

# Environmental Impact Assessment in Mexico and Canada: Comparative Analysis at National and Regional Levels of Federal District and Quebec

Maria Perevochtchikova<sup>1</sup>, Pierre André<sup>2</sup>

<sup>1</sup>El Colegio de México, México, DF

<sup>2</sup>Université de Montréal, Quebec, Canada

<sup>1</sup>mperevochtchikova@colmex.mx; <sup>2</sup>pierre.andre@umontreal.ca

**Abstract** - In this work we perform the revision of the Environmental Impact Assessment (EIA) process in Mexico and Canada based on the comparative analysis at national and regional levels of federal District and Quebec with the objective of contributing to improvement of this environmental public policy instrument directed to implementation of the principles of sustainable development in environmental protection. As was observed, Canada has much experience and important advances in this topic, and Mexico that has several methodological, legal and practical problems, could follow the example of Canada and use this knowledge to reflect about the challenges of the EIA.

**Keywords** - *Environmental Impact Assessment; Mexico; Canada; Comparative Analysis*

## I. INTRODUCTION

The environmental impact (EI) in the contemporary world was recognized since 1960 [1] in relation to population growth that has been accompanied by changes of land use, urban expansion and consecutively ecosystem deterioration. In Mexico it is predicted that about 53% of the population would be concentrated in 35 big cities of 500 thousand inhabitants by the year 2030, such as Mexico City, Guadalajara, Monterrey and Puebla, causing even stronger pressure and modifications on natural resources inside and in adjacent territories of the cities [2, 3].

So the environmental impact (EI) is understood as the effect that happened in determined space and time, and that manifests in the form of variation, alteration, modification or change in the environment of one or several of its components [4, 5]. The EI has three main recognized dimensions: (I) the magnitude (the change *per se* in quantity terms); (II) the importance (the judgment of experts in the matter about the relevance of such changes); and (III) the significance (the value attributed by the society to this alteration). In virtue of the complexity of the concept, it is necessary to consider diverse factors and relations of multiple participants in its evaluation, in integral and systemic form [6, 7]. For the evaluation of the deterioration process produced by carrying out different human activities and in order to mitigate their negative effects, thus responding to sustainable development goals, the *Environment Impact Assessment* (EIA) procedure has been designed [8-10].

The first political initiative of incorporation of EIA procedure was reflected in the National Environmental Policy Act emerged in the USA in 1970; it was followed in the same decade by countries, such as Canada, Australia, France, Sweden and New Zealand, etc. [11]. But, the real world-wide recognition of the EIA was until 1992 when the United Nations (UN) Conference on Environment and Development declared the necessity of including this evaluation for the preservation of planet natural resources [12]. With other international events, such as the UN Convention on Biological Diversity, the UN Convention on the Law of the Seas, the Convention on Transboundary EIA, the Convention on Wetlands, the UN Framework Convention on Climate Change, the Convention on Access to Information, etc. [9], nowadays 191 countries of the United Nations have incorporated formally the EIA procedure within their policies [10, 13].

In Mexico, the Environmental Assessment (EA) process was strongly influenced by international policies. Particularly, the government of Mexico has signed and now forms part of the Stockholm Declaration, the Rio Declaration and the North America Free Trade Agreement [14, 15]. But despite these advances, the national EA process is still in development [16, 17] with multiple methodological, legal and practical limitations [18].

As Sadler mentions [19], the EIA could be described as one of the most successful policy innovations of the 20<sup>th</sup> century responding to the demands of a changing world. As any political instrument, it requires the implementation of a learning process, "evaluating practice to improve performance". In this sense we consider that one of the ways to contribute to such improvement is to compare the Mexican EA practice with experiences of other countries, particularly those which have succeeded in this area. The federal states seem a more appropriate scale for such comparison because it must lead up to sustainable development best practices [20].

In this way the present work aims to review the EIA process in Mexico based on the comparative analysis with the case of Canada that has held up 40 years of experience and learning. For this it was proceeded to look into national and federated state and province levels, detect the differences and similarities between these processes and determine the future challenges for Mexico.

## II. THEORETICAL FRAME

EIA is defined as a process by means of which the alterations caused by the development of diverse anthropogenic activities are possible to detect and measure [21]. With almost 40 years of experience at the international level, EIA has become a key juridical, technical, scientific, administrative and political tool that helps to identify, predict, evaluate and quantify the environmental effects that a human activity potentially can produce; it includes prevention, correction and mitigation stages of the identified impacts [8, 9, 22]. This multipurpose process has recognized two main objectives: (I) to provide the authorities with the efficient and sufficient information about the effects of each project, in order to evaluate the options about its development and execution; and (II) to recommend solutions and mitigation measures within sustainability vision, in economic, social and environmental terms [6, 10, 23-25].

In general terms, the EIA takes place under formal legal and institutional arrangements for authorization of projects proposals, and establishment of terms or specific conditions for its implementation. It is applied in accordance with requirements and the available information for decision making; depending on jurisdictional arguments, the EA process may be advisory or regulatory, presenting a balance among the different factors and interests for sustainable development [7]. The EIA process *per se* is divided into three major stages [19]:

- ✓ Preliminary assessment (*screening* to establish whether the EIA is required; *scoping* to identify the key issues and impacts)
- ✓ Detailed assessment (*impact analysis*, *mitigation* to specify measures to prevent, minimize and offset environmental modifications; *reporting* the results; *report review*; and *decision making* to approve or disapprove a proposal)
- ✓ Follow-up to decision making (*monitoring* to check actions compiled within terms and conditions; *management* to address unforeseen events; *audit or evaluation* of results, learn from experience and improve the EA process).

These EIA basic steps are identified in laws, regulations, procedures and guidelines of each country, adapted to their specificities. The EIA practice had to be built on practitioner's core values of integrity, utility and sustainability that have become guiding and operational principles for the best EIA practice [8, 9].

The diffusion of the EIA innovation around the world since 1970 was spectacular. It is now a prerequisite to project authorizations in over 80 % of the countries of the world, and in all the multi- and bilateral donors. The scientific literature on this topic is currently impressive and reflects the diversification of interests as well as the evolution of the Environmental Assessment (EA) process and is nowadays state of the art. For example, it is necessary to mention the Environmental Impact Assessment [10, 26, 27], Social EA [25], Health EA [10], the Strategic EA [28, 29] and the Sustainability Assessment [24, 30].

The EA system review shows a diversity of ways and techniques applied in this decision making mechanism; that was marked in its development by: I) the establishment of EIA process in many developing and in transition countries; II) the adaptation of innovations in laws, methods and procedures; III) the emerging in some development nations of a second-generation of EIA, called the Strategic EA linked to integrated national planning and decision making process (see Fig. 1); and finally, IV) the introduction of the concept of effectiveness<sup>1</sup> of the EA [19].

