Environmental Impact Assessment as management tool for protected areas in Canada and Mexico

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Abstract. Environmental Impact Assessments (EIAs) were introduced into the environmental legislation of various countries starting in the early 1970s. Since then, they have been used in Canada to evaluate the potential impacts of development projects on protected areas' ecosystems. However, it was not until 1988 that EIA was introduced into the first Mexican Environmental Law. This paper analyzes the use of EIA, including the consideration of cumulative effects, as a tool for improving management of protected areas in Mexico. A comparison of the environmental regulations of Mexico and Canada suggests that the EIA process is less participative and proactive in Mexico than it is in Canada. It also highlights, among other aspects, the need to consider cumulative effects not only for large-scale projects (regional EIAs), as is now stated, but also for small-scale projects (particular EIAs). Eight EIA reports of projects affecting protected areas in Mexico were evaluated using a model developed by Mendoza, Spaling, and Ross for reviewing cumulative effects assessments reports for protected areas. The review showed that the Mexican reports evaluated only one phase of a major development. The reports did not provide information on items considered relevant, and provided a superficial analysis of the potential impacts of the project and their significance. The EIAs analyzed contained no evaluation of residual effects and mitigation measures focused on the direct impacts of the projects. The review of EIA reports exemplified a trend that was later confirmed through interviews of managers and staff of protected areas. Informants indicated that, although EIA is becoming a useful and effective tool to identify and mitigate environmental impacts, the reports are generally poor, especially in regard to the use of scientific information for determining the significance of impacts, the appropriateness of mitigation measures, and the usefulness of the reports in identifying park management needs. Managers indicated a need for assessing cumulative effects for all projects affecting protected areas.

INTRODUCTION

The Environmental Impact Assessment (EIA) was introduced into the environmental legislation of various countries in the early 1970s (Sadler 1996). Since that time, EIAs have been used in Canada as a management tool to evaluate projects with potential to impair the ecological integrity of national parks and other protected areas. In 1971-72, public opposition to proposals to upgrade and expand the roads in Rocky Mountain and other National Parks called for an assessment of such projects (Nelson 1978). Evidence that the most detrimental impacts resulted from the combination of minor individual effects deriving from multiple actions occurring over the long-tern, rather than from

direct major actions, demonstrated the need to identify and evaluate the significance of cumulative effects (CEQ 1999). The *Canadian Environmental Assessment Act* (CEA Act hereinafter, GC 2003) requires all EIA studies to consider cumulative effects (s. 16(1)). In compliance with the *Act* and with the policy commitment of the Federal Government to sustainable development, Parks Canada along with other government and non-governmental organizations have taken an additional step and have carried out cumulative effects assessments for protected areas (Mendoza et al. 2002).

EIA was introduced in Mexico in 1988, when the first Mexican Environmental Law (*Ley del Equilibrio Ecologico y Proteccion al Ambiente* or *LGEEPA*, SEMARNAT 2001, 2003) was passed by the Congress. *LGEEPA* was reviewed in 1996 and it has been amended in 2001 and 2003. This paper analyzes the use of the EIA as a management tool for protected areas and the treatment that cumulative effects receive both in applicable regulations and in the actual practice of environmental impact assessment (EIA) in Mexico. In this paper, the assessment of cumulative effects (CE) is considered as part of the EIA process, based on the *CEA Act* and on Duinker (1994), who refers to Cumulative Effects Assessment as "EIA done right." The *Canadian Environmental Assessment Act* (GC 2003) is taken as a reference point because of Canada's longer history in the use of EIA. The goal of this inter-state comparison is to determine if there are elements of EIA process, as it is followed in Canada, that could help to improve EIA practice in comparable situations in the protected areas of Mexico.

Three questions guide this research:

- What are the main similarities and differences between Canadian and Mexican legislation regarding EIA and cumulative effects (CE)?
- Are CEs considered in EIA reports?
- If there is need for improving EIA practice in Mexico for protected areas, what do managers think are the main problems and possible solutions?

