

## Flora and Fauna in Federal Protected Areas of Mexico (FPAM): A sustainable vision?

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### Abstract

Among the goals, I can mention: *a)* synthesis of the characteristics about flora and fauna and *b)* critical analysis about the sustentability in the FPAM.

The method used was sustained in the documentary material checking: archives, books, magazines, Web pages on Internet, printed statistic data consulting, digital data bases, chart interpretation, aerial photography and fieldwork in FPAM mainly 12 states of Mexico, that included the direct observation, exploratory routes, photographic interviews with members of non-governmental organizations. In this sense, the approach is multimodal or mixed since the qualitative and quantitative points of view through and they define the reach of this investigation with explanatory character.

The results were: the FPAM locally protect different vegetation and fauna. The pine, holm oak or “*oyamel*” forest is the best presentation of vegetal association. In the fauna, the vertebrates excel, many of them are endemic and others are endangered. To conclude, we can say that 1) the FPAM keep samples of almost all the range of existing flora and fauna in Mexico and 2) the presence of natural resources are in problems of hazard.

### Flora, Fauna, Federal Protected Areas of Mexico, sustentability

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## Introduction

Mexico has great physical-biological wealth that generates environmental goods and services through its biodiversity and wild spaces. It has motivated the adoption of a conservational attitude to save the natural patrimony of the country, since the FPAM are an alternative to maintain the integrity of the ecosystems. At the moment, the declaration, handling and administration of these areas are in charge of CONANP (*Comisión Nacional de Áreas Naturales Protegidas*, which means National Commission of Natural Protected Areas) whose policy tends to favor processes of supporting development in which diverse sectors of the national society concur, and the restraining and reverting of the degradation that hits the atmosphere and its natural resources are implicit. Therefore, to preserve habitats in their natural state demands to maintain some areas in the margin of the anarchical human intervention.

First of all, we would like to refer to the definition that was proposed in the 90's of the last century about the Protected Natural Areas and the own characteristics of each category that were united in the LGEEPA (*Ley General del Equilibrio Ecológico y la Protección al Ambiente*, which means: General Law of the Ecological Balance and the Atmosphere Protection).

LGEEPA defined the zones of the national territory and those on which the Nation exercises its sovereignty and jurisdiction as ANP in which the original atmospheres have not been strongly altered by the activity of man and have been subject to the protection regime (Porrúa, 1991:2-3).

To sum up, paying special attention to this document, we can see that ANP in Federal Jurisdiction are the ones that are enunciated:

“RB (*Reserva de la Biósfera*, which means: Biosphere Reserve) will be constituted in excellent bio-geographical representative areas, at national level, of one or more non-altered ecosystems and at least, a non-altered zone in which species considered as endemic, threatened or endangered ones live and whose surface is greater than 10,000 hectares” (*Ibid.*, 1991:31). In other words, they constitute representative bio-geographical areas of not too altered ecosystems in which excellent endemic or endangered species of biodiversity inhabit.

PN (*Parque Nacional*, which means: National Park) “will be constituted according to this Law and the Forest Law, in forest lands, being bio-geographical representations, at national level, of one or more ecosystems according to their scenic beauty and scientific, educational or recreational values, also their historical value due to the existence of flora and fauna of national importance, because of their aptitude for the development of the tourism, or for other analogous reasons of general interest” (Porrúa, 1991:32), this means that this law refers to areas with ecosystems with scenic beauty and educational, recreational and historical values which are important because of their flora and fauna and tourist aptitude.

MN (*Monumento Natural*, which means: Natural Monument) “will be settled down according to this Law and to the Forest Law in areas that contain one or several natural elements of national importance, consisting of natural places or objects that, due to their unique character, are solved to be incorporated to a regime of absolute protection. Such monuments do not have the variety of ecosystems nor the necessary surface to be included in other handling categories” (*Ibidem.*, 1991:33). It contains elements that, due to their unique character, aesthetic, historical or scientific values, are joined up to regime of absolute protection.

It does not have a variety of ecosystems nor wide surface to include it in other handling categories.

PMN (*Parques Marinos Nacionales*, which means: National Marine Parks) “will be settled down in Marine Zones that are comprised of the national territory, and will be comprised of beaches and the contiguous federal terrestrial-marine zone. In these areas only activities related to preservation of the aquatic ecosystems and its elements will be allowed, and those of ecological investigation, recreation and education, as well as the advantages of natural resources that have been authorized, in accordance with what this Law provides, the Federal Law of Fishing, the Law of the Sea, the other applicable laws and their regulations, as well as the effective norms of the international right” (*Op. Cit.*, 1991:33).