As it can be observed in Fig. 1 the separate projects of the EIA at municipal level and of community interests (based on environmental regulatory instruments, specific in each particular case) are encompassed by ecosystem approaches in integrative form (sustainability orientated) to Strategic EA lines that respond to goals of territorial planning and programming at national level. In this form, on a higher level of action, the EA is considered as part of policy making decisions that include International Trade Agreements signings and combinations of socio-political processes depending on instrumental frameworks and cultural orientation in place [19:28-30].

On the other hand it is necessary to highlight that the EIA in general presents several political and practical limitations, as influenced by concrete development government decisions, with no consideration of interests of involved actors, bureaucratic problems, no interest by the decision-makers and their professional incompetence, lack of active participation of society, lack

---

<sup>1</sup> The topic of the EA Effectiveness includes ten themes, sub-divided in four blocks [19:9-10]:

- A) Foundations
  - 1. Guiding values and principles
- B) New dimensions
  - 2. Application of sustainability concepts
  - 3. Strategic EA
  - 4. Cumulative and large-scale effects
- C) EIA process strengthening
  - 5. Relationship to decision making
  - 6. Integrated approaches to impact analysis
  - 7. Public participation and dispute settlement
  - 8. Follow-up and post-project analysis
  - 9. Total process management
- D) Capacity Building
  - 10. Capacity building, with particular references to developing countries.

of transparency and the needs of international researches in such matter [6:661-662]. Bond and Pope [31:4] added the following points to these: poor consideration of cumulative effect, inefficiency of the human resources for adequate realization of the evaluation process, poor consideration of alternatives, and many faults on the dialogue between involved sectors.

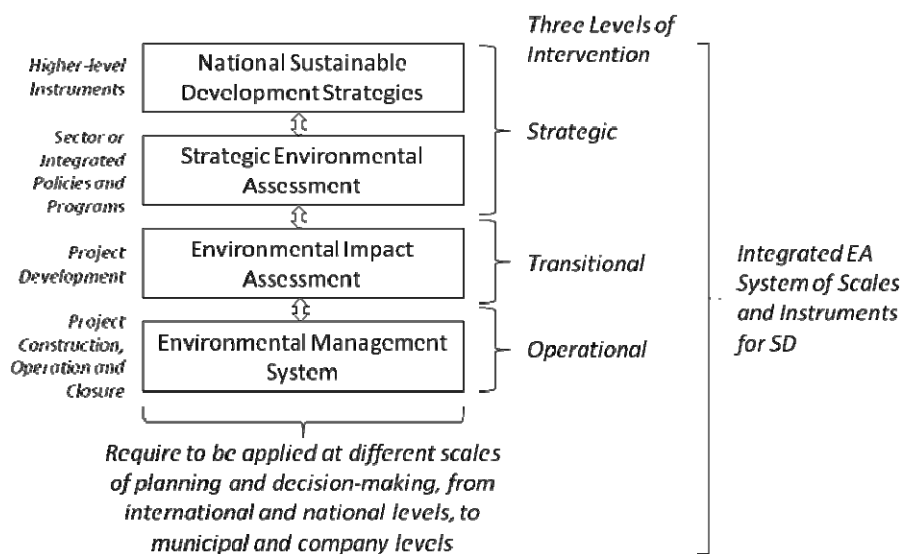


Fig. 1 Integrated Environmental Assessment (Source: inspired on [19:25])

But it is also important to mention the methodological problems, reflected in the differences in the used approaches, theoretical perspective and diversity of contexts and resources available for the EIA. Particularly, the special interest is taken about the inequity in quality and quantity of used information and due to this, common faults of communication [31]. All these problems are very common for Mexico, where the methodological problem is dragged to the application process and it is necessary to compare this case with other perspectives and international experiences for understanding the problems and determining the challenges [18].

### III. METHODOLOGY

It was proposed to apply the technique of the comparative analysis of the EIA process to understand the situation in Mexico based on the experience of Canada; that may contribute to improving the Mexican practice.

There are already some papers available at the international level which deal with the EIA processes in diverse countries. For example, Chacare *et al.* [32] have compared the Venezuelan EIA procedure with other States in North America (USA and Canada), different countries of Latin America (including Mexico) and Western Europe. The criteria for comparison were technical-administrative (referred to the projects) and ecological (referred to significance of impacts). Franca *et al.* [33] have compared the EIA procedure of electricity generation in Brazil and Canada, focusing on the renewable sources and EA tool for its protection. They used the energetic matrix as a comparative tool and review methodology with official data sources.

Barone [34] has looked into the EIA process in Argentina and Brazil. He focused on the search for similarities and differences between both cases based on the following criteria: participants (academic, society and authorities) and process aspects (legislation, juridical, communication and organization). Gao [35] studied the experience in Strategic EA in two European countries (Denmark and the United Kingdom) and China. This comparison included the legal requirements for EA, technical aspects and political perspective. Astorga [36] has compared the EIA systems in seven countries of Central America (Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Salvador and Panama) looking at their role as a tool for sustainable development. He used the consulting methodology with legal, institutional and social participation reviews aspects and the principal objective consisting on the comparison.

It is very important to consider the difference of developing country criteria, the same regional scale of interaction and the signing of the North American Free Trade Agreement (NAFTA) that influenced the EIA process in Mexico. For better learning of these EIA processes and to identify the convergences and divergences between cases, it was decided to incorporate the analysis at national and regional scales (state in Mexico and provincial in Canada) by common criteria that included: a) the general characteristics; b) the legal and institutional frame; and c) the EIA process (in reference to projects, process, techniques and used dates). As the study cases the Federal District and Quebec that have special status at national levels in economic and political means and certain autonomous in the EIA process, were selected.

In order to carry out the investigation we based this on: a) the document investigation of diverse sources of information, as environmental impact statements, official published statistics, other scientific publications and official cartography in printed and digital format on worldwide, regional, national and state levels); and b) the fieldwork involving interviews with key actors and technical visits of construction sites [18].

## IV. RESULTS

## A. General Characteristics of Study Cases

Mexico is a federation of 31 states and the Federal District. All states as federal entities have their jurisdictions aligned with the Federal Government indications and based on the Constitution<sup>2</sup>. The country counts with 2,000,000 km<sup>2</sup> of territory; and in the past five decades, it has experimented exponential increment of cities' population and expansion of urban areas that produced the environmental degradation due to land-use changes and over exploitation of natural resources.