METHODOLOGY

The methodology used to answer these questions integrates four data sources:
1) Document Review. The following acts, statutes and regulations that govern EIA practice and management of protected areas in Mexico and Canada were reviewed to answer what to determine the main similarities and differences regarding the application of EIA to protected areas:

- *Canadian Environmental Assessment Act* (GC 2003),
- *Canada National Parks Act* (GC 2000),
- *General Law of Ecological Equilibrium and Environmental Protection* (*Ley General del Equilibrio Ecológico y Protección al Ambiente*; *LGEEPA* hereinafter, SEMANAT, 2001, 2003),
- Regulations of the *LGEEPA in Matters of Environmental Impact* (EIA Regulations hereafter, *Reglamento de la LGEEPA en Materia de Impacto Ambiental*, SEMANAP, 2000b),
- *Regulations of the LGEEPA in Matters of Natural Protected Areas* (*Protected Area Regulations* hereinafter, *Reglamento de la LGEEPA en Materia de Areas Naturales Protegidas*, SEMANAP, 2000a).

2) Case studies. Following Yin (1994), four protected areas were selected as case studies for examination of EIA Reports and to interview managers and staff. The names

of key informants and of the protected areas are not disclosed to respect anonymity requests. The following criteria were used in the selection of protected areas:

- official recognition of the protected area as part of the national system of protected areas;
- relevance of the protected area for biodiversity conservation nationally and in North America;
- presence of populations of endangered migratory species shared by Canada and Mexico: Golden Eagle (*Aquila chrysaetosi*), Bald Eagle (*Haliaeetus leucocephalus*), Piping Plover (*Charadrius melodus*), Burrowing Owl (*Athene cunicularia*), Peregrin Falcon (*Falco peregrinus*), Sharp-shinned Hawk (*Accipiter striatus*), Cooper's Hawk (*Accipiter cooperi*), and Monarch Butterfly (*Danaus plexippus*);
- presence of a management team; and
- adoption of a working management plan.

The areas selected consisted of two Biosphere Reserves, one National Park, and one Wildlife Refuge.

3) Review of EIA reports

Eight EIA reports of projects taking place inside or adjacent to protected areas were compared with a model used in a previous study (Mendoza et al. 2002). The model has 61 items organized in three sections: (1) scoping, (2) study area and methods, and (3) management of environmental impacts. Each item is scored from 0 to 4 based on the quality of the treatment given to each element (0 means no treatment at all, while 4 indicates good qualitative or quantitative treatment, in the context of each item). The reports dated from 1992 to 2001 (Table 1).

Table 1. Environmental Impact Assessment Reports reviewed in this study. Names in parenthesis are used in Table 3)

Year	Purpose	Author or proponent
1992	Modification of a canal, Yucatán (Canal)	CINVESTAV
1994	Rehabilitation of a salt mine, Yucatán (Salt mine)	Industria Salinera de Yucatán
1997	Cupper Mining, Sonora (Metal Mining)	Minera Teck
1998	Valuation of a limestone mining deposit, Sonora (Limestone)	Americal
2000	Extraction of material for road construction, Sonora (Bank of Material)	ARL Construcciones
2000	Town expansion, Rio Lagartos, Yucatán. (Rio lagartos)	Consultores en Ecosistemas
2000	Construction of transmission towers, Sonora. (Phone tower)	Movitel del Noroeste

2001	Town expansion, San Felipe, Yucatán. (San Felipe)	Consultores en Ecosistemas

4) Key Informant interviews

Between November 2002 and November 2003, twelve key informant interviews (Punch 1998; Yin 1994) were conducted with managers and staff of the case studies and four more with directors of the National Commission on Natural Protected Areas (CONANP, Comisión Nacional de Areas Naturales Protegidas). Non-structured interviews were centred on environmental impact assessments and included related topics such as management, legislation, and barriers and driving forces to improve EIA. To respect anonymity requests, key informant identity is not disclosed. Throughout the document, the information provided by interviewees is referred to only as 'Informant'.

