RELATIONSHIP BETWEEN WATER MANAGEMENT AND PRESERVATION OF MARINE PROTECTED AREAS. INSTITUTIONAL PERSPECTIVE WITHIN THE FRAMEWORK OF THE UNCLOS AND OTHER INTERNATIONAL INSTRUMENTS

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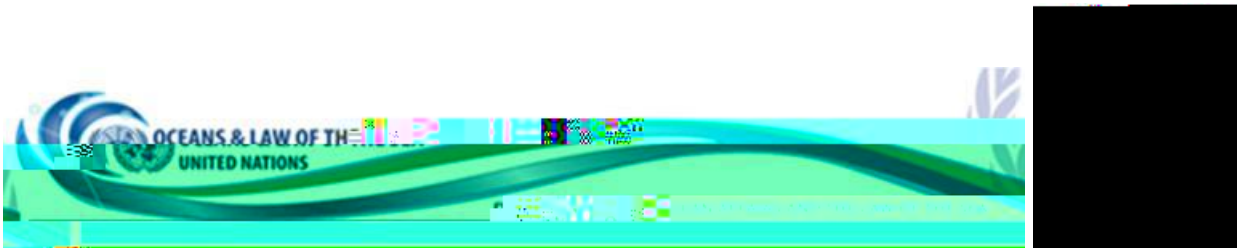

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CBD	Convention on Biological Diversity
CNH	Comité Nacional de Humedales/National Wetland Committee
CONABIO	Comisión Nacional para el Conocimiento y Uso de la Biodiversidad /National Commission for the Knowledge and Use of Biodiversity
CONAGUA	Comisión Nacional del Agua/National Water Commission
CONANP	Comisión Nacional de Áreas Naturales Protegidas/National Commission of Natural Protected Areas
COP	Conference of the Parties
CPEUM	Constitución Política de los Estado Unidos Mexicanos/ Political Constitution of the United Mexican States
DOF	Diario Oficial de la Federación/Official Federal Gazette
EIA	Environmental Impact Assessment
ENBIOMEX	Estrategia Nacional sobre Biodiversidad en México/National Strategy on Biodiversity of Mexico
ES	Ecosystem Service
GDP	Gross Domestic Product
GESAMP	Group of Experts on the Scientific Aspects of Marine Environmental Protection
GPA	Global Programme of Action for the Protection of the Marine Environment from Land-based Activities
ICZM	Integrated Coastal Zone Management

INEGI National Institute of Statistics and Geography

NOM	Norma Oficial Mexican/Official Mexican Standard
NPA	Área Natural Protegida/Natural Protected Area
PA	Protected Area
CPD	Particular Discharge Conditions
PND	Plan Nacional de Desarrollo/ National Development Plan
PNH	Programa Nacional Hídrico/National Water Programs
PROFEPA	

Relationship between water management and preservation of Marine Protected Areas. Institutional perspective within the framework of the UNCLOS and other International Instruments

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'There is no man of any nation who, having taken nature as a guide, cannot reach the truth'. M. T. Cicero

INTRODUCTION

Nature attends to its own dynamics and has consequences that impact on human beings. However, human activities can affect these dynamics; every day humans use nature or ecosystems and their biodiversity to satisfying basic needs and other necessities, some of these activities and how they are carried out, menace the dynamics of nature.

The loss of biodiversity and ecosystems is a global problem; according to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), 75% of the land surface is significantly altered, 66% of the ocean area is experiencing increasing cumulative impacts, and over 85% of wetlands (area) has been lost[1].

During the last decades the international community has made various attempts to address this problem, a tool for protecting biodiversity is the creation and management of Protected Areas (PAs), or other area-based conservation measures.

This document takes an institutional and literature-based approach, by analyzing two main Mexican institutions and its legislation. These Institutions are, the National Commission of Natural Protected Areas (CONANP, by its acronym in Spanish) responsible for the administration and conservation of protected areas; and the National Water Commission (CONAGUA, by its acronym in Spanish) in charge of the administration, regulation, control, and protection of national water resources, those two Institutions under the Secretariat of Environment and Natural Resources (SEMARNAT, by its acronym in Spanish).

The study focuses on identify gaps that, if filled, would allow better protection of water quality, that currently have negative impacts on ecosystem in general, but also within Natural Protected Areas, specially Marine Protected Areas (MPAs), indeed this include coastal areas, and will be referred as MPAs.

The study also focuses on the United Nations Convention on the Law of the Sea (UNCLOS)[2] as a legal framework for all activities in the ocean, but also the protection of the seas. As well

[1] IPBES. *Summary for policymakers of the global assessment report on biodiversity and ecosystem services of IPBES,* 6 May 2019, p. 3. https://www.ipbes.net/ne

examines the Convention on Biological Diversity (CBD)[3] that promotes the conservation and sustainable use of biodiversity; and the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the Ramsar Convention)[4] as one of the first modern Multilateral Environmental Agreements, all of them consider as an universal accepted treaties. The latter two are critical internatio

Federal Official Gazette (DOF, by its acronym in Spanish) in 10 June 2011, represented the greatest advance in Mexico in Human Rights matters, by placing these as the central axis of the Mexican legal system. Human rights described in the constitution are expressly protected, in addition to those established in international treaties to which Mexico is a party.

Furthermore, Article 1 of the Constitution establishes the obligation for all authorities, within the scope of their powers, to promote, respect, and protect Human Rights in accordance with the principles of universality, interdependence, indivisibility and progressivity.

property of natural resources, their link to use them sustainably, and its relationship with Human Rights. Even though, this document is not related to Human Rights; it is known that these rights are related to the daily life of the people and the Nations. For instance, since the foundation of the National Human Rights Commission in 1990 (CNDH, by its acronym in Spanish), more than thirty recommendations on matters concerning different environmental issues have been submitted[7]. Nevertheless, social conflicts over water and environmental menaces remains a problem in Mexico (Annex 1)[8].

Some scholarly reflections, international[9]* and national organizations highlight conservations and that measures on protections of landscapes and seascapes are likely to be shaped by a consideration of human rights[10]. Proper management and conservation of Protected Areas could allow international commitments addressed in this document to be fulfilled, in addition to some

[7] Among others: 1110/1991, 64/1996, 80/1996, 08/1999, 37/2003, 81/2004, 56/2012, 16/2000, 47/2002, 57/2004, 65/2008, 39/2009, 12/2010, 46/2010, 70/2010, 76/2010, 84/2010, 54/2011, 61/2011, 37/2012, 48/2015, 26/2016, 10/2017, 67/2017, 03/2018, 11/2018, 32/2018, 47/2018, 62/2018, 82/2018, 56/2019, 91/2019. All recommendations are on the official website: CNDH. https://www.cndh.org.mx/

[8] http://osa.fisica.unam.mx/app/mapa_gral.php (accessed on 7 July 2019).

[9] A/HRC/34/49. John H. Knox (Special Rapporteur on Human Rights and the Environment), *Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment.* Paragraphs 59 and 62.

*Advisory Opinion OC-23/17. Inter-American Court of Human Rights Upholds the Human Right to a Healthy Environment, paragraphs 47 55, and 147.

** Conservation Initiative on Human Rights (CIHR) is a collaboratio

others related to the protection of Human Rights, in particular the Human Right to a healthy environment and access to water.

The above-mentioned legal framework obliges the Federation to take legislative, administrative and budgetary measures to safeguard Mexican natural capital, including water quality discharged into water bodies; among these efforts are the creation and management of Natural Protected Areas.

Although the principle of sovereignty states that countries are free regarding the management of their natural resources, when those resources are not adequately protected or regulated, it represents a potential loss to the healthy environment for the rest of the world[11]. Moreover, the -being will only be ensured if the State adopts a path of sustainable development which integrates environmental concerns and protects natural resources from depletion to ensure their sustainable use[12].

Mexico is a Federal Country with a territorial area of 1, 960 189 km^2, and its Exclusive Economic Zone is 3,149, 920 km^2. Due to the diversity on ecosystems Mexico is considered one of the first five mega-diverse countries in the world, is also the center of origin and domestication of essential worldwide foods, suc

Invasive alien species[22]**:** The Secretariat of Environment and Natural Resources (SEMARNAT, by its acronym in Spanish) published in the Official Gazette of the Federation (DOF, by its acrony

es are currently listed[23].

Habitat change: In 1993 to 2003, the leading causes of the change in land use were: agriculture and livestock use, with a contribution of 17.5%; overgrazing, 17.5%; deforestation, 7.4%; urbanization, 1.5%; overexploitation of vegetation, 1.1% and industrial activities, 0.5%; the rest (54.6%) is without apparent degradation[24].

Climate Change: According to the Group II contribution to the Intergovernmental Panel on Climate Change (IPCC) on its Fifth Assessment Report, (WGII AR5)[25]* points the risk of global aggregate impacts is moderate for additional warming between 1 2°C, which has implications ersity and the overall global economy.

This report underlines the high confidence that the redistribution of global marine-species, and the reduction in marine-biodiversity in sensitive regions will challenge the sustained productivity of fisheries and other ecosystem services. In that regard, it is also noteworthy that the ocean is one of the largest natural reservoirs of carbon[26].

Protected Areas have individual and collective value; they are characterized by bringing together different economic and social activities, so many stakeholders and interests are involved within or nearby. Those PAs or Natural Protected Areas (NPAs, as will be alluded to in this paper), have been created to preserve representative and fragile ecosystems, to ensure the continuity of evolutionary and ecological processes; for safeguard genetic diversity, and to ensure preservation

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[22] Also underscore at the Ramsar Convention COP8. Resolution VIII.18; and CBD COP 6 Decision VI/23.

[23] Published in DOF 7 December 2016.

[24] SEMARNAT INECC, *Quinta Comunicación Nacional ante la Convención Marco de las Naciones Unidas sobre el Cambio Climático*, México, 2012, p.55.