Canada is a confederation of 10 provinces and three territories<sup>3</sup>. Its Constitution mentions the share of responsibilities between each level of government. Environmental protection, which was not a concern in 1867, is of shared responsibility between the federal and the provincial levels. The federal State and the federated States, such as the Province of Quebec, have adopted their own laws and regulations on this specific issue, and there is no obligation for the provinces to comply with the federal legislation. To reduce possible duplications and costs, and to improve coherence, these entities have ratified cooperation agreements.

As it is possible to observe these are two very different countries, but with some political aspects that can be compatible in order to consider these countries for a comparative analysis, in addition to both being members of the NAFTA (see Table 1).

TABLE I GENERAL CHARACTERISTIC OF MEXICO AND CANADA

Characteristics <sup>4</sup>	Mexico	Canada
Inhabitants, Million	112.34	34.12
Surface, Million of km <sup>2</sup>	1.96	9.97
Population density, inhabitants per km <sup>2</sup>	57	3.4
Growth rate, %	1.4	5.4
Political regime	Federation	Federation
Number of Federal entities	31 State and the FD	10 Provinces and 3 territories
Water resource, Surface on thousand km <sup>2</sup>	20.43	891.16
Vegetation coverage, Million ha (% of national territory)	128.04 (65.4%)	397.3 (54%)

Source: [37, based on 2, 38-40].

The Federal District (FD), the capital of Mexico, has grown since the middle of the last century to the grade that at the moment it forms part of the Mexico City Metropolitan Area (MCMA), consolidating itself as a member of the 20 most important megacities of the world, one of the four located in Latin America. It is constituted by 16 delegations and 60 municipalities, of the State of Mexico and Hidalgo. The territorial extension of the MCMA is approximately of 4,900 km<sup>2</sup> (0.3% of the national territory) and the population of 23 million (20% of the total of the country) [41].

As natural space, the MCMA occupies the whole south part of the Valley of Mexico that is a closed watershed with a surface of 9,600 km<sup>2</sup> and average altitude of 2,240 meters above sea level, surrounded by big mountains in its southwest, south and southeast parts. On the other hand, the territory of the FD consists of 59% of Conservation Land, which accounts about 87,310 ha with natural vegetation and distributed at the south; and another 41% (61,458 ha) considered as urban territory. Mexico City concentrates the political and economic power of the country; with 32% of the Gross Internal Product generated [2] and where the federal, state and local level institutions are located. The situation, altogether with the population increase, has given rise to the process of urban expansion towards the periphery of the city that has transformed the landscape and interferes in the basin's natural regime.

The Province of Quebec is located on the East side of the country and crossed by the St. Lawrence River. It is divided into 14 administrative regions. Amongst the 1135 local municipalities of Quebec<sup>4</sup>, 10 cities hold a population over 100,000 people where 48% of the 7,979,782 inhabitants live (2012). Montreal is the only city with more than 520,000 people with 1,701,782. The *Communauté Métropolitaine de Montréal* (CMM<sup>5</sup>) is a supra-municipal entity of 82 cities covering 4,304 km<sup>2</sup> (0.26% of the provincial territory, and 0.04% of Canada). With more than 3,772,850 inhabitants, it represents the second biggest

2 Political Constitution of the United Mexican States is published in the Official Journal of the Federation on February 5, 1917 with the text of last publication from reform DOF 25-06-2012 available on the web page: <http://www.diputados.gob.mx/LeyesBiblio/pdf/1.pdf> (accessed 30 of July, 2012).

3 The Constitution of Canada is available on the web page: <http://laws-lois.justice.gc.ca/eng/Const/> (accessed 30 of July, 2012).

4 Gouvernement du Québec; L'organisation municipale et régionale au Québec en 2012. Ministère des Affaires municipales, des Régions et de l'Occupation du territoire ([www.mamrot.gouv.qc.ca/pub/organisation\\_municipale/organisation\\_territoriale/organisation\\_municipale.pdf](http://www.mamrot.gouv.qc.ca/pub/organisation_municipale/organisation_territoriale/organisation_municipale.pdf)) (accessed 25 of August, 2012).

5 <http://cmm.qc.ca/home/> (accessed 25 of August, 2012).

metropolitan Canadian area after Toronto (5,838,800 inhabitants)<sup>6</sup>. In 2010, the real GDP of Canada was 3.2%<sup>7</sup> while it was 2.5% for Quebec.

As natural space, the territory is divided into three large sections: the Canadian Shield which covers about 95% of the Quebec area, the St. Lawrence Valley and the Appalachian Mountains which share the remaining 5%. About 80% of the population is located within the St. Lawrence Valley<sup>8</sup>. The St. Lawrence River on which the Island (and the City) of Montreal stands, is the 14<sup>th</sup> most important river in the world. Fed by the Great Lakes and draining about 1,030,000 km<sup>2</sup>, it flows on 1,200 km<sup>9</sup>.

In this way it is possible to mention as convergences the political regimen of the countries, the environmental impact produced by change of land use (in majority due to high urbanization process), and the EIA procedures included in the political process of both countries at national and state or provincial levels. There are the following divergences as the surface of national and state territory, the number of inhabitants, the growth rate, the water and vegetation resources, the time of experience in the EIA process as a legal instrument.

### *B. Legal and Institutional Frames for the EIA*

The adoption of the EIA process in Mexico was influenced by some international events and even more by the North American Free Trade Agreement (NAFTA) signed between Canada, Mexico and the United States of America (USA) in 1992 [15, 19:174]; in simultaneous form with the Rio Summit. It was first a trade agreement to undergo environmental review, which determined the responsibility of each country for undertaking its own assessment. As a result it catalyzed a parallel process of cooperation in environmental matter in the three countries and the establishment of important precedents for assessment of trade agreements, and for the EIA in Mexico.

The Mexican EIA process has been related to the evolution and changes of the environmental legislation and institutions. Particularly, it is possible to detect three stages in this process: (I) under hygienist approach (1970's), when the Law of the Prevention and the Control of Environmental Contamination, and the Law of the Environment Protection were created; (II) with urban topic (1980's), due to the foundation of Secretary of Urban Development and Ecology, and presented the Federal Law of the Environment Protection 1982; and (III) evolution to the integral aims (1990's), with presentation of General Law of Ecological Equilibrium and the Environment Protection 1988 (LGEEPA in Spanish abbreviation), and foundation of different environmental institutions, including the National Council of Environment and Natural Resources (SEMARNAT), the National Ecology Institute (INE), etc. [14, 16, 17]. Finally in 2000 the new regulations for application of the LGEEPA were approved [42] as an integral form of the EIA system [15]. During this period, diverse policy instruments of environmental protection were created, such as ecology planning, ordering and regulation, EIA ecological investigation and education.