RESULTS AND DISCUSSION

I. Environmental law

This section summarizes the main similarities and differences between Canadian and Mexican legislation regarding the use of EIA and cumulative effects (CE) for protected areas management (Table 2).

Environmental Law. In Canada, the *Canadian Environmental Assessment Act* (GC 2003) regulates EIA. The Canadian Environmental Assessment Agency is the authority responsible for administering the EIA process and any other requirements or procedures that derive from the *CEA Act*. The *Canada National Parks Act* (GC 2000) regulates management of national parks In Mexico, the *LGEEPA* regulates both EIA and protected areas. *EIA Regulations* (SEMARNAP 2000b) and Protected Areas regulations (SEMARNAP 2000a) derive from the *LGEEPA*.

Definition of environmental impact. Environmental impact has different meanings in Canada and Mexico. Whereas, in Canada, its meaning is restricted to human-caused (anthropogenic) impacts on the environment (*CEA Act* s. 2). In Mexico, it includes both natural disturbances and human-caused impacts (*EIA Regulations*, Art. 3.19). The definition is more ample in Canada, since it also considers changes to socio-economic and cultural conditions and includes historic, archaeological, palaeontologic, or architectonic values.

Types of EIA studies. In Canada, the *CEA Act* recognizes two types of studies, screening and comprehensive (e.g. s. 16(1)). The inclusion, exclusion, and comprehensive study lists of the *Act* determine the requirement to conduct one or the other. The Canadian Environmental Assessment Agency has the ability to refer classes of projects to a class screening (s. 19(1)). In addition, the *Act* enables the Minister of the Environment to refer the EIA study of a project to a mediation or review panel, depending on factors such as its complexity or public concern (e.g. s. 14(b) & 29). In Mexico, the *LGEEPA* considers two types of assessments; particular, for small-scale projects, and regional for large-scale projects. SEMARNAT has prepared guidelines for regional and particular environmental assessments of various activities (SEMARNAT 2004). The projects that require a regional EIA are listed on Art. 11 of the *EIA Regulations*. Some activities may qualify for presenting a Preventive Report, instead of

a particular or regional EIA when they will take place in a region for which a zoning plan or activities for which official norms exist (Arts. 28, 31 *EIA Regulations*).

Cumulative Effects. The *CEA Act* requires all types of assessments to consider cumulative effects (s. 16(1)). By comparison, the *EIA Regulations* of the *LGEEPA* mention cumulative require assessment of cumulative effects only for regional EIAs (Art. 13).

Transboundary effects. The *CEA Act* indicates that a project may be referred to a mediation or review panel when, in the Minister's opinion, the project may cause significant impacts on other province(s) or state(s) when the project will be carried out outside Canada (ss. 10 & 46). Neither *LGEEPA's or the EIA Regulations* consider transboundary effects.

Precautionary principle. One of the purposes of the *CEA Act* is to ensure that projects do not cause significant impacts by enforcing consideration of the projects in a careful and precautionary manner (s. 4(1)(a)). This principle is not considered in the *LGEEPA* or its regulations.

Follow-up. Follow- up for the purposes of verifying the accuracy of Environmental Assessments and determining the effectiveness of mitigation measures is defined in the *CEA Act* (s. 2). It is specified as part of the EIA process (s. 14 (c)) and required for comprehensive studies (ss. 16(2)(c) & 53). Follow-up is not referred to in the *EIA Regulations or* under the *LGEEPA*.