APRN (*Área de Protección de Recursos Naturales*, which means: Protection Area of Natural Resources) “are those destined for the preservation and restoration of zones and waters. The following areas are considered within this category of handling: I. Forest reserves; II. National forest reserves; III. Protective and forest zones; IV. Zones of restoration and forest propagation, and V. Zones of protection of rivers, springs, deposits and in general, water sources for the service of populations” (*Ibid.*, 1991:33 - 34). It preserves and protects grounds, hydrologic basins and forest land resources in reserves of rivers and water bodies.

APFF (*Área de Protección de Flora y Fauna*, which means: Flora and Fauna Protection Area), “aquatic and wild areas that will be constituted in accordance with the requirements of this Law, the Federal Laws of Hunting and Fishing and the applicable ones, in the places where habitats are contained.

Since the attendance, transformation and development of the species of wild and aquatic flora and fauna depend on these places’ balance and preservation” (*Op. Cit.*, 1991:34). It contains habitats whose balance sponsors the presence, transformation and development of species of wild flora and fauna.

S (*Santuario*, which means: Sanctuary) is an area with great wealth of flora or fauna, or because of the presence of species, subspecies or habitat of restricted distribution, including gorges, fertile valleys, grottoes, natural wells, geographic creeks or other units that need to be protected. Beaches, priority enclaves which will be protected in the immediate future against the contamination are left outside; this contamination can be visual, made by urban solid remainders, physical-chemical of black water in bordering urban centers.

Some ANP of Mexico show a rational handling and others have been hit negatively by lack of planning which risks the maintenance of the physical, biotic, geo-morphological and cultural resources that integrate them.

The purpose of the essay is to increment the interest in the flora and fauna elements of the Mexican natural resources. It is important the planning of resources accompanied for better environmental management has resulted in maximal preservation of the national territory and to get the ecological equilibrium. This act increase the esthetic of the nature reserve and the environmental educational potential, the cultural knowledge and human welfare of the FPAM. The flora and fauna provides the visitors with a place to recuperate physically, mentally and spiritually.

It is important to make this study because it allows us to offer a didactic-practical vision that briefly enriches the general diagnosis of the flora and fauna in FPAM in the actuality. Moreover, it sketches a strategic planning that makes it possible to take firm steps towards the achievement of the environmental and economic maintenance of the people that live inside or on the margins of the Federal FPAM.

A question relevant was Which is the actual situation about flora and fauna in FPAM?. There are six sections that integrate this essay, these sections are: introduction, objective, methodology, results, conclusions and references.

### Objective

To explain the factors and consequences that affect the lifetime flora and fauna in the FPAM.

### Methodology

Firstly, an office work was carried out through consultation of digital and printed literature of topics as the competitiveness of the flora and fauna (Sepúlveda, 2008); nature tourism (Chávez, 2005); sustentability (López, 2008); ecogeographic method of Melo & Niño (2003) and touristic space planning (Pérez, 2004).

It is sustained in the documentary material checking: archives, books, magazines, Web pages on Internet, printed statistic data consulting, digital data bases, chart interpretation, aerial photography and finally fieldwork in FPAM mainly Chiapas (Niño, Melo & Castillo, 2008), Estado de México (Melo & Niño, 2003), Guanajuato (Niño & Saldaña, 2014a & 2014b), Guerrero (Niño, 2009) y Michoacán (Correa, Niño & Segrelles, 2013).

That included the direct observation, exploratory routes, photographic interviews with members of non-governmental organizations, photography and videos. In this sense, the approach is multimodal or mixed since the qualitative and quantitative points of view through the General Theory of Systems and the Geography of the Landscape are conjugated and they define the reach of this investigation with explanatory character.

### Results

The total of the FPAM covers terrestrial and aquatic surface of 25' 628, 239 Ha and it represents 13.5% of the country. The BR show the greater extension and the NM, the minor (Table 1).

Decreed total	Name/Number	Abbreviation/surface
39	Flora and Fauna Protection Areas	FFPA
8	Natural Resources Protection Area	NRPA
5	Natural Monuments	NM
66	National Parks	NP
41	Biosphere Reserves	BR
18	Sanctuaries	S
<b>177</b>	<b>6</b>	<b>25'628,239 ha</b>

**Table 1** Categories of FPAM. Source: Conanp, 2016.

Regarding the impact, the FPAM locally protect different vegetation and fauna. The pine, holm oak or “*oyamel*” forest is the best presentation of vegetal association with predominance in the NP; the S specially spreads coastal dune vegetation; and after these, we have the *xerophilous scrub* [plants, scrub and/or trees that live in dry lands] and the low *deciduous forest* [forest whose trees lose their leaves in autumn].

The *mesophyllous forest* [forest with plants and/or trees with leaves in the middle]

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has scarce representation on mountain and “*petenes*”. I can say that the FPAM keep samples of almost all the range of existing vegetation in the country.