Due to the influence of the creation at federal level of the General Direction of Environmental Impact and Risk in 2003 [43], it was pronounced at local level in 2007 the incorporation of the General Direction of Environmental Regulation (GDER) within the structure of Secretary of Environment of Federal District Government [44:11-12]. One of the new substructures that composed this institutional scheme has been the Direction of the Environmental Impact Assessment (DEIA) and its sub-direction of evaluation (SDE); based on the juridical-administrative frame formed by the Mexican Constitution, the FD Government Statute and some federal and local laws, codes, regulations and norms [44-46].

In this way the SDE of the DEIA has acquired the functions to emit the resolutions in the matter of EIA and to follow up their fulfillment [45]. This department is subdivided in three units in virtue of profile of the analyzed construction works and other activities: directive unit (DU) of Industry and Services; DU of Housing Development; and DU of Projects on Conservation Land [46:51-52]. For each case of application for authorization the DU's open special folders where gather all information of following process, but it is in majority confidential [18, 50].

After NEPA of USA, the EIA was formally introduced in Canada in 1973 by the federal Environmental Assessment and Review Process (EARP). These guidelines were modified in 1978 and a decree was adopted in 1984. In 1992, the Canadian Environmental Assessment Act<sup>10</sup> was proclaimed and came into force in 1995 as a law that replaced EARP with the objective of strengthening EIA in Canada, entrenching requirements and procedures that were formerly administered under a Guidelines Order. The CEAA was modified after review in 2001, and more recently in 2012.

6 [www.statcan.gc.ca/tables-tableaux/sum-som/102/cst01/demo05a-fra.htm](http://www.statcan.gc.ca/tables-tableaux/sum-som/102/cst01/demo05a-fra.htm), (accessed 25 of August, 2012).

7 [www.statcan.gc.ca/pub/13-016-x/13-016-x2011001-eng.htm](http://www.statcan.gc.ca/pub/13-016-x/13-016-x2011001-eng.htm) (accessed 25 of August, 2012).

8 [www.quebec-guidetouristique.travel/geography.aspx](http://www.quebec-guidetouristique.travel/geography.aspx) (accessed 25 of August, 2012).

9 [www.greatcanadianrivers.com/rivers/stlawer/stlawer-home.html](http://www.greatcanadianrivers.com/rivers/stlawer/stlawer-home.html) (accessed 25 of August, 2012).

10 It had the following purposes to [19:15]:

- Ensure that the environmental effects receive careful consideration before responsible authorities take actions in connection with them
- Encourage responsible authorities to take actions that promote sustainable development and thereby achieve or maintain a healthy environment and healthy economy
- Ensure the projects that are to be carried out in Canada or federal lands do not cause significant adverse environmental effects outside the jurisdictions in which the projects are carried out
- Ensure that there is an opportunity for public participation in the environmental assessment process.

After NAFTA, Canada's review took place under federal process for policy and program assessment [47]. "... Of particular note, are the addition of mediation as a means of public review of projects with potentially significant impacts, the provisions for public scrutiny and consultation at the self assessment stage of the process, and establishment of a public registry of all screening and comprehensive studies"; and finally in 2006 it was approved by the Federal Sustainable Development Act 2008<sup>11</sup>.

The EIA is required under the law of the provinces and territories and under various land claim agreements in Canada's northern regions in virtue of their specific jurisdictions [48]. At federal level all agencies submitting policy for Cabinet decision are required to assess and document their potential environmental effects, which are compiled into the "blue book", drafted the Federal Environmental Assessment Review Office [19:144]. As a result there are 75% of the EIA cases submitted to the Cabinet that do not require an EIA.

Quebec is responsible, totally or partially, for the EA on its territory. Indeed, its territory may be divided into two main areas with different EIA legislations: the Southern Quebec where Montreal and most of the population is located, and Northern Quebec where there is a very low residential density mainly in Cree, Inuit and Naskapi communities<sup>12</sup>. Within the Quebec Environmental Quality Act, chapter 1 concerns the Southern part while chapter 2 is related to the Northern context. These laws are the relevant EA regulations which are autonomous and do not subordinate to the CEAA [7:76-81]. However the Federal Government applied its laws on the federal land of Quebec on projects such as airports, waterways, national parks, military bases and Indian reserves. The Governments of Canada and Quebec ratified in 2004 a cooperative agreement which has been renewed in 2010. For the purpose of this paper, we will discuss the Southern context.

The EIA process in Southern Quebec is rooted in the Environmental Quality Act adopted in 1972. According to its article 22, any project with environmental impacts requests an authorization delivered by the Minister of the Environment. The modifications of 1978 have introduced explicitly EIA for those projects with significant impacts; they also have created two institutions: the Ministry of the Environment and Environmental Public Hearing Board (Bureau d'Audiences Publiques sur l'Environnement, BAPE). The EIA regulation, in force since 1980, identifies the project submitted to the EIA process and details the procedure to be followed.

Nowadays, the EIA of Quebec is considered as a systemic and integrated procedure<sup>13</sup> that has a multilateral perspective as well as a democratic instrument with socio-political orientation represented by public hearings and mediations of the Quebec BAPE [19:26]. The legal and institutional frameworks of both study cases are summarized on Table 2.

TABLE II LEGAL AND INSTITUTIONAL FRAMEWORKS OF MEXICO AND CANADA

Characteristics	Federal District, Mexico	Quebec, Canada
Laws	LGEEPA at national level Environmental Law of FD at local level	Canadian Environmental Assessment Act and Federal Sustainable Development Act at national level Environmental Quality Act and Sustainable Development Act at provincial level
Institutions	SEMARNAT at national level SMA-GDF at FD level, with 3 Directive Units	Canadian Environmental Assessment Agency at national level Ministry of the Environment and BAPE in Southern Quebec Multi institutions created by the James Bay and Northern Quebec Agreement in Northern Quebec
Mechanism of regulation communication	Diario de la Federación Gaceta Ecológica	Gazette du Canada Gazette officielle du Québec
Norms for EIA	Exist, but no on all themes and only for Presser criteria	Exist at legal level
Public consultation in the EIA process	Exist on paper, not in practice	Public consultation (BAPE, CEAA) and audit

Source: author's elaboration based on documental revision and field work.

There are the convergences, as the legal frameworks exist at federal and state or provincial levels, the cooperation at levels, the institutions created; and the norm elaboration in the process. The divergences are the years of experience; the different regulation mechanism; the types and number of projects; difference in the legal sustenance; lack of indicators for many themes in the EIA process and lack of real public consultation in Mexico.