Protected areas. The *CEA Act* (s. 48) enables the Minister to refer projects to a mediation or panel review when the projects may potentially have significant adverse environmental effects on parks. The same section requires consideration of the ecological integrity of those parks, as defined in the *Canada National Parks Act*, for determining the significance of impacts. It also indicates that the results of follow-up can be used for adaptive management (s. 38(5)). Similarly, the *Canada National Parks Act* indicates that maintenance or restoration of ecological integrity shall be the Minister's first priority when managing national parks (s. 8(2)). In Mexico, *EIA Regulations* under the *LGEEPA* specify the projects that require an EIA when they are carried out in protected areas, and the associated exceptions (Art. 5). *Protected Areas Regulations* indicate that the exploitation of natural resources inside protected areas will be authorized only when it brings benefits to the inhabitants of the reserves, when the use is sustainable and does not significantly affect the ecological equilibrium of the protected area's relevant ecosystems. The regulations require an environmental assessment for forestry, fishing, and mining use inside protected areas (Art. 81).

Public participation and access to information. Both the *CEA Act* (e.g. ss.4, 12.4, & 18) and *LGEEPA* (Title 5, chapters I, II, & VII) require the introduction of information about EIA reports under review into a public registry to allow for public input. Public participation in Canada is considered throughout the EIA process, and into the review stage of the study; this includes solicitation of normative input, such as comments on the elements that comprehensive studies should deal with. The mediation process and the review panel are two of the alternatives used to promote public participation on the EIA process. Public participation in Mexico does not include direct involvement in the review process, but consists mainly of the invitation to submit comments on the

EIA reports that are being reviewed by SEMARNAT. In controversial cases, SEMARNAT may set a one-day meeting to air publicly significant issues.

Table 2. Main similarities and differences on EIA between Mexico and Canada (Based on GC 2000, GC 2003, SEMARNAP 2000a, SEMARNAP 2000b, SEMARNAT 2001, 2003).

	Mexico	**Canada**
EIA		
Responsible authority for EIA	SEMARNAT	Canadian Environmental Assessment Agency
Regulations on EIA	*LGEEPA* *LGEEPA EIA Regulations*	*CEA Act*
Protected Areas		
Responsible authority	SEMARNAT	Parks Canada
Regulations	*LGEEPA Protected Areas Regulations on*	*Canada National Parks Act*
Enforcement authority	PROFEPA inspectors	Park wardens
Similarities and differences		
Definition of Environmental impact	Includes changes to the environment caused by the action of man or nature. Considers changes to ecosystems and risk to human health, but not changes on cultural heritage or socio-economic conditions.	Includes any change that a project may cause on the environment. Considers changes on the natural and cultural heritage and on socio-economic or cultural conditions and human health.
Types of EIA	Particular Regional Preventive report	Screening ComprehensiveClass screenings
Cumulative effects	Only mentioned for regional studies	Considered for all
Transboundary effects	Not considered	Considered, even for projects carried outside Canada by Canadian agencies
Follow-up	Part of EIA process	Not considered
Precautionary principle	No	Yes
Public involvement	After EIA has been submitted	Early in the process
Panel Review	Yes	No, only a 1-day public meeting
Mediation	Yes	Not considered
Public registry	Yes	Yes

II. Review of EIA reports

The review showed that the EIA reports reviewed did not include an analysis of cumulative effects. Only one report (Canal) mentioned that some impacts resulting from the project could be cumulative. However, it contained no further consideration of cumulative effects since neither the assessment of significance of impacts nor the mitigations measures dealt with those impacts.

Score of EIA reports reviewed

The maximum score that can be obtained in the adopted ranking scheme, if all items are covered in depth, was 128 points. All assessments scored very low, from 4 to 18 (see Table 3). The more developed sections of reports included project description, followed by the description of local environments. Clearly, one area not covered by the projects was the management of impacts. The reports including neither follow-up programs or their implementation. For purposes of comparison, the scores reported by Mendoza et al. (2002) for cumulative effects assessments carried out for Canadian protected areas ranged from 20 to 65.

Table 3. Scores of EIA reports.