[25] Intergovernmental Panel on Climate Change. Working Group II contribution to the fifth assessment report of the IPCC. *Climate Change. 1014, Impacts, adaptation and vulnerability, Summary for policymakers*, 2014. Pp.12-13. https://www.ipcc.ch/site/assets/uploads/2018/02/ar5_wgII_spm_en.pdf (accessed on 8 July 2019).

* Group II assesses the vulnerability of socio-economic and natural systems to climate change, the negative and positive consequences of such modification, and the possibilities of adaptation to it.

[26] CBD COP 10 Decision X/29, paragraphs, 7. UNGA, resolution A/RES/71/312, paragraph 3.

and sustainable use of ecosystems. In that regard, NPAs also could help to address some of stressors mentioned above. Currently, Mexico has 182 NPAs which 37 are marine or coastal

studied throughout the paper, three main targets of NPAs are: to ensure preservation, sustainable use of ecosystems and its biodiversity, preserve representative natural, environments and the most fragile ecosystems, and to ensure the balance and continuity of evolutionary and ecological processes, since they are essential to the well-being of humans.

In recent times we have begun to recognize the benefit of ecosystems, specifically the new r example, water purification and pollination. This recognition draws attention to the value of biodiversity and its dynamic to humanity and should help to make long-term decisions.

For example, Mexico has the most diversity with 144 species. Recent studies evaluating the role of these species in environmental services, such as, pollination and pest control estimate that it is equivalent to more than 100 million dollars in the world. Mexico has made some noteworthys made some

and seas play a key role in this vital cycle of water, 78% of global precipitation occurs over the ocean, and it is the source of 86% of global evaporation[33].

The hydrological cycle has been threatened by human activities around exploitation and water

Those ecosystems are particularly relevant considering that 27 million Mexicans live in vulnerable areas affected by extreme weather events such as hurricanes and floods, etcetera[37].

Article 133 of the CPEUM establishes that the Constitution, the laws that emanate from the Congress, and all treaties that are in accordance with the Constitution, are concluded and will be concluded by the President of the Republic, with the approval of the Senate, and will be the Supreme Law of all the Union

existing international arrangements for the conservation of biological diversity and sustainable use of its components.[43]

Nature to be commanded must be obeyed.… Francis Bacon

PART ONE

It took 4.5 million years for the Planet Earth to shape the dynamics of energy and biological diversity that

1.1.

well as the others that tend to protect surrounding elements with which the area is ecologically related; and; **VII)** protect the natural environments of archaeological, historical and artistic areas, monuments and vestiges, as well as tourist areas, and other areas of importance for recreation, national culture and identity and indigenous peoples.

The satisfaction of basic needs[61], the exploitation of natural resources for other necessities, pollution, and its impact on nature have all led to declining biodiversity and ecosystems becoming a global issue.

For instance, one measurement to show the impact of human activities on nature is the Ecological Footprint; this data points out that in 2016 Mexico had a deficit on its biocapacity reserves of -1.7[62]; this means that its national ecosystems and their biodiversity in general have been used on unsustainable way[63]. Therefore, NPAs as part of those ecosystems they are constantly under external threat, furthermore they are complex spaces, within which coexist different social, economic, and political interests, and problems to be faced.

The legal Mexican definition of NPA incorporates ecosystems as an objective of protection and restoration. These are defined by LGEEPA as the basic functional unit of interaction of live organisms with each other and these with the environment within a certain time and space.

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Article 26 of the CPEUM notes that the Mexican State shall have a National Statistical and Geographical Information System (SNIEG), its data will be considered official and monitored by the INEGI. In 2017 this Institution calculated that the cost of environmental degradation[71] and depletion was equivalent to 4.3% of Gross Domestic Product (GDP); on the other hand, the environmental protection expenses incurred by the federal sector represented just 0.6 % of GDP in the same year[72]. This information does not include the value of ESs in general nor in NPAs.

In addition, other institutional efforts have been made to show the importance of Mexican biodiversity and its ESs, and how

17,813 million pesos[75]. On the other hand, studies show that changes in mangroves to perform shrimp farming activities are linked to their productivity, the lower the modification of mangroves, the greater the profit[76].

The particular situation concerning Natural Protected Areas and their ESs has been calculated by CONANP and the German Corporation for International Cooperation (GIZ, by its acronym in German), called "EcoValor Mx Assessment of ecosystem services in Natural Protected Areas[77]", and its results show the following data[78]:

Agricultural sector: NPAs provide ESs such as pollination, erosion control, and water

The EcoValorMx exercise highlights, including others: 1) NPAs and its ecosystem services are important to Mexican development and hu

on Earth[86]. Mexico is among the top 10 producers of 16 different minerals[87], also it has been calculated that in 2010, at least 63 NPAs overlapped with mining concessions and 13 of these also have one or more mining projects[88].

One indirect consequence of mining is the severe toxicological effects on local and downstream aquatic ecosystems, scientists have pointed out the need to define hydrologic connections between surface water, groundwater, and mine workings to understand the source of both water and contaminants in the drainage tunnel discharge[89]. No less important the possible accidents that this activity entails, for example the accidents on August 6, 2014[90], and 9 July 2019[91].

Soil erosion: Activities such as agriculture, monoculture, the use of pesticides, fertilizers, and urbanization contribute to the processes of soil degradation. In 2012 chemical degradation affected 17.9% of Mexican territory; water erosion 11.8%; wind erosion, 9.5%; and physical degradation 6%. In total this is 45.2%, corresponding to 88.7 million ha[92].

Some of the indirect consequences of soil erosion are the decrease in fertility, salinization, loss of productive function, and decrease in water availability. The use of agrochemicals increases the susceptibility of aquatic environments to biological invasions, as loss of habitat in coastal and marine areas, impacting on fishing activities. Approximately 140 pesticides banned in other

[86] CBD. COP 14 Decision XIV.13; IUCN recommendations: WCC-2016-Res-053; WCC-2012-Res-079.

[87]

countries are still in use in Mexico[93]; however, there is no Official Mexican Standard (NOM, by its acronym in Spanish) related to waste management.

leading to immunosuppression[107]. Moreover, the ballast waters[108] of cruise ships constitute a risk factor in increasing the dispersion of invasive species[109].

Despite that this paper is just related to water issues, it is necessary to emphasize as was shown above, that all human activities have an impact on biodiversity and its ecosystems, transforming them, and this leads to the modification and interaction of species, and with them the functionality of the system that causes changes in the cycles of nature, including the hydrological cycle.

The Millennium Ecosystem Assessment underscores that excessive current use of ESs compromises their future availability, and this can be prevented by ensuring that its sustainable use[110]. Latter statement applies also on changes in water availability and quality, including *inter alia* humidity, soil moisture and evapo-transpiration of plants, affect biodiversity, ecosystem functions and the delivery of ecosystem services[111].

Scientists have pointed out that human activities have been absent from the depictions modeling and empirical studies of the hydrological cycle[112]; Mexico is not the exception in this tendency[113]. Those models are essential to help increase understanding of the impact of human activity impacts and influence decision-makers and sectors which use water. (Annex 5).

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[107] United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea, 19th meeting, Discussion Panel on "Anthropogenic underwater noise". Dr. Jonathan Vallarta, Senior Underwater Acoustics Consultant. *Underwater Acoustic Soundscape of Paradise Reef, Cozumel: A Tool for Assessment, and Conservation Planning.*

To summarize, human activities alter the water cycle in three different and interrelated ways[114]: 1) Appropriation of the water; 2) the pollution of the water; 3) change of land surface through activities that include agriculture, deforestation and wetland destruction resulting in disturbances that alter evapotranspiration, groundwater recharge. Also, Climate change is disrupting patterns of water flow and storage at local to global scales; furthermore, some ESs such as carbon cycle and the water cycle that are considered two most important large-scale biogeological processes for life on Earth and that these two cycles are broadly linked [115], has been menaced by climate change.

1.6 Mexican Water issues

Article 27 CPEUM states the principle of public domain of the Nation on natural resources, including surface and groundwater. The Federal Law of the Sea (LFM, by its acronym in Spanish)[116], published in 1986; consists of 65 articles, divided into two parts. The first one sets out the fields of law enforcement, and the second notes the regime applicable to the Marine zones established under UNCLOS.

Article 21 of the LFM states the suppletive norms

services[125]. Latter statement without the responsibility of the municipal authorities noted in article 115, fraction III of the CPEUM.

Also, CONAGUA has the faculty of administration of national goods, among them: The beaches and federal zones, at the corresponding part to the current channels; channels of national water flows; lands of the channels and

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standards were replaced by the NOM-001-SEMARNAT-1996, and two totally different types of water discharges (municipal and industrial) were regulated into a unique NOM.

As part of its mandate, the CONAGUA is responsible for monitoring and supervising the above-mentioned NOM, it is also in charge of assessing and collecting the fees for discharging wastewater. Related to municipal water discharge, this standard establishes a gradual and progressive implementation scheme at the time it was published.

Table 1[137]
Municipal Discharges scheme

Compliance with the deadlines	Population range
January 1, 200	More than 50,000 habitants
January 1, 2005	From 20,001 to 50,000 habitants
January 1, 2010	From 2,500 to 20,00 habitants

Table 2[138]
Other uses discharges scheme (Industrial)

Compliance with the deadlines	Type of pollutant

industrial wastewater was treated. Also, in 2013, 44.1% of the sites evaluated report contaminated to heavily contaminated quality for the indicator Chemical Oxygen Demand (Annex 7).

According to Article 51 of the Federal Law on Metrology[140], NOMs shall be reviewed every 5 years since enforcement, this does not imply its necessary amendment. In that regard, in its first quinquennial review (2002), NOM-001-SEMARNAT-1996 was ratified to allow compliance with the standard, by the terms established in Tables 1 and 2.