### C. The EIA Process (Projects, Process, Techniques, Dates, Indicators)

The EIA in Mexico is performed on different levels, from federal, state to local competence. The procedure begins with the presentation of Environmental Impact Manifestations (EIM) by proponents that are evaluated by the Ministry of Environment

11 <http://laws-lois.justice.gc.ca/eng/acts/F-8.6/page-1.html> (accessed 29 of July, 2012)

12 [www.mddep.gouv.qc.ca/evaluations/mil-nordique/index-en.htm](http://www.mddep.gouv.qc.ca/evaluations/mil-nordique/index-en.htm) (accessed 25 of August, 2012)

13 It is possible to consult the Act and Regulation in French on the web page of the Quebec Government: [http://www.mddep.gouv.qc.ca/evaluations/inter\\_en.htm](http://www.mddep.gouv.qc.ca/evaluations/inter_en.htm) (accessed 29 of July, 2012)

(SEMARNAT), where they are approved, denied or conditioned at the project level of the Fig. 1. About 816 projects per year are presented at federal level in the EIM in “particular” modality (84%), regional modality (8%) or as preventive report (8%) in the list of the activities of national interest that require the EA [15:102]. The list of the projects that require assessment by SEMARNAT<sup>14</sup> includes hydraulic works, routes of communication, gas pipelines, oil and chemical industry, paper fabric, etc.

In the Federal District diverse works of housing, infrastructure and roads construction, services and other activities are constantly developed. Those are mainly private capital, with a relatively low proportion of public works, with a marked difference between the private funds taking part in the construction industry in the urban territory and the public ones applied in the Conservation Land (where the common land property predominates). In particular, the Secretary of Environment of the Federal District Government (SE-FDG) is the institutional organ that has within its internal structure the General Direction of Environmental Regulation (GDER) that reviews the EA reports presented by the proponents or promoters<sup>15</sup> (*promoventes* in Spanish), emits the recommendations, supervises and controls its fulfillment. The Direction of Environment Impact Assessment of the GDER, created in recent years, performs analysis of the Risk Studies, Preventive Reports, Environment Impact Manifestations, in general and in specific modalities [44-46].

The EIA process begins with an application form that the proponents present, or that alternatively, can be impelled as a demand of the SE-FDG, in answer to the realization of a work without authorization. Usually, these studies are carried out by an external consultancy service; and legally there is not a definition of the neither professional profile nor census of specialists required for this process. That represents a problem, because the characteristics of the EIA demand a use and analysis of high volume of information; that must be performed only by a multidisciplinary group.

This situation causes the inequity in the quality and contents of the studies and reports; which are impossible to evaluate and communicate adequately. On the other hand, because of the absence of clearly defined indicators, it is not possible to make comparisons between the stages of the development of the projects for determining the impacts, doing the follow-up and controlling them. Between other limitations, it is possible to observe the methodological complications, irregular time delimited to different steps of the EIA process, different quality of information and absence of public participation [18].

The process in Canada results in recommendation on project justification, alternatives, and terms and conditions [19:16]; including provisions for monitoring and other forms of follow-up. Certain EA processes have significant decision-making powers with regards to major projects. For the purpose of the EIA, the term Designed Project is defined in the CEAA (art. 2) as “one or more physical activities that (a) are carried out in Canada or on federal lands; (b) are designated by regulations made under paragraph 84-a or designated in an order made by the Minister under subsection 14-2; and (c) are linked to the same federal authority as specified in those regulations or that order”<sup>16</sup>. About 90% of their projects are exempt from EA; 9% proposals undergo preliminary assessment with little or no problem; 1% proposals are subject to full EA; and 0.1% proposals go to public hearings and gain public and political attention. For the year 2010-2011, the CEAA has coordinated 207 federal EAs, and “managed 26 EA of major resource projects (including 14 comprehensive studies), conducted 13 non-major resource project comprehensive studies, contributed to the coordination of 14 James Bay and Northern Quebec Agreement projects, and provided support to 12 projects subject to an EA by a review panel”.

The projects submitted to EIA are identified in the regulation<sup>17</sup>. They include building an airport, funding or transferring lands for mining developments, establishing nuclear developments, dredging a harbor, constructing a fish ladder and all projects in national parks. The list excluded since 2012 nuclear projects as well as oil and gas projects which are submitted to sector laws. The EIA process consists of a number of steps that are practiced under EIA systems as: “i) a detailed description of the proposed project; ii) a screening process to determine whether an EIA is required; iii) a baseline study to identify past, present and future conditions against which the effects of the project will be assessed; iv) identifying and evaluating potential project effects; v) developing strategies to manage these effects; vi) a technical and public review of the generated information; vii) a decision as to whether the project should proceed and, if so, under what conditions; and, if the project is approved, viii) monitoring and managing actual outcomes. Early involvement of the public and the public's sustained involvement throughout the process are regarded as essential to a good EIA” [48].

In Southern Quebec, the EIA process is compulsory for private and public projects, if these projects are listed in the relevant regulation. It involves various stages: registration of the project notice, developing guidelines and giving these to the project proponent (forty in 2010-2011<sup>18</sup>), realizing of impact study and the producing of an EA Statement, internal environmental analysis, public participation review process and decision making by the Government of Quebec on recommendation made by the Minister of the Environment. The proponent is responsible to carry out the EIA Statement, set out time-tables and pay for all the costs involved. Also he is asked to insure public consultation while the impact study is being

14 Available on the web page of SEMARNAT (accessed 26 of July, 2012) <http://www.semarnat.gob.mx/transparencia/transparenciafocalizada/impactoambiental/Paginas/obrasyactividades.aspx>

15 The proponent or “promoter” is a physical or moral person that is interested in the development of certain works or activities; that is “promoting” the project [16].

16 The CEAA, 2012 is available on the following website: <http://laws-lois.justice.gc.ca/eng/acts/C-15.21/page-1.html#h-2> (accessed 20 of September, 2012).

17 List of projects is available on: <http://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-147/page-3.html#h-1> (accessed 20 of September, 2012).

18 MDDEP, Rapport annuel de gestion 2010-2011, is available on: [www.mddep.gouv.qc.ca/ministere/rapports\\_annuels/rapport2010-2011.pdf](http://www.mddep.gouv.qc.ca/ministere/rapports_annuels/rapport2010-2011.pdf) (accessed 20 of September, 2012).

undertaken [7:76-81]. When the EIS is completed, the proponent deposits the documents to the Minister who initiates both an external and internal review.

- *External review:* The Minister asks the BAPE to initiate the statutory 45-days public information and consultation period. On reception of a request for public hearing from a citizen, a group or a municipality, the Minister mandates the BAPE to undergo a public hearing procedure (statutory 4 months) or mediation (about 2 months). The opinions and findings of the commissioners are collated into an inquiry and public hearing report which should be made public by the Minister within 60 days after its reception.