	Phone towers	Bank of material	Canal	Rio Lagartos	St Felipe	Salt mine	Lime stone	Metal mining
Scoping	2	3	4	2	3	3	1	1
Study area and methods	2	3	5	4	3	5	0	0
Significance	2	2	1	0	1	0	0	0
Local and Regional context	4	3	2	4	5	4	0	1
Projects	5	5	6	3	4	4	2	2
Mitigation and Recommendations	2	2	0	2	2	0	0	0
Monitoring program	0	0	0	0	0	0	0	0
Implementation	0	0	0	0	0	0	0	0
Total score	17	18	18	15	18	16	3	4

In general, the reports displayed similar deficiencies on the three sections covered by the model. Below is a summary on a section-by-section basis.

Scoping

- Lack of description of scoping process;
- No setting of objectives or goals for biophysical, social, or economic components;
- With one exception, indicators or Valued Ecosystem Components were not identified.

Study area, methods, and significance of impacts

- The studies contained a brief description of park ecosystems.
- Boundaries of the study areas were not clearly defined.
- Analysis focused on the direct impacts likely to result from the projects.

- Seven studies evaluated only one phase of a major project development. The eighth study evaluated the expansion of an existing development and focused on that expansion.
- Only one study presented information on the state of indicators. However, the analysis did not evaluate how that state would be affected by the project. The analysis contained in the other studies was descriptive and not based on specific indicators.
- Information on methodologies was minimal. Two reports mentioned having used field surveys. Three reports specified the methods and criteria used for determining significant impacts: two reports used a list of impacts and a matrix; another used cause-effect linkages.
- None of the reports incorporated in their analysis past and present activities taking place locally or regionally. No information was provided on growth trends for human population or economic activities.
- None of the assessments provided predictions of the magnitude and/or extent of impacts.
- Discussion of project benefits to the local population was not supported by information on socio-economic trends or the state of the environment.
- Except in two cases, the location of proposed developments was not clearly defined; in two cases, it was inaccurate and ostensibly placed the project outside protected areas.

Management of environmental effects

- No information was provided on the management of impacts, except for the provision of mitigation measures.
- Mitigation measures focused on direct impacts and therefore did not address any of the potential cumulative effects either mentioned by the reports or which could be expected based on the information provided.
- Two of the projects provided tables relating the impacts to the mitigation measures. Nevertheless, the recommendations included actions that by themselves could cause additional impacts not addressed in the study. None of the reports assessed residual impacts.
- Four assessments made mention of stakeholders who could participate in the implementation of mitigation measures; however, this was treated superficially. In general, there was no identification of areas of responsibility for implementing mitigation measures and none of the studies provided suggestions for follow-up.

III. Interviews with Mexican managers

The informants (park managers and staff) agreed on the need for improving EIA practice in Mexico to make it more useful for protected areas management. In general, the informants considered that EIA and cumulative effects assessment are tools that can be very useful towards helping protected areas to achieve conservation goals. However, the current practice needs to deliver higher-quality reports. The informants considered that the legislation was sound in its intention but that it was not enforced properly.

The following paragraphs summarize what informants perceive as the main problems and possible solutions.

- **What are the main problems you perceive regarding the quality of EIA reports?**

The general consensus was that the quality of the EIA reports is poor. The main reason was that the assessments are not based on good or up-to-date scientific information and, further, that the people conducting the assessments do not have enough knowledge about the EIA process, the ecosystems, or the socio-economic context.

A second reason was that the analysis of impacts is often superficial and incomplete because relevant information about the project and the receiving environment is omitted. Three informants commented that some projects use inaccurate information, do not disclose information about the actual scope of the project, and that the reports may diminish the significance of potential impacts without proper analysis.

A third reason is that there is not enough coordination between consultants and park staff during the assessment. This may determine that the mitigation measures end up being not be feasible for the proponent or useful for the park. The reports usually focus on direct impacts to the biophysical environment and there is not proper evaluation of the potential impacts on human health or on socio-economic conditions. The reports do not consider cumulative or residual effects either through the analysis or the mitigation measures.

