LICENSING SYSTEM – SCREENSHOT OF THE LICENSING REPORT THAT IS AUTOMATICALLY GENERATED BY THE SYSTEM AFTER ENTERING THE PRELIMINARY INFORMATION OF THE PROPOSED PROJECT AND THE GEOGRAPHICAL COORDINATES

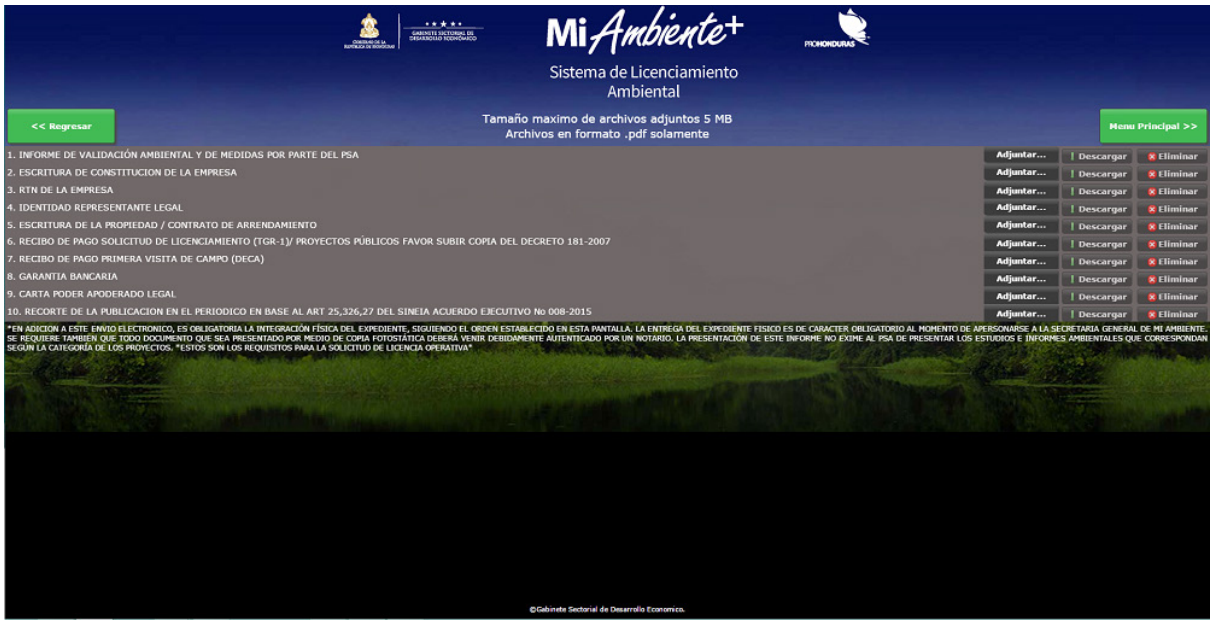

FIGURE 6. MIAMBIENTE ENVIRONMENTAL LICENSING SYSTEM SCREEN THAT ALLOWS THE PROJECT PROPONENT TO UPLOAD ALL DOCUMENTATION

Annex 2: Honduran Accreditation requisites

Competencies to be evaluated. Source: OHN 55:2011, Work competency — Environmental Evaluator and Environmental Regent—Prerequisites, Edition 01, 2011.

Competency	Weight/100
1. Establish work programs	5
2. Characterization of the biophysical and social environments	12
3. Identify on a technical basis, the impacts and potential impacts on the environment	11
4. Purpose, prevention, mitigation and/or compensation	11
5. Identify, describe and weigh indicators	11
6. Design a contingency plan	6
7. Apply international/national environmental legislation, as well as conventions and treaties	6
8. Apply the administrative and technical procedure of environmental licensing	5
9. Work in multidisciplinary teams	4
10. Interpret and analyze information generated by the equipment and instruments for measuring environmental variables	9
11. Apply knowledge of metrological confirmation in the field of competency	5
12. Analyze and synthesize	7
13. Write technical reports	6
14. Effective oral communication	3
TOTAL	**100**

Honduran Standards Organization (OHN) http://ohn.hondurascalidad.org/

Criteria for competency in environmental risk http://www.oitcinterfor.org/sites/default/files/riesgoambiental.pdf

The Honduran Accreditation Organization http://oha.hondurascalidad.org/

Las 117 Normas, Guías, Especificaciones Técnicas e Informes Técnicos vigentes publicados por el OHN http://ohn.hondurascalidad.org/119_normas_publicadas_2015-08-19.pdf

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