- *Internal review:* The Minister asks the General Direction of Environmental Assessment of the Ministry of the Environment to analyze the scientific content of the EIA. This analysis, undertaken with the consultation of the concerned Ministries, will be completed after the external review. The results of the analysis are synthesized into an internal review report (*Rapport d'analyse environnementale*) which is generally made public on-line with the deliverance of the Governmental Decree.

The EA process in Quebec is recognized for its transparency (all documents are made public numerically on Internet, and locally in Quebec City and Montreal) and its framework was formally evaluated twice, in 1988 and 1992, but few changes (mainly some administrative ones) have been made. The comparative aspects of the EIA process in Mexico and FD, and Canada and Quebec are presented on the Table 3.

TABLE III PROCESS OF EIA IN MEXICO AND CANADA

Characteristics	Federal District, Mexico	Quebec, Canada
Project numbers	816 at federal level about 1000 per year at FD level	207 at federal level 40 terms of reference per year 18 EIA reports per year are made public 9 public hearings or mediations per year
Project types	List of activities of SEMARNAT at federal level At FD level: 1) housing construction, 2) services and hazards, and 3) conservation works	Lists of projects submitted or excluded from the EIA process at the federal level List of project submitted to EIA in regulation at the Quebec level
Process	Promoter-Consultant-Public Policy Decision	Promoter-Consultant- Public-Policy Decision
Environmental indicators used for EIA	Only exist 4 groups of criteria for analysis (no indicators): air, water, soil and vegetation	Specific for each case Exist for quality of water and air; and for management
Participative process	Non-functional in practice	Functional at federal and Quebec levels Financial support available to participants at the federal level
Control and following of projects (monitoring and follow-up)	Exist in the document, but in practice it is deficient	Delegated at the regional level both at federal and Quebec level, but reports are not made public
Public access to information	Information is presented on the web page of SMA-GDF Federal Institute of Access to Information	Canadian EA Registry at the federal level BAPE website for EIA documentation, and MDDEP website for internal reviews and decisions at the Quebec level
Evaluation process of public policy	The evaluation mechanism is lack	Periodic planned review process of the CEAA until 2012 Deficient at the provincial level
Strategic Environmental Assessment	None exist in practice application, only in the Sector Program of Environment and Natural Resources	Yes at the federal level, including an assessment of the performance by the Commissioner of the Environment and Sustainable Development Being actually experimented in Quebec

Source: author's elaboration based on documental revision and field work.

The convergences are the following: lack of control and follow-up of projects due to lack of money, staff and time; lack of scientific sustenance or refreshing of EIA (methodological problems); lack of monitoring of EIA of projects based on field work and rigorous criteria; corruption problems and lack of sanction measures (practical application problems).

As divergences it is determined as: the different number and quality of information in the projects, the indicators existing and the participative public process in Canada, the lack of evaluation process in Mexico and the social participation [15] with the insufficient and inefficient information, fault in the access to environmental justice; and lack of SEA real application in Mexico (aligned with other territory planning public policy instruments). Resulting that in Mexico only the term of EIA is handled and it is very early to consider the implementation of the principles of the Strategic EA (SEA) as a political instrument at national scale, despite it exists as a legal mention [42, 51].



## V. FINAL OBSERVATION AND CONCLUSIONS

In the twenty years that had passed after the Earth Summit and acceptance of the Rio Declaration, the Environmental Impact Assessment (EIA) originated in the United States under the National Environmental Policy Act of 1970 is now considered as one of the most widely practiced environmental management tools. Even though it has many deficiencies, the actual trend shows its incorporation on the legislation schemes at national level of many countries. With the objective of improving this instrument, it was carried out the comparative analysis of the EIA's process in Mexico based on the experience of Canada; where it was possible to determine the convergences and divergences between both cases, and to observe diverse types of limitations that obstruct normal application of this instrument in Mexico.

Even if Mexico differs greatly from Canada in its geographical and socio-demographical contexts, there are similarities in their political regimen. They are both a federation of States with shared responsibilities for environmental issues. In Mexico, the States' legislation must conform to the Federal legal documents. In Canada, each province has their own environmental legislation and there are some federal-provincial agreements to prevent duplications and give coherence to the environmental protection system.

Mexico forms part of NAFTA with the USA and Canada, where these latter countries have had an almost 40 years experience in the EIA. In 1982, a first environmental protection law was proclaimed and the relevant administrative structures were put in place. Under the influence of this agreement, the government of Mexico has reinforced the EIA legislation and the administrative system. Mexico has now an EIA procedure at the federal and states levels [50]. There exists a cooperation system between these two levels of governance and new institutions have been created for this objective.

With comparative analysis, the following particular problems were detected in Mexico: the methodological deficiency with differences on the approaches, techniques and methods used in EIA statements; the radical difference on the quality and quantity of information used in the documents; the lack of certification of consultant offices which carry out the impact study; the absence of indicators; the legal faults such as lack of norms to sustain different categories of air, water and soil pollution and also vegetation degradation, etc.; the practical complications due to the absence of public participation, lack of personnel, time and infrastructure to carry out the correct EA process; costs of EIA reports are higher than established by the law [18].

In Canada the administrative, territorial, human and natural systems and technique limitations are recognized too [7:85-96]. In specific the administrative limitations are related to the fault of financial support, lack of time and human resources to carry out the EIA process that becomes in the analytic complication which can produce the bad quality of evaluation, the incorrect definition of regional and specific aspects, the risk of the conflict generated between participants and in general the increase of uncertainty of the EA study.

The territorial limitations are about not coinciding between definition of natural and administrative boundaries for the evaluated processes that is a methodological problem which can influence the bad determination of the process, the conflict generation, the insecurity of the EA and an incorrect political decision. The human problems are related to definition (representatively, structure and development) of the public to participate in the EA process; the natural limits with determination of the physical, chemical and biological characteristics that may produce other complications and all of the mentioned influence on the technical limitations of the EA process.

So the analysis of convergences and divergences of the EIA process in Mexico and Canada shows that the Canadian jurisdictions despite their many limitations (very similar to Mexico) nowadays have ten attributes of effectiveness on federal, provincial and territorial systems mentioned by [49]. Its developed process is what is considered as strategic EA (SEA) stage and which has a democracy procedure including (based on the public consults).

In this form the EA process in Mexico could be defined as a process in evolution without SEA guidelines function and multiple analytical, technical, legal and limitations on practice [50]; in virtue of this the following recommendations were formulated that:

- Control the quality in EIA, with review of key mechanisms and relationships
- Implement public involvement (new models of public consultation, including negotiated scoping)
- Reinforce policy level assessment with briefing materials, useful methods, and procedures, and measuring and communicative results
- Consider economic aspects in the integral scheme of the EIA
- Seek for alternative approaches in the SEA
- Use research and scientific expertise to develop best impact models, integrate social, economic and ecological functions, information techniques
- Improve the quality of used information and reports
- Increase responsibility of decision makers and proponents

- Give public access to the EIA process (open democracy legitimate procedure)
- Build public and professional capacity.