In the fauna, the vertebrates excel, many of them are endemic and others are endangered; there are also two invertebrates (“*lepidóptero*” [insects with complete metamorphosis] which are migratory: Monarch butterfly, “*celenterados*” [a kind of mollusks and crustaceans], “*equinodermos*” [like starfish], crustaceans, mollusks and coralline reef).

The mammals better represented are “*artiodáctilos*” [mammals with two fingers and nails] (mottled and/or wild lamb, wild boars, white-tail deer and/or bura) and Felines (cougar and/or jaguar, ocelot, lynx, jaguarindi and margay); and lodge cetaceans (migratory gray whale, manatee or sea cow and totoaba) and “*Pinnípedos*” (marine seals or elephants).

Among the birds, the “*Falconiformes*” (golden eagle, harpy eagle, fishing eagle, elegant eagle and others, travelling hawk and king buzzard), there are also the “*Psitaciformes*” (mount parrot, macow and other parrots) and “*Galliformes*” (quail, wild peacock, mount hen, pheasant and dotted and colorful peacock); the most frequent bird is “*Cracidiforme*” (kind of pheasant).

Scaly reptiles (constrictor boa and/or Nauyaca serpent, chameleon, iguanas, Gila monsters, colar snake, rattlesnake and swamp or river crocodile), and at a minor grades, the “*Quelonios*” (migratory and/or local marine turtles, turtois, river turtle and desert turtle). It is important to emphasize that the numerous islands of the Gulf are officially catalogued as a unique area of flora and fauna protection.

The unit called “River basin of the Caribbean” and that of the Gulf of Mexico.

Are important the BR and FFPA categorize the tropical-humid zone populated with rainy, high and medium forests, and savannahs; at the same time, in barren-semi-arid ones where there are a lot of scrubs and pastureland.

Finally, remarkable invertebrates like the migratory monarch butterfly winter and the coralline reefs that beside their fauna. I can say that the FPAM constitute the only and best fauna refuge in Mexico.

*Flora and fauna*, integrates the natural resources of the terrestrial and marine landscape minimizing the socioeconomic impact to the natural heritage and promote activities such as bird watching, and hiking among others. They are fragile geosystems. This zone will help maintain, preserve and conserve the landscape as well as the natural resources and promote the development of scientific activities, which will to prevent negative environmental consequences to the ecosystems.

The preservation of the flora and fauna has, as an obstacle, the deficiency of handling programs, which combined to diverse regimes of soil possession causes the anarchical use of the soil and natural resources, which results in ecological imbalance and loss of flora and wild and aquatic fauna.

The most damaging actions are the settlements, from which cattle and agricultural activities derive. Coral extraction and oil installations are less frequent but also damaging in the Southeast Mexico and even mini-tourist recreational infrastructure in NP and others areas categories.

In general, the knowledge from the origins and fruition of the national movement on FPAM but in particular FFPA shows the multiple environmental, social, economic, scientific and cultural functions that they provide mankind through their conservation and adapted handling. Regarding our country, it is urgent to understand and reflect on the causes of the problem that prevent the protected areas from joining an authentic process of sustainability.

Where the indicators of sustainability are interrelated in its various aspects such as the physical component which includes the slope of the ground, plant development, agrological capacity (depth, fertility, development and stoniness), gathered from coverage and water erosion; biotic component, presence or absence of vegetation (deforestation) and anthropic component, such as the total population, economically active population, economically inactive population, wages, occupation, production, consumption, index of marginalization (housing, services, access roads, transportation, food supply center).

The strategy is an adjustable process whose aim lies in "meeting the set of rules to ensure a better decision in every moment". The challenge here is to make the right decisions at the right time since carrying out a developmental option rarely relies on clearly distinguishable and instantaneous events (Oñate, Pereira, Suárez, Rodríguez & Cachón, 2002).

The public use of the resource, refers to protected natural areas in operation, it seeks to know the interrelation between visitors, facilities and services, as well as the impact that public use exerts on the environment in order to detect the type of most frequent activities, the number of participating users and favorites sites for their performance.

## Conclusions

It is capital idea to say that 1) the FPAM keep samples of almost all the range of existing flora and fauna in Mexico therefore are biodiversity containers and other physical natural resources that are incorporated to the regional and/or local development by means of the development of productive projects (eco-tourism, supporting agriculture, wild fauna raising, forest exploitation, aqua-culture, crafts, etc.) and 2) the presence of natural resources are in problems of hazard moreover, it is priority to implement the conservation (forest prevention of fire, ecological restoration, zone setting, important species handling, etc.); of investigation (biological inventories, studies of environmental impact, polluting agents monitoring, data-basis making, studies of territorial ordering, etcetera).

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