It is noteworthy that since NOM-001-SEMARNAT-1996 was published its parameters have not modified[141]. The need to update those standards has been pointed out by the Mexican Senate[142]* and civil organizations[143], considering the new technological advances in wastewater treatment plants, the existence of similar international regulations, and the low standards compared with other countries. At the time of writing, this NOM continues to be in the amendment stage[144].

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[139] *Estadísticas del agua en México,* 2017, p.134. In 2016, 2 536 municipal treatments plants existed.

[140] Published in DOF 1 July 1992, last amendment 15 June 018.

[141]

Table 3[145]
Comparation of Maximum allowable concentration

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1.4 Impacts on ecosystems and their biodiversity

Among the various polluting materials established in the NOM-001-SEMARNAT-1996, the follo

nutrients from wastewater treatment plants or runoff from various land uses also adds to the problem[152].

Eutrophication[153]**:** The input of nutrients to the sea from land-based activities[154] is increasing globally and has led to eutrophication of coastal and near-shore waters. This is among potentially the most damaging o all human influences on the oceans, in terms both of scale and

[158]* that is also a Ramsar Site, where detected pollution from wastewater discharges, by the reason of the treatment plants, were not in operation, as well as the infiltration of agrochemicals and sediments as a result of soil erosion in the upper and middle part of the basin, which has brought cons

pollution of the oceans and affect the most productive areas of the marine environment; in particular, pollution from sewage has a massive effect on health worldwide[162].

'We are living in a dangerous age. Human beings are controlling and dominating the nature, before they have learned to control themselves' Albert Schweitzer

CHAPTER 2. INTERNATIONAL FRAMEWORK RELATED WITH PROTECTION AND PRESERVATION OF MARINE PROTECTED AREAS

Article 133 of the CPEUM establishes that all treaties in accordance with the Constitution will be the Supreme Law of all the Union. Therefore, all international treaties that Mexico ratifies are not just national aspirations; they are part of the Mexican legal system, and its obligations need to be fulfilled.

This chapter analyzes three Multilateral Agreements (MAs): UNCLOS, CBD, and the Ramsar Convention and synergies to the protection and conservation of marine ecosystems and biodiversity through area-based conservation measures, such as MPAs. Since there is a relationship between all ecosystems, this chapter also refers how through the years, the CBD and the Ramsar convention have pointed out the close relationship with inland waters and marine and coastal ecosystems, and its implications on water cycle and freshwater resources. Following by the discussion on some State obligations under these MAs in order to promote the sustainable use of those ecosystems.

It is noteworthy that these instruments outline general and minimum standards to reach the objectives on each Multilateral Agreements, and over time more accurate interpretations have been issued to guide the actions of the States to achieve the objectives of those MAs.

In the second section, two important instruments for the international community are discussed. First, s up the seventeen Sustainable Development Goals (SDGs), two of which are analyzed SDG 14 (life below water) and SGD 6

[162] GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP. *Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection) and Advisory Committee on Protection of the Sea, 2001. Op. cit,* p. 26, 42.

(clean

established [166], this prescribes general principles and measures to prevent, reduce and control pollution in the marine environment. Its provisions should be considered as an important step in the codification and progressive development of the Law of the Sea [167].

For this paper, it is important to analyze three primary obligations of Part XII: 1) the creation of MPAs, 2) the relationship to other international instruments, and 3) the prevention and control of Land Based Sources of Marine Pollution (LBSMP).

Firstly, Article 194 (5) recognizes[168] and the need to take measures to protect and preserve the habitat of depleted, threatened or endangered species and other forms of marine life. The recognition of vulnerable ecosystems had substantial consensus during the Third United Nations Conference on the Law of the Sea[169]. On this subject, Part XII undoubtedly plays an important role in the protection of these vulnerable ecosystems, for instance, when there is a threat from LBSMP or other sources of pollution.

Also, the importance of area-based conservation measures, including MPAs [170] and their conservation and management for different goals[171], has continuously been pointed out by the international community at the United Nations General Assembly (UNGA) on its resolutions

[166] The explanatory statement of the LFM recognizes the active participation of the Mexican delegation in the Third United Nations Conference on the Law of the Sea. Mr. Jose Luis Vallarta leaded the informal meetings on protection and preservation of the marine environment.

[167] James Harrisson, *Saving the Oceans Through Law, The international Legal Framework for the Protection of the Marine Environment.* Oxford University Press, United Kingdom, 2017, p. 23.

[168] During the United Nations of Human Environment (Stockholm, 1972) in recommendations 36, 37 encourage governments to cooperate in the management of Protected Areas. The recognition of this necessity was also pointed out in 1975, at the 12th General Assembly of the International Union for Conservation of Nature and Natural Resources (IUCN), adopted three resolutions urging governments to establish marine parks, to conserve critical coastal marine habitats, mangroves, and its habitats.)

[169] 38th

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The provisions mentioned in article 237 should not be viewed solely as a text of law, as they are also a political document [178]. In that regard diverse files have been raised through competent international organizations or diplomatic conferences, establishing global, regional rules and standards[179].

Even though some of those documents are considered *Soft Law*[180] they set guidelines for the protection and preservation of the marine environment, among these instruments are: the Montreal Guidelines for the Protection of the Marine Environment against Pollution from Land-Based Sources[181], Agenda 21[182], Rio Declaration[183], the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)[184].

At the regional level[185] the 'Protocol Concerning Pollution from Land-Based Sources and Activities[186] derived from The Convention for the Protection and Development of the marine

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[177] Paragraph 284. The Tribunal acknowledges some overlap in the subject matter of Part XII of the Convention and ion to protect and preserve the marine environment, which may be broadly enough worded to include

[187]. It is noteworthy that Mexico is not party to the Protocol, even though it participated in the negotiations.

Thirdly, as was mentioned in Chapter 1, there are some direct (overexploitation) or indirect threats to the marine ecosystem, such as biological and chemical pollution. Part XII of UNCLOS refers to the various sources of pollution[188]; among them are those noted in articles 194 (3.a)[189], 207 and 213 that point out the potential damage to the marine environment from Land Based Sources (LBS), article 207 states:

> Article 207. Pollution from land-based sources
>
> 1. States shall adopt laws and regulations to prevent, reduce and control pollution of the marine environment from land-based sources, including rivers, estuaries, pipelines and outfall structures, taking into account internationally agreed rules, standards and recommended practices and procedures.
>
> 2. States shall take other measures as may be necessary to prevent, reduce and control such pollution.

release of toxic, harmful or noxious substances, especially those which are persistent, into the marine environment.

The negotiation of LBSMP was not difficult to spell out, since no

1.1(4)[195]; for instance, the General Law of Ecological Balance and Environmental Protection (LGEEPA) definition of pollution[196], clearly is weaker than the one in UNCLOS. Also, as was pointed out in Chapter 1 Mexico, has low standards related to sewage.

2.2. The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat (The Ramsar Convention)

The Ramsar Convention[197] is considered the first modern Multilateral Environmental Agreement (MEA) on the conservation and sustainable use of certain ecosystems, the wetlands whether inland or coastal. Its provisions are relatively straightforward. As with many other MEAs the continual development of its provisions is through the adoption of decisions by its Conference of the Parties (COP)[198], which provides guidance for achieving the main goal of each Convention.

It is noted that COP decisions under the Multilateral Agreement discussed in this paper are formally non-binding and are consider *Soft Law* a variety of non-binding normatively worded instruments used in contemporary international relations by states and international organizations [199].

Article 1 defines wetlands as a marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including

[195] Article 1 Use of terms and scope 1. For the pu

areas of marine water the depth of which at low tide does not exceed six meters. In that regard, the CBD-

Convention at national level, as well as the need to establish

Development of the Marine Environment of the Wider Caribbean Region[217]. Hence, it is noted that there is a mutual supportiveness in CBD and Ramsar Convention.

2.3. The Convention on Biological Diversity

The Convention on Biological Diversity (CBD) [218] is the only international instrument comprehensively addressing biological diversity; at the time of its creation, it was novel in encourage partnership between national and local authorities, local and indigenous communities, and the private sector[219]. CBD also recognizes that the conservation of biological diversity is a common concern of humankind[220]; noted also in the World Charter of Nature[221]; the need of participation between national, local authorities, communities and other stakeholders was also recognized in recently in the Paris Agreement, this shows the importance of promoting participation among different stakeholders for facing environmental issues.

Article 1 establishes three main goals: 1) the conservation of biological diversity; 2) the sustainable use of its components; 3) the fair and equitable sharing of the benefits arising from the use of genetic resources. The separation of these two objectives does not imply that they are isolated objectives, the separation has its origins in the wishes of the developing countries who wanted to emphasize the importance of using the components of biological diversity in a sustainable way[222]. The focus of the follo,.067 Tm0 g0 G 0.06 Tc[mhd39 Tm4 oph(the)-2will2(no)]

regulate surface, groundwater and coastal water resources. It also underscores the need for coordination and collaboration between all sectors using water and other resources associated with inland water ecosystems to avoid negative impacts on biodiversity and ESs.

No less important is the recognition of cooperation under CBD for improving the coherent implementation of biodiversity with other conventions and international organizations and initiatives, including the Ramsar Convention[230]. It

account the vulnerability of the environment, the limitations of science, the availability of alternatives, and the need for long-term, holistic environmental considerations, thus operating as a safeguard against asymmetric information and imperfect monitoring [244].

In this respect, the precautionary principle has been addressed by international tribunal[245], and it has also motivated decision under COP- CBD that allow the protection of marine ecosystems, such as, decision II/10 on conservation and sustainable use of marine and coastal biological diversity[246], decision IX/16.Biodiversity and climate change[247]; decision IX/20. Marine and coastal biodiversity[248].

The EIA should be a minimum standard for pursuing the sustainable use of nature, and its importance has been recognized under other MAs, such as the Ramsar Convention[249], and together the CBD a Voluntary guidelines on biodiversity-inclusive impact assessment [250].