On the other hand, in Mexico the limitations of the environmental impact assessment and considers to strategic EA as important preventive instrument for finding a sustainable development, have been recognized by National Council of Environment and Natural Resources (SEMARNAT) for more than ten years ago, but without real advances [51]. In contrast the SEA in Canada is compulsory for policies, plans and programs requiring decision-taking by the Cabinet. But, even 20 years after the adoption of the SEA directive, public participation, transparency and willingness to proceed are still weak and in the Province of Quebec, after many years of lobbying, its government is currently proceeding to an experimental SEA. Now it is necessary to move to SEA if we want to position the sustainable assessment and planning principles as part of an integrated policy making (coordinating mechanism between different levels of government and international interests and programs).

#### ACKNOWLEDGMENT

We thank the Ministry of Foreign Affairs of Canada for financing this project inside of the program of “Understanding Canada” of Canadian Studies Programs in modality of Faculty Research Program.

#### REFERENCES

- [1] R. Carson, *Silent Spring*. Houghton Mifflin Company, MA, 1962.
- [2] CONAGUA, *Estadísticas del agua en México, Edición 2011*. SEMARNAT, México, 2011.
- [3] A.G. Aguilar and C. Santos, “Informal settlements' needs and environmental conservation in Mexico City: An unsolved challenge for land-use policy”, *Land Use Policy*, vol. 28, iss. 4, pp. 649-662, 2011
- [4] C. Rodríguez Ortega, “El Sistema Nacional de Indicadores Ambientales (SNIA)”, en *Desarrollo de indicadores ambientales en México*, J. López Blanco y M.L. Rodríguez Gamiño (coord.), IG-UNAM, México, pp. 15- 26, 2008.
- [5] P. André, C.E. Delisle and J.P. Revéret, *Environmental Assessment for Sustainable Development: Processes, Actors and Practice*. Presses Internationales Polytechnique, Montreal, Canada, 2004
- [6] S. Nooteboom, “Impact assessment procedures for sustainable development: A complexity theory perspective”, *Environmental impact Assessment Review*, vol. 27, pp. 645-665, 2007.
- [7] P. André, C.E. Delise and J.P. Revéret, *L'évaluation des impacts sur l'environnement. Processus, acteurs et pratique pour un développement durable. 3e édition*. Quebec, Canada, Presses Internationales Polytechnique, 2010.
- [8] IAIA, EIA Follow-Up. *International Best Practice Principles. Special Publication series N6*, 2007. Available on web page: [www.iaia.org](http://www.iaia.org) (access 22 of April, 2012).
- [9] IAIA, *What is Impact Assessment?* 2009. Available on web page: [www.iaia.org](http://www.iaia.org) (accessed 22 of April, 2012).
- [10] R.K. Morgan, “Environmental impact assessment: the state of the art”, *Impact Assessment and Project Appraisal*, vol. 30, iss. 1, pp. 5-14, 2012.
- [11] C. Wood, *Environmental Impact assessment. A comparative review*. 2nd Edition, London, Prentice Hall, 2003.
- [12] UNCED, *United Nation Conference for Environment and Development*. UN, Rio de Janeiro, 1992.
- [13] J. Pope, A. Morrison-Saunders and D. Annandale, “Applying sustainability assessment models”. *Impact Assessment and Project Appraisal*, vol. 23, iss. 4, pp. 293-302, 2005.
- [14] INE-SEMARNAP, *La evaluación de impacto ambiental. Logros y retos para el desarrollo sustentable 1995-2000*. SEMARNAP, México, 2000.
- [15] J. Palerm and C. Aceves, “Environmental Impact Assessment in Mexico: an analysis from a “consolidating democracy” perspective”. *Impact Assessment and Project Appraisal*, vol. 22, iss. 2, pp. 99-108, 2012.
- [16] R. Arriaga Becerra, *La evaluación del impacto ambiental en México. Situación actual y perspectivas futuras*. México, 2012. Available on web page: [http://www.ceja.org.mx/IMG/pdf/Situacion\\_actual.pdf](http://www.ceja.org.mx/IMG/pdf/Situacion_actual.pdf) (accessed 30 of April 2012).
- [17] INE-SEMARNAT, *Evaluación de Impacto Ambiental en México*. Segunda edición. México, INE-SEMARNAT, 2012.
- [18] COLMEX, *Desarrollo de indicadores ambientales a nivel local para la evaluación de impacto ambiental: caso Distrito Federal*. Informe final, COLMEX, México, 2011.
- [19] B. Sadler, *Environmental Impact Assessment in a changing world: Evaluation practice to improve performance. Final report*. International study of the Effectiveness of Environmental Assessment, CEAA, IAIA, Canada, 1996.
- [20] N. Sutley, *Québec, the Rio+20 Agenda and the White House*. Quebec International, 2012. Available on web page: [http://www.mri.gouv.qc.ca/portail/\\_scripts/Actualites/ViewNew.asp?NewID=10683&Menu=default&lang=en&strIdSite=qc](http://www.mri.gouv.qc.ca/portail/_scripts/Actualites/ViewNew.asp?NewID=10683&Menu=default&lang=en&strIdSite=qc) (accessed 23 of July 2012).
- [21] OECD, *Environmental indicators. A preliminary set. Organization for Economic Co-operation and Development. Publication Service*. OECD, Paris, France, 1991.
- [22] E. Vidal de los Santos y J. Franco López. *Impacto ambiental. Una herramienta para el desarrollo sustentable*. AGT Ed., México, 2009.
- [23] D. Gómez Orea, *Evaluación del Impacto Ambiental. Un instrumento preventivo para la gestión ambiental*. Mundi Prensa, Madrid, España, 2003.