A fourth reason is that some proponents perceive EIA as merely paperwork and leave its completion to the end of the project design, when most decisions have already been taken, and other approvals granted or in process. Thus, the assessments may be done poorly just to meet the deadlines

- **What other factors may influence the efficiency of the EIA process?**

The first factor identified by informants was that parks do not have staff appropriately trained in EIA and available for conducting thorough reviews. Therefore, when a report is given to the park management for comments, staff may not be qualified and able to review it and to comment appropriately.

A second factor was the politics behind the review process. One informant whose previous position was as a reviewer of EIA reports indicated that, when measures were inadequate or non-existent, the staff would often be called upon to propose measures; however, it was left to upper-level authorities to decide which measures would be part of the final conditions for approvals. The other four informants commented that economic interests might still, in some cases, take precedent over environmental or human health concerns.

A third factor was the endorsement of projects before EIAs are conducted. There was a general perception that cases still occur where projects have already been approved. In those cases, EIA is used to deal with the major impacts that could be expected; cumulative effects and other potential impacts are not identified or considered. In other cases, EIA may be replaced by zoning plans, which are another class of instrument used to regulate land use but which are not directly intended to evaluate environmental impacts. The construction of a dam inside a national park, in north-east Mexico, was given as an example of the first case. A regional tourism development program in the Pacific and Baja coasts, known as Escalera nautica, was given as an example of the second case. The exploration phase of the proposed limestone-mining project evaluated in one of the reports reviewed had approval to

proceed from authorities outside SEMARNAT, even when there was controversy about the actual location of the project and the resulting impacts.

- **How useful have the assessments been for park management purposes?**

Informants agreed on EIA being consolidated as a management tool and aid for decision-making although there was room for improvement. Four informants indicated that the assessments were not useful for parks because of their poor quality and inadequacy, or total lack, of recommendations. Despite that, informants considered that EIAs were helpful for identifying controversies and potential impacts that should be addressed. Two informants mentioned that regional EIAs should automatically be required for projects affecting protected areas. This form of EIA has a great potential to preserve protected areas since is the only one requiring assessing cumulative effects. However, this would require amending the law to pay more attention to cumulative effects; another way of reaching this goal could be making the process more proactive.

Informants considered that EIA could be more useful for park management if there were more collaboration between proponents, consultants, and park staff from the early stages of the process.

- **What role do you think assessing cumulative effects may have for improving park management?**

Informants indicated that there have not been evaluations of cumulative effects for parks, and that doing it would be very helpful for identifying and mitigating the factors contributing to the degradation of park ecosystems and ecological processes. In their opinion, there is insufficient knowledge of cumulative effects and methods to assess them and these effects are not properly addressed by current legislation and practice. This could be in part because thresholds or limits of acceptable change are not known, and in part because applications are often submitted for individual works and not for entire projects. This piece-by-piece approach evade the need for regional assessments.

One agency staff member mentioned that they would like to use the precautionary principle when deciding on how many applications for a single activity, such as tourism, may be granted without affecting the capacity of the ecosystems, but this principle is not considered in the law. Three informants mentioned that there are gaps in existing regulations, which contributes to leaving cumulative effects unattended. These gaps may arise in the form of activities for which no regulations have been created, or in the form of discrepancies among different laws and procedures that diminish the effectiveness of inter-agency coordination.

- **How have EIA been used for assessing a park's own operations?**

Informants indicated that, in general, EIAs are not formally done for internally-generated projects. The legislation requires an EIA for works or activities taking place inside protected areas. However, protected areas do not have the staff or resources to carry out EIA for works or activities needed for the park operations. One informant mentioned that, during the planning process for a work or activity, staff discusses the design and tries to incorporate mitigation measures. Another informant indicated that two EIAs were conducted for two activities necessary to achieve long-term goals stated on the management plan. However, the proponents were the municipalities involved and not the park. In general, there is not a distinct assessment of the

environmental impacts associated to the design and implementation of projects undertaken by park authorities, such as facilities or conservation works.