To summarise, under UNCLOS, CBD and the Ramsar Convention, as shown above, the importance of area-base management conservation issues, such as Marine Protected Areas, has been underlined. The latter two instruments state the need to formulate and implement plans to manage and promote the conservation, protection and the sustainable use of those MPAs and their biodiversity.

Furthermore, either in legal texts or subsequent decisions, the need for coherent implementation between these instruments has been noted. In addition, attention has been drawn to the fact that LBSMP represents the most serious menace to the seas, consequently several biding and non-binding instruments have been developed to deal with this issue. Therefore, is essential to emphasize mutual concerns and synergies related to the reduction of LBSMP in MPAs.

As Mexico is part of UNCLOS, CBD, and the Ramsar Convention, it is necessary to create coordination among federal institutions implied in the fulfillment of those MA. For instance, in the case of LBSMP, the two main organisms related with water quality and quantity and NPAs

In that regard, measures for the conservation and maintenance of ecosystems and biodiversity have been include on the international agenda. For instance, at the maximum international fora, and some MEAs commitments on marine protection have been made, two of these instruments are discussed in the following section.

2.4 The Sustainable Development Goals

The Sustainable Development Goals (SDGs) were built on the progress made by the Millennium Development Goals[251]. However, in those objectives, the ocean and seas were given a marginal

Development Goals and 169 targets. Those goals, as pointed out at the resolution, have indivisible character and should be interpreted on an integrated manner[253].

Furthermore, the UNGA resolu
provides further clarity to the interpretation of SDG 14 targets and their alignment with EA[254], it also strengthens the significant importance of the ocean in the environmental and political agenda and calls for accelerated actions to prevent and significantly reduce marine pollution of all kinds, particularly from LBS[255].

That ambitious Agenda addresses the global challenges that as humans we face, it brings its own social, political, administrative and economic challenges at national and international level.

Despite the fact that this paper is related to the protection of ecosystems through NPAs, it is noteworthy that SDGs and Aichi Targets point out the need f
product [256], this as a cornerstone of sustainable use of biodiversity, that urgently requires the reduction of our ecological footprint by changing the way we produce and consume goods and resources; for instance 3% percent59(/F2 1 0 612 7/2 Tf1 0 0 1 209.69 421 69Gq0.00000912 0 612s7n/.69 421

faces[263]. Therefore, there is a need for coherent governance on environmental issues and to underline the indivisible character and integrated interpretations of SDGs.

In that respect, SDG 6 (clean water and sanitation) plays an important role in protecting hinterland water ecosystems and marine ecosystems. Some negative impacts, of hazardous materi

2.5

It is highlighted that Target 11 states quality elements, these are: ecological representativeness, particular importance for biodiversity and ecosystem services, management equity and effectiveness, connectivity conservation, integration into wider landscapes and seascapes.

For instance, the need to use connectivity measures such as the development of ecological networks, ecological corridors, and the restoration of degraded habitats and landscapes has been pointed out as a mechanism to address climate change impacts and increase resilience to climate change[270].

Related to other effective area-based conservation are considered as a geographically defined area other than a PA, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the *in situ* conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio economic, and other locally relevant values[271].

On the other hand, Aichi target 14 points out the need to restore[272] and safeguard ecosystems that provide essential services, including services related to water, and which contribute to health, livelihoods and wellbeing. In that regard, the need to pursue restoration of degraded habitats is emphasised, in order to maintain their integrity, structure, functioning, resilience and persistence in those PAs.

The IPCC highlights that the far-reaching services and options provided by ocean and cryosphere-related ecosystems can be supported by protection, restoration, precautionary ecosystem-based management of renewable resource use, and the reduction of pollution and other stressors (high confidence). Integrated water management (medium confidence) and ecosystem-based adaptation (high confidence). Restoration of vegetated coastal ecosystems, such as mangroves, tidal marshes and seagrass could provide benefits, such as providing storm

[270] CBD. COP 10. Decisions X/31, paragraph14 (a); X/33 paragraph 8, (d) (iii).

[271]

protection, improving water quality, and benefiting biodiversity and fisheries (high confidence)[273].

In order not to duplicate efforts, the Aichi indicators may be used for a variety of purposes at national, regional and global levels, including, Aichi Targets mainstreaming within other international processes, in particular SDGs, by facilitating the integration of biodiversity in other processes through shared indicators or aggregated or disaggregated elements[274].

Despite those quantity conservation efforts, scientists have pointed out that they might be insufficient to meet due to the continued biodiversity loss[275], therefore some international nongovernmental organizations such as IUCN urgently increase the ocean area that is effectively and equitably managed in ecologically representative and well-connected systems of MPAs or other effective area-based conservation . This network should target protection of both biodiversity and ecosystem services and should include at least 30% of each marine habitat. The ultimate aim is to create a fully sustainable ocean, at least 30% of which has no extractive activities [276].

The latter statement represents a big challenge, considering that under the CBD- COP[277] it is noted that an effective marine and coastal biodiversity would comprise sustainable management practices and actions to protect biodiversity over the wider marine and coastal environment, including integrated networks of marine and coastal PAs consisting of: (a) Marine and coastal protected areas, where threats are managed for the purpose of biodiversity conservation and/or sustainable use and where extractive uses may be allowed; and (b) Representative marine and coastal protected areas where extractive uses are excluded, and other significant human pressures are removed or minimized, to enable the integrity, structure and functioning of ecosystems to 603.94 Tm0 g0 G

At the national level, the use of natural resources, including water resources and the utilization of water bodies as a tip requires changes for the conservation of protected areas; additionally, of how the institutions, society, and other stakeholders deal with the preservation and protection of water resources. It therefore challenges our

will only succeed if the key drivers of biodiversity and ecosystem service loss are addressed in the whole planet [278].

First, it was necessary to civilize man in

also discusses legal instruments aimed at promoting water discharge quality, and

The implementation of the EA means that more integrated or holistic concepts are needed in order to move away from protection on the species level to the conservation of habitats or ecosystem networks, as well as from area protection to integrated land use planning[284].

In that regard, as noted in Chapter 2, there is a need for regulation or managing biological resources important for the conservation of biological diversity whether outside or within NPAs[285], this means that not just PAs are recognized for conservation purposes or subject to regulation, management and conservation targets, all the natural resources, should be used in a sustainable way.

The central concept of EA is integration, and attempts to remove artificial barriers between economics, social science and ecology[286]. This methodology can be used to seek an appropriate balance between the conservation and use of biological diversity in areas where there are both multiple resource users and important natural values[287], including the work in PAs and ecological networks[288]. As pointed out in Chapter 1, in the national context many human activities are performed within or near those NPAs including MPAs, as a result theird o

they are complementary and interlinked[290]. A *soft law* instrument called

interactions

biodiversity. This approach calls for increased intersectoral communication and cooperation at a range of levels (government ministries, management agencies)[313].

Uncoordinated sectoral initiatives only add complexity and uncertainty regarding the use of EA, in that regard, exchanging information, whatever is appropriate, is essential for effective management [314]. At the national level, many ministries interact within or out NPAs, those activities impact in NPAs, including MPAs, as showed in Chapter 1.

Related to the poor understanding of ecological processes, it is noteworthy that Principle 11 states the need to consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices. In that regard, scholarly reflections highlight that ESs as an area of research, provides an opportunity for those from the natural and social sciences to work together in a novel and, more significantly, an integrated way. It is very important for there to be a common language and dialogue between the natural and social sciences [315]. In this detail, the broader perception of ecosystem services under IPBES brings the opportunity to integrate different environmental worldviews, also to better understating the impacts of biodiversity loss on the most vulnerable sectors and in general, to human wellbeing.

Even though the concept of EA does not yet have a universally accepted definition, the need for its urgent application has been pointed out in various [316] international regimes, among others, the Food and Agriculture Organization of the United Nations which applies the concept to Fisheries[317], and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[318], as well as UNCLOS and the Ramsar Convention that will analyzed in next sections.

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[313] CBD. SBSTTA 9 Recommendation IX/6, paragraph 9.

[314] UNEP/CBD/EM-EA/1/3 Expert es of the ecosystem approach and

[315] The Challenges of Implementing an Ecosystem Approach Professor Edward Maltby, Director, SWIMMER, University of Liverpool. In

COP to address questions arising in other international environmental agreements, thereby serving to ensure mutual supportiveness among them[324].

3.1.3. The Ramsar Convention

Despite the fact that the provisi1l:s-2( )3349(tof)]TJETQ0.00000912 0 612 792 reW* nBT/F2 12 Tf1 0 0 1 21

Principle 1. The Ramsar Convention is the global intergovernmental treaty that specifically addresses the conservation and wise use of coastal zone ecosystems.

Principle 2. The full incorporation of wetland conservation and wise use issues into ICZM is essential for a successful sustainable coastal management process.

Principle 3. Coastal wetlands have important values and functions and provide multiple goods and services of high economic value.

Principle 4. Mechanisms to resolve jurisdictional overlap in the coastal zone must fully include the legal and institutional frameworks for wetlands.

Principle 5. Many stakeholders use coastal wetlands and must participate fully in their management.

Principle 6. The designation and management of Wetlands of International Importance in the coastal zone provides a global mechanism for the identification and recognition of critically important parts of coastal zone ecosystems, as the basis for their sustainable management.

Principle 7. Coastal wetlands are highly vulnerable to degradation and loss, but although easily degraded their restoration is costly and sometimes impossible.

Principle 8. ICZM should be linked with river basin/catchment management and oceans and fisheries management so as to secure the conservation and sustainable use of coastal wetlands.

As some scholarly reflexions emphasize different challenges for the implementation of *Malawi Principles.* The above principles also highlight some issues for its operation, for instance: The unclear jurisdictional powers of sectoral managers and decision-makers (Principle 4); the need for coordination and participation within all stakeholders at the local (Principle 5); the poor understanding of coastal wetlands as an economically and ecologically critical element of coastal areas, including the duty of EIA (Principle 2)[328]; the necessity for valuation of ESs, in order to weigh up alternative strategies for the sustainable use of biodiversity (Principle 3).