- [24] A. Bond, A. Morrison-Sounders and J. Pope. "Sustainability assessment: the state of the art", *Impact Assessment and Project Appraisal*, vol. 30, iss. 1, pp. 53-62, 2012.
- [25] A.M. Esteves, D. Franks and F. Vanclay, "Social impact assessment: the state of the art", *Impact Assessment and Project Appraisal*, vol. 30, iss. 1, pp. 34-42, 2012.
- [26] S. Jay, C. Jones, P. Slinn and C. Word, "Environmental impact assessment: retrospective and prospect", *Environmental Impact Assessment Review*, vol. 27, pp. 287-300, 2007.
- [27] A.J. Sinclair, A. Diduck and P. Fitzpatrick, "Conceptualizing learning for sustainability environmental assessment: critical reflections on 15 years of research", *Environmental Impact Assessment Review*, vol. 28, pp. 415-428, 2008.
- [28] O. Bina, "A critical review of the dominant lines of argumentation on the need for strategic environmental assessment", *Environmental Impact Assessment Review*, vol. 27, pp. 585-606, 2007.
- [29] M. Fundingsland Tetlow and M. Hanusch, "Strategic environmental assessment: the state of the art", *Impact Assessment and Project Appraisal*, vol. 30, iss. 1, pp.15-24, 2012.
- [30] R. Gibson, "Sustainability assessment: basic components of a practical approach", *Impact Assessment and Project Appraisal*, vol. 24, iss. 3, pp. 170-182, 2006.
- [31] A. Bond and J. Pope, "The state of the art of impact assessment in 2012. *Impact Assessment and Project Appraisal*, vol. 30, iss. 1, pp.1-4, 2012.
- [32] A. Chacare, M. Cabeza, M. de Arconada y P. Misle, "Análisis comparativo del procedimiento de Evaluación de impacto Ambiental Venezolano (decreto 1.257) en el contexto Norteamericano, Latinoamericano y Europeo", *Terra Nueva Etapa*, vol. 7, iss. 32, pp. 41-75, 2006.
- [33] D. Franca Moreira, J. Adilson de Castro and A. Seroa da Motta, "Environmental Impact Assessment of electricity generation sources and the parallel of Brasil - Canada energetic matrix focusing on the renewable sources". *Canadian Journal on environmental, Constriction and Civil Engineering*, vol. 3, iss. 1, pp. 18-25, 2012.
- [34] M. Barone, "Evaluación de Impacto Ambiental (EIA). Una mirada en búsqueda de similitudes, diferencias. Estudio comparativo entre Argentina y Brasil", en materiales del VI Congreso Argentino de Presas y aprovechamientos Hidroeléctricos, Neuquén, Argentina, 2010.
- [35] J. Gao, "Comparative study of SEA experiences between EU and China: the use of indicators", in proceedings of *EASY-ECO Conference on Sustainable Development Evaluation in Europe*, Brussels, Belgium, 2010.
- [36] A. Astorga Gattgens, *Estudio comparativo de los sistemas de Evaluación de Impacto Ambiental en Centroamérica*. CCAD y UICN, San José, Costa Rica, 2006.
- [37] A. Tiburcio and M. Perevochtchikova, "La gestión del agua y el desarrollo de indicadores ambientales en México y Canadá: un análisis comparativo", *Journal of Latin American Geography*, vol. 11, iss. 2, pp. 145-165, 2012.
- [38] INEGI, *Censo de Población y Vivienda (2010). Panorama Socio-demográfico*. México, INEGI, 2011.
- [39] Environment Canada, *Eau*. 2011. Available on the web page: <http://www.ec.gc.ca/eau-water/default.asp?lang=Fr&n=65EAA3F5-1> (accessed 30 of July, 2012).
- [40] Statistics Canada, *Canada Yearbook 2010*. Statistics Canada, 2010.
- [41] INEGI, *Estadísticas del Medio Ambiente del Distrito Federal y Zona Metropolitana 2002*. México, INEGI, SMA-GDF, 2005.
- [42] DOF (Diario Oficial de la Federación), *Reglamento de la Ley General del Equilibrio Ecológico y Protección Ambiental en materia de Evaluaciones de Impacto Ambiental*. México, DF, 30 de mayo de 2000.
- [43] GF, Gaceta Oficial de México. *Manual de la Organización General de la SEMARNAT*. 13-08-2003. Available on the web page: [www.ordenjuridico.gob.mx/](http://www.ordenjuridico.gob.mx/) (accessed 28 of April, 2012).
- [44] GDF, *Gaceta Oficial del Distrito Federal N 354*, 12-06-2008. Available on the web page: [www.ordenjuridico.gob.mx/](http://www.ordenjuridico.gob.mx/) (accessed 28 of April, 2012).
- [45] SMA-GDF, *Trámites y servicios de regulación ambiental*. Distrito Federal, México, Secretaría de Medio Ambiente, 2009.
- [46] SMA-GDF, *Dirección de Evaluación de Impacto Ambiental. Sistema de información de trámites de impacto ambiental*. México, 2012. Available on the web page: [www.sma.df.gob.mx/sitia](http://www.sma.df.gob.mx/sitia) (accessed 24 of April, 2012).
- [47] Government of Canada, *North American Free Trade Agreement*. Canadian Environmental Review. Cat. N. E74-54/1992E, Ottawa, 1992.
- [48] F. Noble Bram, *Environmental Impact Assessment*. Canadian Encyclopedia. Canada, 2012. Available on the web page: <http://www.thecanadianencyclopedia.com/articles/environmental-impact-assessment> (accessed 23 of July, 2012).
- [49] D. Doyle, and B. Sadler, *Environmental Assessment in Canada: Frameworks, Procedure and Attributes of Effectiveness*. Canadian Environmental Assessment Agency, Ottawa, 1996.
- [50] M. Perevochtchikova and I.A. Rojo Negrete, "Development of an indicator scheme for the environment impact assessment in the Federal District, Mexico", *Journal of Environmental Protection*, vol. 4, iss. 3, pp. 226-237, 2013.
- [51] B. Ahumada Cervantes, M.I. Espejel Carbajal y G. Arámburo Vizcarra, "Beneficios potenciales de la evaluación ambiental estratégica en la planeación del desarrollo en México, caso de estudio el Programa Nacional de Infraestructura 2007-2012", *Investigación ambiental*, vol. 3, iss. 2, pp. 5-17, 2011.

**Maria Perevochtchikova** is Engineer-hydrologist (1996) with PhD in Geography Science (2003) from the Russian State Hydrometeorological University (San Petersburg, Russia), and postdoctoral fellowship by the Institute of Geography of National Autonomous University of Mexico (Federal District, Mexico). Currently, she is professor-researcher of the Center for Demographic, Urban and Environmental Studies of El Colegio de Mexico A.C. (COLMEX). Since 2006 is a member of the National System of Researchers and since 2008 a member of the Water Network of National Committee of Science and Technique.

**Pierre André** is Ecologist with a Ph.D. (1985) in Biological Sciences from Université de Montréal (Québec, Canada). He is currently professor in Environmental Assessment and Sustainable Development at the Department of Geography, and director of the Center for International Research Development in Environment (CEDRIE), Université de Montréal. Dr. André is member of the International Association for Impact Assessment (IAIA), and the Association Québécoise pour l'évaluation d'impacts (AQÉI). Since 2003, he chaired or participated to six public commissions held under the Quebec EIA process by the Quebec Public Hearing Bureau (BAPE).