- **What do you think is needed to make EIA more effective for park management?**

Seven aspects were identified by informants as critical to improving EIA effectiveness in Mexico.

- Ensure that EIA reports based their analysis on up-to-date scientific information about the park, its ecosystems, and its area of influence. Although this is implied, informants reported that the information used on EIS may be very poor and outdated.
- Require more collaboration with park staff from the beginning of the EIA process, and from the design phase of the project if applicable. This could help to strengthen project design and mitigation measures, based on park staff's knowledge about the park's ecosystems, which may be more extensive than the knowledge of those carrying out the assessments.
- Address the discrepancies between the *LGEEPA* and other laws that regulate economic activities generating impacts on protected areas. For instance, Amendments to *LGEEPA* in 2003 eliminated the requirement of EIAs for forest plantations. One informant considered that this could have future implications for protected areas. Another informant indicated that the *Mining Law* [AMD: give proper name if possible & italicize it]has not been reviewed since decades and that, as it is now, land claims take precedence over other uses such as conservation.
- Promote changes on the *LGEEPA* and regulations to require a greater consideration of cumulative effects. Most of the applications are for particular EIAs, which do not require analysis of cumulative effects.
- Relate the mitigation measures to the goals of the park's management plans. For instance, after the EIA for the salt-mine, the park engaged in water quality monitoring as recommended. However, indicators were not linked to the park's management objectives; therefore, the results of monitoring do not address the information needs of park management.
- Provide training for park staff on EIA so they are able to provide better recommendations on the rejection or approval of projects or on the adequacy of the mitigation measures.
- Make enforcement more efficient. Currently, enforcement of the environmental regulations is the responsibility of the Environmental Prosecutor Agency PROFEPA, which is part of SEMARNAT. However, there are very few inspectors per region of the country and park staff do not have direct authority to inspect the implementation of mitigation measures. In addition, the prosecution process is complex, it involves different departments within the SEMARNAT, and is very slow because of chronic staff shortages. The offenders are charged only in a few cases and the damage is not repaired.

IV. Improving EIA outcomes and their effectiveness for achieving protected areas' management goals.

Three major concerns arose form the perspective of cumulative effects (CE). First, CEs were not evaluated at all in the reports reviewed. Even when the reports provided information that suggested the possibility of CE, the discussion about the

expected impacts focused on the evident direct impacts to the physical environment that would result from selected activities. The assessments did not evaluate to what extent the social and environmental components would be affected or what indirect effects could result from the activities.

Secondly, proponents are submitting EIA reports on a piecemeal basis. To the knowledge of the interviewees, in none of the cases have the proponents presented additional EIAs for the other phases or works that would be related to the projects. For instance, the reports for the delimitation of municipal lands (St. Felipe and Rio Lagartos) evaluated only the landfill and vegetation removal needed for the change in land use; they did not evaluate the projects for urban development that would be carried out in those lands. The report for a mining project (Metal mining) did not mention at all the kind of mineral the exploration was for and the report located the project outside the protected area when, in fact, it was inside it, according to park staff. In this case, the exploration would be exempted from EIA if the works were to take place outside a protected area.

Third, there was not analysis of residual impacts. Besides the failure of mitigation measures to address cumulative effects, the measures had the potential to cause additional impacts not addressed by the studies. For instance, two studies suggested using plastics and non-biodegradable materials for leveling lands. The reports did not address how that would affect water quality and supply for the local people since drinking water comes form shallow underground aquifers replenished by infiltration through the karst.