As noted, some of these issues are similar to the ones pointed out by the *Malawi Principles*. First, the basis for better understanding of the ecological process, its interactions and outcomes, in order to manage ecosystems. Second, the need for coordination and participation at different levels, and stakeholders. Third, the necessity for valuation of ESs.

Furthermore, principle 8 underscores that the influences and linkages of the coastal zone extend far beyond its boundaries: hinterland linkages are extended over the area of entire river

[328] Ramsar handbooks for the wise use of wetlands 4th edition, 2010. Appendix 1. ICZM definitions, terms, and current approaches, paragraph 26.

up by some *soft law* accepted in the international community, such as the precautionary principle. On the other hand, some principles still need a wider inte

Hydrocarbons Sector (ASEA) [334] , the National Commission of Natural Protected Areas (CONANP); the National Commission of Water (CONAGUA).

Due to the change of federal government last December 2018, and to the fact that the new Ministerial or Sectorial Program (as named in Mexico) has not been published yet, the national

Related to latter statement and some of the challenges to applying the *Malawi Principles* it is worth mentioning that part of the problem stems from the overlap between CONAGUA and PROFEPA, which share responsibilities for inspection of sewage outflow into national water bodies, but follow different administrative laws[338] and different statutory deadlines.

Another example, as pointed out in Chapter 1, is a lack institutional capacity and commitment of some States and municipal authorities to improve sewage treatment and its disposal into natural waterbodies[339]*.

Moreover, the last two National Water Programs[340] (PNH, by its acronym in Spanish) recognized the issues related to overexploitation and pollution of the watershed. The threats to hinterland ecosystems (ground, rivers, lakes, wetlands, aquifers, estuaries and coastal waters, etc) have an

It is interesting to note that under the LGEEPA and L em fore this concept was submitted by COP- CBD. Nevertheless, both instruments include general statements related to the *Malawi Principles*.

For instance, the LGEEPA recognizes that ecosystems represent a common heritage of society, and that the life and production possibilities of the country depend on them[344]. On the other hand, LAN mentions general issues related to EA, such as, the economic and social assessment of the waters, the sustainable use of water resources and the restoration of the balance of vital ecosystems linked to water[345]. Moreover, it is worth noting that the LAN emphasizes the Integrated Water Resources Management as a methodology for management water resources[346].

Summarizing, the LGEEPA points out the need for sustainable use of natural resources. However, it does not provide a methodology about how this sustainable use should achieved. On the other hand, the LAN clearly uses the Integrated Water Resources Management. Nevertheless, both laws set up some measures in order to regulate the wastewater discharge and coordinate efforts to improve the quality of that sewage.

The next section will be discussed some instruments related to overexploitation and quality issues, mainly to wastewater discharge. In this regard, it is noted that some *Malawi Principles* could apply to analyzes those national instruments, such as, principles 1 related to management objectives are a matter of societal choice; principle 4 link with the need to internalize costs; and principle 6 which refers to ecosystems limits.

3.2.1. The National Water Commission

3.2.1.1 The NOM-001-SEMARNAT-1996

As mentioned in Chapter 1, CONAGUA has the faculty to give the permissions for sewage discharge into natural water bodies, on condition that wastewater receives the treatment required in the standards before its final disposal in the national receiving water body. This agency is

[344] LGEEPA article 15, fracction I.

[345] LAN articles 6, fraction I, 7, fraction XI, 14 BIS 5.

[346] LAN articles 3, fractions XXIX, XLIII; 7 fractions I and VI.

responsible for monitoring and supervising the NOM-001-SEMARNAT-1996, it is also in charge of assessing and collecting the fees for discharging wastewater.

NOM-001-SEMARNAT-1996 sets up very low parameters of water discharge compared to other countries; it also has not been updated in twenty-one years. Because this NOM collects from two different wastewater sources (industrial and municipal), it does not consider some industrial pollutants such as pesticides, color, some pharmaceutical waste, etc.

Beyond the critical need to update the NOM-001-SEMARNAT-1996 and the need to include some industrial pollutants; it is highlighted that this standard refers in general to different types of national water bodies used as a tip[347], those are:

1) natural receiving bodies -rivers-;
2) natural or artificial reservoirs;
3) coastal waters; and
4) ground, including underground and wetlands.

The classification of those types of water bodies do not consider some characteristics of the land or geographical situation. For instance, the Peninsula of Yucatan is a region highly susceptible to contamination of its groundwater, aquifers, and coastal waters because of its unique karst geology which is composed of highly permeable limestone deposits. The limestone rocks permit a rapid recharge of water from the unsaturated zone to the saturated zone to the underground aquifer system. On the other hand, this permeability makes it extremely threatening to the aquifer by allowing contaminants such as pesticides, and sewage, among others, to be infiltrated quickly[348].

Furthermore, groundwater can transport various materials, allowing the flow of nutrients from the continental zone to marine environments. As pointed out by this region has a very fast water cycle. It only takes seven days for the polluted surface water to go into the

[347] LAN article 3, fraction XVII and the NOM NOM-001-SEMARNAT-

underground water syste [349]. In the Peninsula Yucatan region twenty-five Natural Protected Areas exist, of which twenty are MPAs, some of the dangers were pointed out in Chapter 1.

Indeed, the LGEEPA forbids direct wastewater discharge within NPAs[350], including MPAs. However, this measure has not been enough to stop the pollution into those Protected Areas, since as underscored in this paper all the ecosystems are interconnected, and rivers and lakes drain the pollution to MPAs; besides, those NPAs face other threats as shown in Chapter 1.

3.2.1.2 The Water Body Classification Declarations

The NOM-001-SEMARNAT-1996 and the National Waters Law

PDC)[355], these are specific and higher standards compared to the NOM. They are determined by CONAGUA according to a specific use or user group or a specific receiving body of water. Some PDC are stated in the Water Body Classification Declarations. these instruments shall consider the National Waters Law prescriptions, article 87 states:

> ARTICLE 87. The CONAGUA shall determine the limits that the discharges must meet, the capacity for assimilation and dilution of the national water bodies and the loads of pollutants that they can receive, as well as the quality goals and the deadlines to reach them, by issuing Declarations Classification of the National Water Bodies, which will be published in the Official Gazette of the Federation, as well as their modifications, for their observance. Those declarations shall contain:
>
> I. The delimitation of the classified water body;
>
> II The limits that the discharges must meet according to the body of water classified according to the previous points (is the regulation of this Law);
>
> III. The body's ability to classify diluted water and similar contaminants,
>
> IV. The maximum download limits of the pollutants analyzed, basis for

It is highlighted that the Declaratory were submitted after the recognition of high-level of pollution. And, as well as the LFD, these instruments just recognize two main issues related to the receiving body of water: the capacity for assimilation and the dilution of the catchment area, they do not consider the ecosystems, their biodiversity nor the proximity of NPAs.

It is underscored that this instrument is used as a reactive action, when the limits of the bodies of water where exceed, they also allow a gradual and progressive implementation scheme to fulfill those parameters.

3.2.1.3 The ecological flow in hydrological basins

In recognition of the overexploitation issue and as pointed out in Chapter 2, under the Ramsar Conventions resolution XII.12 Mexico suggested a process for the creation of water reserves for wetlands. In that regard, CONAGUA issued the standard *'NMX-AA-159-SCFI-2012. Which establishes the procedure for the determination of ecological fl*

The main goal of this NMX is to establish a balance between environmental conservation, social functions and uses of the superficial water resources. It is noteworthy that CONAGUA, CONANP and Non-Governmental Organization [361] have been working together on the implementation of the NMX-AA-159-SCFI-2012 in order to decree ecological flow in

of Welfare. Despite the activities mentioned in Chapter 1, which threaten MPAs; it is noted that the Secretariat of Tourism and CONANP are not officially part of the watershed councils.

The the *Malawi Principle* 1, where society can participate in the decision-making. These councils authorize their own rules of operation, as a result CONANP has been invited to participate in some Watershed Councils Protection Area of Flora and Fauna [365]. This circumstance is a step towards the involvement of other relevant stakeholders in the management of ecosystems, and specially NPAs including MPAs.

CONAGUA also has created eighty-

conservation of ecosystem services, and the participation of society in the conservation of NPAs[369].

In 2014, CONANP submitte [370] that also app

scientific information in order to recover ecosystems (p
Q F2 12 W* n Q 0.00000912 0 61 Q

The sea, the great unifier, is man's only hope. Now, as never before, the old phrase has a literal meaning: we are all in the same boat. Jacques-Yves Cousteau.

CHAPTER 4. CHALLENGES AND OPPORTUNITIES FOR PROTECTION AND PRESERVATION OF NATURAL PROTECTED AREAS AND MARINE PROTECTED AREAS

This Chapter outlines some national opportunities and gaps related to the fulfillment of CBD and the Ramsar Convention, in order to preserve Natural Protected Areas. It also identifies some gaps that Mexico should consider in the protection and conservation of NPAs, including MPAs. Following the discussion on Mexico's efforts to carry out the Sustainable Development Goals and the Aichi Targets, outlined in Chapter 2. The second part focuses on the national instruments that would allow better protection of water quality on the marine ecosystem, especially Marine Protected Areas.

4.1 Analysis of compliance and gaps in international commitment

4.1.1. The Convention on Biological Diversity

As discussed by the Multilateral Agreements outlined in Chapters 2 and 3, there is a need for the best

The general analysis of biodiversity aims to preserve the representative natural environments and the most fragile ecosystems to ensure the balance and continuity of evolutionary and ecological processes. The classification of these priority areas, the description of their physical, biological and social characteristics, as well as the problems and recommendations identified, do not intend to be an exhaustive and final revision. CONABIO divided those representative regions into three, these are:

Priority Terrestrial Regions[375] (Annex 9)
Priority Hydrological Regions[376] (Annex 10)
Priority Marine Regions[377] (Annex 11)

Related to the latter one, 70 priority coastal and oceanic areas were identified, among them, 58 are considered high biodiversity areas, of which 41 present some threat to biodiversity, also 9 biologically essential regions were identified. CONABIO also pointed out that 3 areas have no classification due to the limited data.