This research highlights two additional concerns. The first one is that no Valued Ecosystem Components or indicators were used for the analyses, and the determination of significance was not supported by scientific information on the state of the environmental or socio-economic conditions, or information on future trends. Three of the reports mentioned wildlife species that could be affected by the proposed activities. From these, only one (Salt Mine) provided information on the status of specific biophysical and socioeconomic components. However, it did not estimate what influence the project would have on specific indicators associated with these components.

The second concern identified by this research is the risk of over-simplifying the EIA process. It was observed that all assessments followed a pre-determined format. SEMARNAT has been preparing guides for assessing groups of activities through regional or particular EIAs (SEMARNAT 2004); this is to ensure that the EIA reports cover the elements necessary to evaluate the projects. However, despite covering the items that were applicable according to SEMARNAT guidelines, the reports' assessment of environmental impacts was superficial and incomplete. Similarly, the mitigation measures were not appropriate for managing the resulting environmental impacts, both from the point of view of the researcher and of the informants. The only question addressed in the formats used for the reports in relation to protected areas was if the project was inside or near a protected area. The formats did not have items related to interactions of the project with other local or regional activities. This calls for further analysis of whether the elements of the existing guidelines are appropriate for dealing with the various environmental impacts that protected areas are receiving.

CONCLUSION AND RECOMMENDATIONS

Although EIA has been used as an aid when making decisions about projects that may have significant negative effects on protected areas, both the practice and the regulations guiding that practice in Mexico could stand significant improvements. A comparison of the environmental regulations between Mexico and Canada suggests that the EIA process is less participative and proactive in Mexico than in Canada. This is mainly because the *LGEEPA* and the *EIA Regulations* do not have mechanisms that allow for public input early in the process, such as commenting on the terms of reference for EIA studies to be done in relation to projects. Public participation in Mexico takes place after the EIA report has entered into the public registry and is under revision by SEMARNAT. In addition, although the Mexican legislation specifies EIA as an instrument to promote sustainable development and environmental protection, it does not consider the precautionary principle or emphasizes ecological integrity when deciding on projects affecting protected areas, as it is done in Canada.

This review of EIA Reports, although based on a small sample, showed that EIA reports are not addressing cumulative effects even when the information provided about the projects suggests that they might occur. The low score that EIA reports received reflects the fact that they did not provide information on items considered relevant, and that analysis of the potential impacts of the project and their significance was superficial. The scores also reflect a lack of evaluation of residual effects and the focus of mitigation measures on direct impacts.

The review of EIA reports showed a trend that was later confirmed by Mexican managers and staff of protected areas. They indicated that, although EIA is becoming a helpful tool to identify and mitigate environmental impacts, the reports are generally of poor quality, especially in regards to the use of scientific information for determining the significance of impacts, the appropriateness of mitigation measures, and the usefulness of the reports for park management needs.

A major concern for Informants was that cumulative effects are not evaluated and the current legislation only requires their evaluation for regional EIAs. Informants indicated a need to assess cumulative effects for all projects affecting protected areas.

<u>Recommendations</u>

The following is a summary of actions that could strengthen the role of EIA in the interest of improving management of protected areas in Mexico (Figure 1).

- Provide park staff with training in conducting and reviewing EIAs.
- Enhance the treatment of cumulative effects on the *LGEEPA* and *EIA Regulations*: require them for both types of assessments.
- Make the process more proactive. Incorporate involvement of park staff and public participation early in the process.
- Incorporate the precautionary principle into environmental legislation and policy.
- Require an EIA for entire projects and not for individual phases.
- Include the requirement for a follow-up program with clear roles and responsibilities to conduct it in *EIA Regulations, Protected Area Regulations,* and *LGEEPA*.

- Make enforcement more efficient by empowering park staff to supervise the implementation of mitigation measures and follow-up programs, and to sanction offenders if required.
- Create a system to assess CE at local and regional levels by integrating information from individual EIAs.
- Conduct a gap analysis to determine areas not properly covered yet by official norms or EIA regulations.

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Figure 1. Summary of recommendations to improve the usefulness of EIA for protected areas management.