The data related to Priority Regions have been used for the creation of new Natural Protected Areas[378], including MPAs; together those PAs constitute the *'Mexican National System of Natural Protected Areas'* in the charge of CONANP. Currently Mexico has 182 Natural Protected Areas of which thirty-seven are Marine Protected Areas.

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and use of natural resources aimed at conserving the national ecosystems and generate criteria for their sustainable management.

[375] 151 priority terrestrial regions were identified, covering 504 796 km2. Those priority terrestrial regions were spatially defined according to natural features of the landscape, including topography, watersheds, soil and vegetation types, together with the range of distribution of certain key species. The presence of NPAs, as well as firsthand knowledge provided by the experts were also considered when defining the final boundaries of the priority terrestrial regions http://www.conabio.gob.mx/conocimiento/regionalizacion/doctos/Tabstract.html (accessed on 31 October 2019).

[376] 110 drainage basins of top priority considering biodiversity were identified, 82 correspond to areas in use and 75 are biologically rich areas with potential for conservation; within these two categories, 75 are threatened in some way. Also 29 areas were identified that are biologically important but for which there is not enough scientific information on biodiversity http://www.conabio.gob.mx/conocimiento/regionalizacion/doctos/Hacerca.html (accessed on 31 October 2019).

[377] 70 priority coastal and oceanic areas were identified, delimited and characterized; those were considered as such because of their high biodiversity, for the variety of their resource uses and for their lack of biodiversity knowledge. CONABIO. http://www.conabio.gob.mx/conocimiento/regionalizacion/doctos/Mmapa.html (accessed on 31 October 2019).

[378] LGEEPA, article 58.

Despite the efforts made by Mexico to protect its natural capital through Natural Protected Areas, some conservation gaps have been identified by CONABIO and CONANP (Map 2). In that regard, it is noted that some areas that contain valuable ecosystems and their biodiversity are still without any legal protection[379].

However, the latter statement is not a suggestion for the creation of more NPAs nor MPAs, since

information within NPAs; however, this agreement was not enforced because it was not officially gazetted[386].

In this regard, it is noted that information under SEMARNAT agencies is scattered and better coordination is necessary in order to develop more precise and useful information. Also, this data should constantly updated, considering that ecosystems are dynamic structures and cumulative effects of interventions o-109(that)-109(e)-5(c)]TJETQ0.00000912 0 612 792 reW* nBT/F2 12 Tf1 0 0 1 30.s1 0

mention of the importance of protection of Ramsar Sites nor the

ion of the Strategy.

To comply

no institutional coordination for the fulfillment of the Ramsar Convention. As a result, in 2005 a and sustainable use of wetlands and the [398] was submitted at the Congress, in order to give it SEMARNAT the authority to lead the coordination within its deconcentrated agencies. This was, however, rejected.

Even though CBD and the Ramsar Convention have pointed out their mutual supportiveness, especially related to ecological inter-linkages between inland, coastal and marine areas, at the national level there is a lack of integrated policies and framework to fulfill both Convention in a mainstreaming way.

Therefore, clearly there is a need under the Administrative Authority, in this case, SEMARNAT, to put in place law coordina
to align commitments to other MEAs, such as, CBD. Moreover, as discussed in Chapter 3, under the CBD- COP, and the Ramsar Convention COP the need for sectoral coordination, exchanging information, and the resolution of jurisdictional overlap have been pointed out.

The following section outlines the national effort for implementing the Sustainable Development Goals and the Aichi Targets related to the protection of marine environment.

4.1.3 The Sustainable Development Goals and the Aichi Targets

that the Sustainable Development Goals (SDGs) have indivisible character and should be interpreted in an integrated manner. It was also noted that the Aichi Targets and SDGs are mutually supportive and reinforcing, and the implementation of one contributes to the achievement of the other.

In this regard, IPBES highlights that ecosystems, their biodiversity, and their services directly underpin the achievement of several of the Sustainable Development Goals, including those related to water and sanitation, c

and 15). Besides, those SDGs are related to the reduction of poverty, hunger, and the improvement of health and well-being and sustainable cities[399].

Council of the 2030 Agenda for sustainable [400]. This Council is a multi-stakeholder body, headed by the President and the Federal Public Administration, it also meets the private sector, civil society, the academia, invites permanently local governments and the Congress.

mechanism to reduce their menace, such as, overexploitation of water and reducing land base sources pollution.

Aichi Target 11 also state a quality target, the Protection of those areas sh
effectively and equitably managed, ecologically representative and well-
this regard, it is noteworthy that, those currently thirty-seven Marine Protected Areas represented seven of the nine Marine Ecoregions identified by CONABIO[404].

i-effectiveness System was designed conside

compromises, such as, the Secretariat of Agriculture and Rural Development to consider a progressive improvement of these standards, and including new industrial pollutants.

Furthermore, PROY-NOM-001-SEMARNAT-2017 recognizes the vulnerability of certain ecosystems[411]:

> Wetlands are an essential and irreplaceable link of the water cycle and strategic because of its biological richness and the environmental services they provide; they are surface waters or shallow depth and low dilution capacity, which requires particular discharge conditions.
>
> Karst ecosystems have a high use value due to their contribution in the water supply, their permeable characteristic and the rapid filtration of their rocks makes this ecosystem very vulnerable to pollution from wastewater discharges and direct contamination of the aquifers.

In this regard, PROY-NOM-001-SEMARNAT-2017 points out the need to consider the limits of and karst soils must comply with the particu [412]. The latter hypothesis leads to two main reflections.

First, this legal hypothesis aims to apply the Malawi Principle 6 which states that when the uncertainty associated with defining the limits to ecosystem functioning under most circumstances, the precautionary approach should be applied.

On the other hand, the hypothesis refers to out in Chapter 3, they are higher parameters than the NOM. However, those PDC have not been t could take years to determine those parameters. Hence, there is a need that those PDC be determined by CONAGUA at the same time that PROY-NOM-001-SEMARNAT-2017 enters into enforcement.

Summarizing, PROY-NOM-001-SEMARNAT-2017 sets up more restrictive parameters,

CONCLUSIONS

The importance of protection of ecosystems and their biodiversity through area-based management has been generally accepted in the international community as a tool of conservations. In this regard, Natural Protected Areas are the main mechanism to conserve and protect biodiversity; its key objectives to the creation are the preservation of representative and fragile ecosystems, the continuity of evolutionary, ecological processes, safeguard of genetic diversity, and to ensure preservation and sustainable use of ecosystems.

Moreover, through this paper were discussed the benefits that people obtain from ecosystems in general, and especially from Natural Protected Areas including Marine Protected Areas, such as, agriculture, forestry, fisheries, reducing risk from extreme weather events, leisure and culture. All those benefits provide the basis of security and sustainability of human well-being and to development.

At the Federal level, two main efforts collect data of the valuation of ecosystem services, and just one focuses on NPAs; it is noteworthy that both studies point out the need to continue these exercises with standardized methodologies that could allow the Mexican Government for mainstreaming biodiversity in other sectors and for tracking effectively all the drivers of biodiversity loss, and to weigh up decisions and strategies related to the conservation, sustainable use of biodiversity.

Despite the fact all those invaluable ESs that ocean and Marine Protected Areas

and their biodiversity, especially, Marine Protected Areas and its relationship to the use of river basins as a tip.

UNCLOS is a cornerstone for the protection of marine environment and a tool for its sustainable use, in two approaches discussed in this paper. Firstly, Part XII of UNCLOS preservation of t , prescribes general principles and measures to prevent, reduce and control different sources of pollution in the marine environment, among them, Land Based Sources Marine Pollution.

This Convention notes that States shall adopt laws and regulations to prevent, reduce and control pollution in marine environment from LBS, including rivers, estuaries, pipelines and considering internationally agreed rules, standards, recommended practices and procedures. Nevertheless, States have the individual duty to measures, and decide what substances and actions should be regulated in order to protect the marine environment.

Secondly, UNCLOS also states the need to protect and preserve rare or fragile marine ecosystems; however, it does not mention how those ecosystems should be established and managed. In this matter, there is a need to take a comprehensive approach with other Multilateral Agreements, such as, the Convention on Biological Diversity and the Ramsar Convention in order to conserve those Protected Areas.

This paper shows the mutual supportiveness between UNCLOS and CBD concerning the marine environment; their legal basis is founded in articles 237 and 22, respectively, and through the years has been recognized in recent decisions of courts and tribunals. Hence, CBD provides a significant framework for implementing article 194.5 of UNCLOS, since it enforces national establishment and management of NPAs, including Marine Protected Areas.

On the other hand, CBD is a cornerstone for the protection of the marine environment in two ways outlined in this paper. First, it comprehensively addresses conservation and sustainable use of biological diversity; moreover, promotes the partnerships between different stakeholders by placing people and how they use natural resource right at the center of the decision-making framework. Additionally, the Convention encourage to the coherent implementation of biodiversity with other conventions, such as, the Ramsar Convention.

CBD-COP notes that the t

which promote the rapid infiltration of pollutants, such as, karst ecosystems. Third, the NOM does not consider some industrial and agricultural pollutants that have been found in Marine Protected Areas. Finally, even though this NOM establishes a gradual and progressive implementation scheme, currently less than 50% of used water is treated417.

On the other hand, a new draft of NOM published in 2018. Related to PROY-NOM-001-

Mexico has made effort to decree large extensions of Natural Protected Areas including MPAs, t

Due to the fact LGEEPA and LAN were published before EA was submitted by COP-CBD, under those main environmental law. Currently, new water law is in the course of consultation; Mexico has the opportunity to improve water issues with an amendment of LGEEPA and the new water law, by promoting broader standards related to wastewater discharge, and not just based on the capacity for assimilation and the dilution of the catchment area.

Furthermore, other the necessary legislative, administrative and public policy reforms should be done, such as, coordination under SEMARNAT agencies related to inspection, surveillance, sanctioning procedure with a uniform legal procedure. As well, SEMARNAT should lead a long-term vision and unify criteria and approaches under its agencies, for face and management of ecosystems, including water quantity and quality, and considering its negative impacts within MPAs.

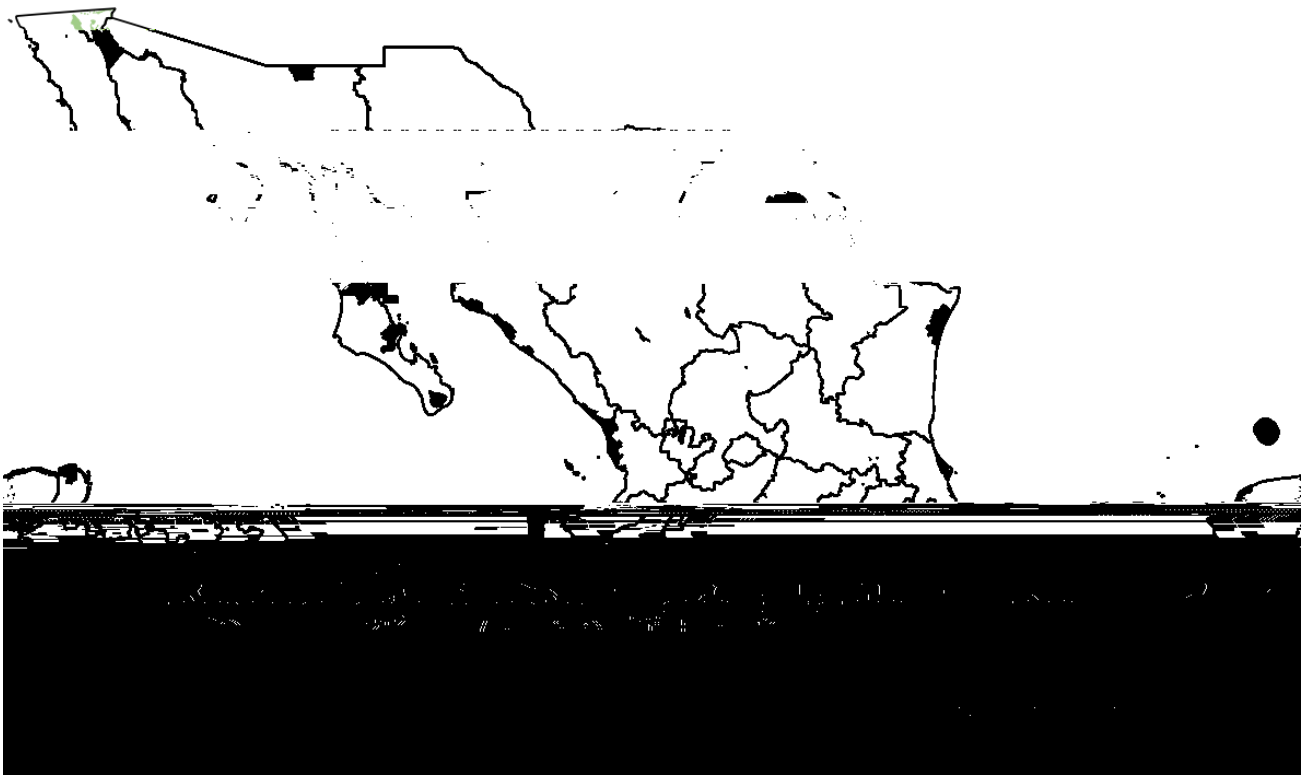
The instruments set up by LAN should be reinforced, for instance Water Bod nBTf/F2 12 Tf1 0 0 1 136.46 6

Annex 1[418]

Social conflicts over water in Mexico

[418] http://osa.fisica.unam.mx/app/mapa_gral.php

Annex 2[419]



[419] CONANP

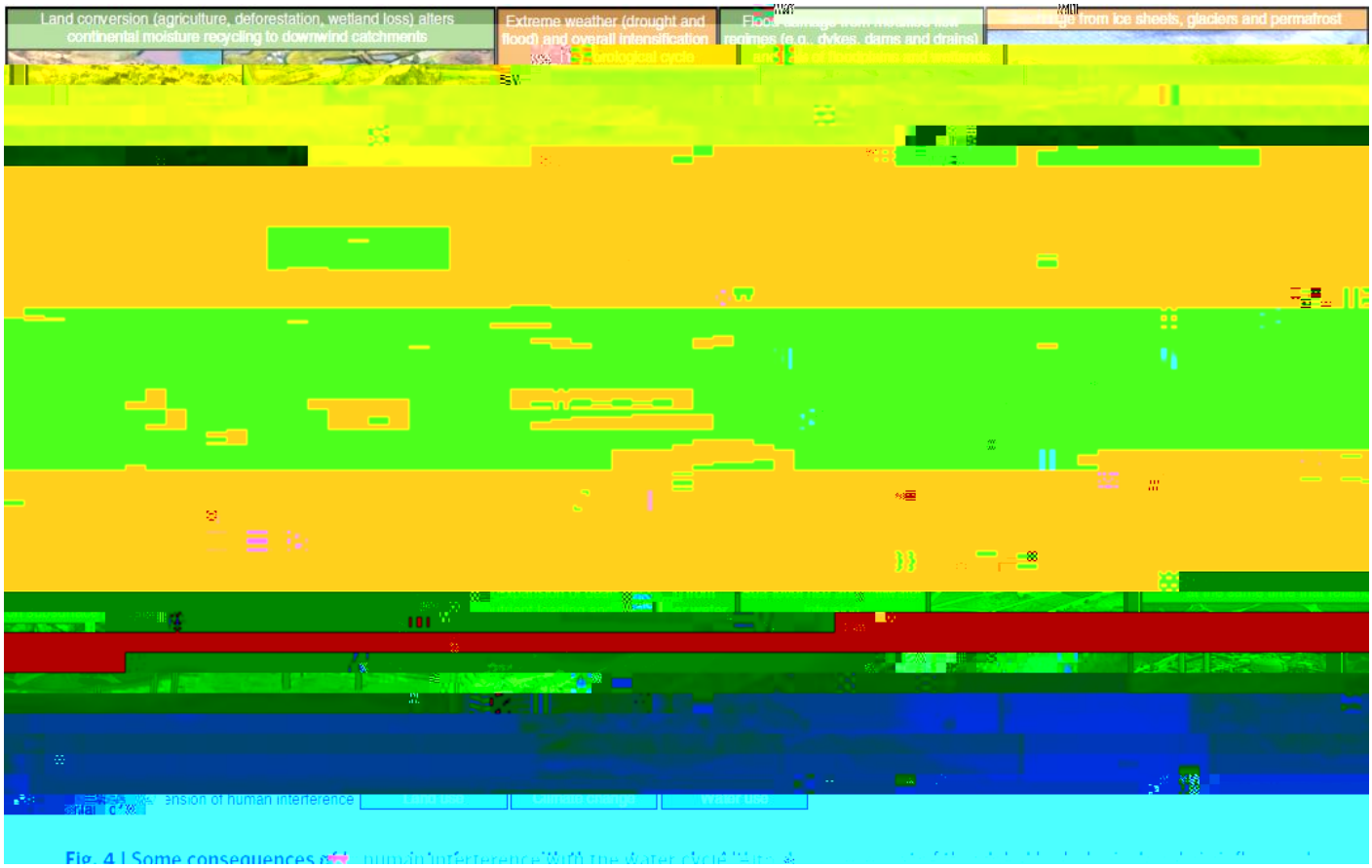
Annex 3[420]

Relationship between NPAs and Ramsar Sites

[420] CONANP. https://www.gob.mx/conanp/acciones-y-programas/sitios-ramsar (accessed on 11 October 2019).

Annex 5[422]

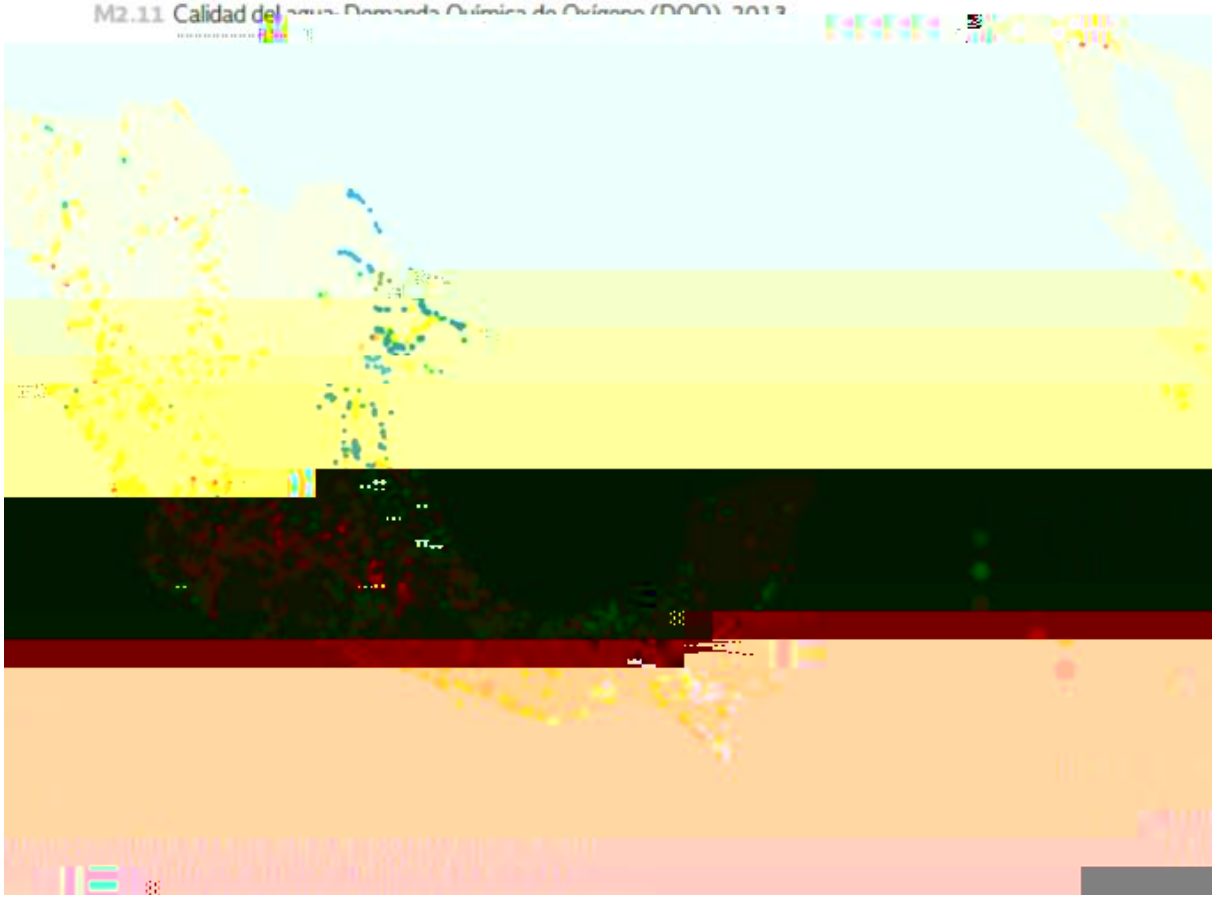
Some consequences of human interference with the water cycle.



[422] Benjamin W. Abbott, and others, Nature Geoscience 12(7):1 *Human domination of the global water cycle absent from depictions and perceptions.* July 2019.

Annex 7[424]

Water quality related to Biological Oxygen Demand (BOD)



[424] SEMARNAT - CONAGUA, *Estadísticas*

Annex 8[425]

Mexican Ministries and agencies related to activities that impact in MPAs

Annex 9[426]

Hydrological-administrative Regions

[426] CONAGUA. https://www.gob.mx/cms/upload

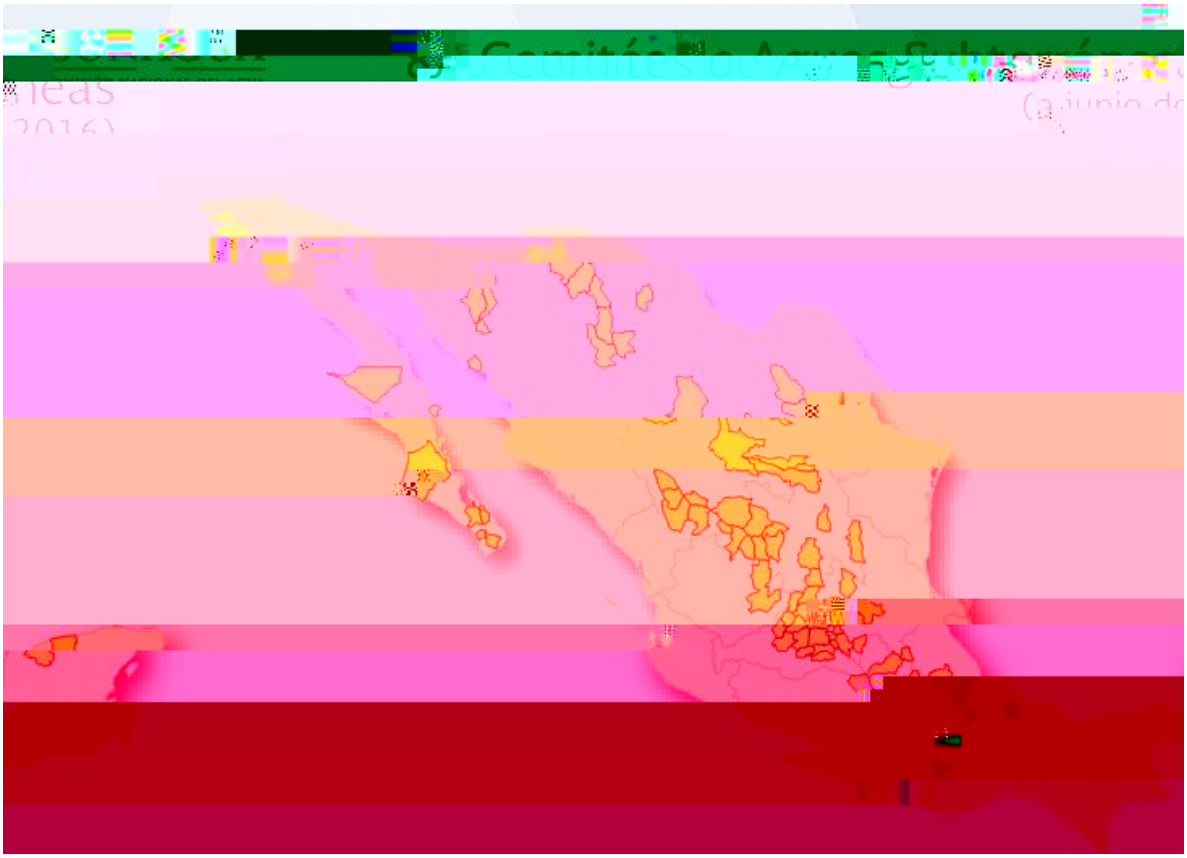
Annex 10[427]

Watershed Councils

[427] CONAGUA. https://www.gob.mx/cms/uploads/attachment/file/110940/Generalidades_Consejos.pdf (accessed on 18 November 2019).

Annex 11[428]

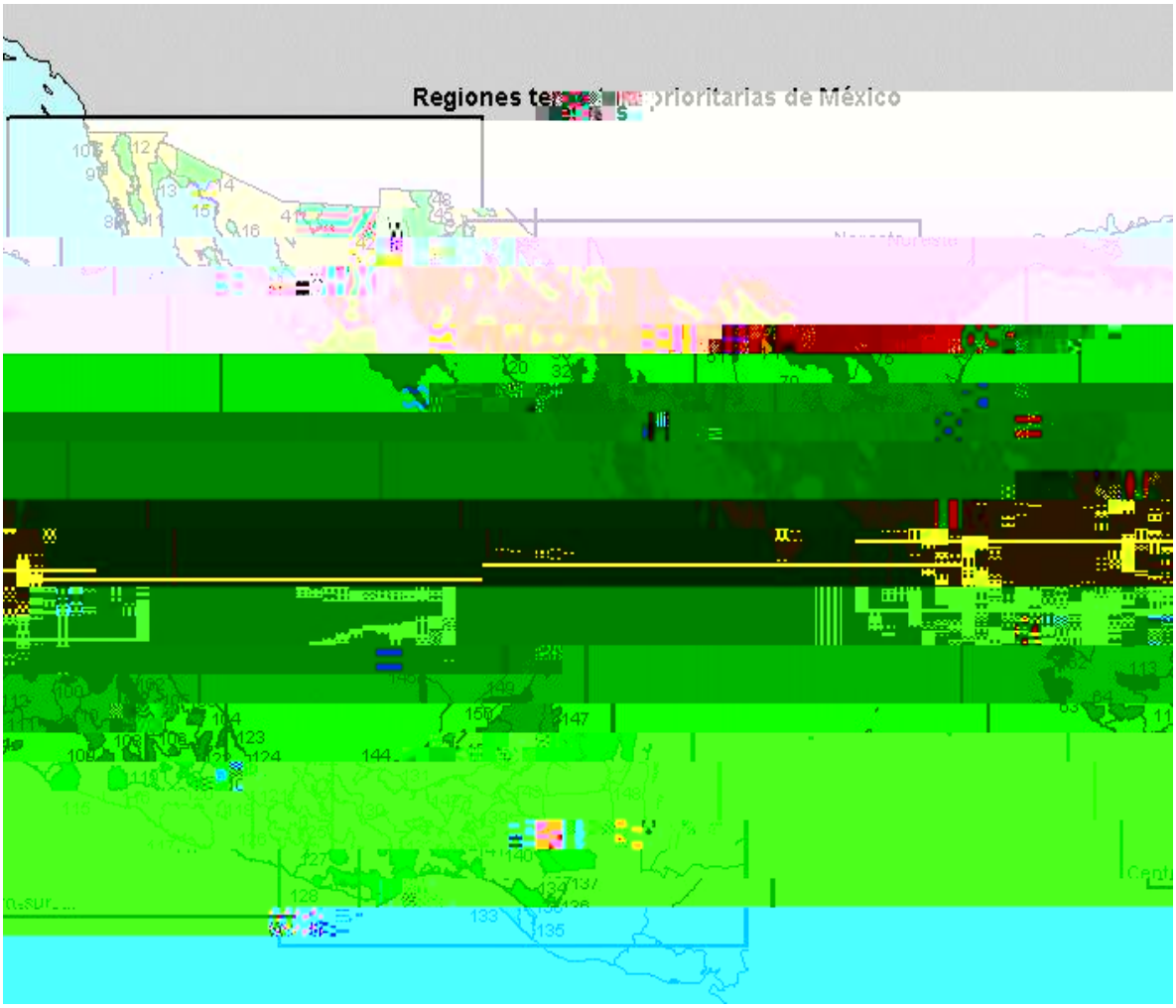
Groundwater committees



[428] CONAGUA. https://www.gob.mx/cms/uploads/attachment/file/110940/Generalidades_Consejos.pdf (accessed on 18 November 2019).

Annex 13[430]

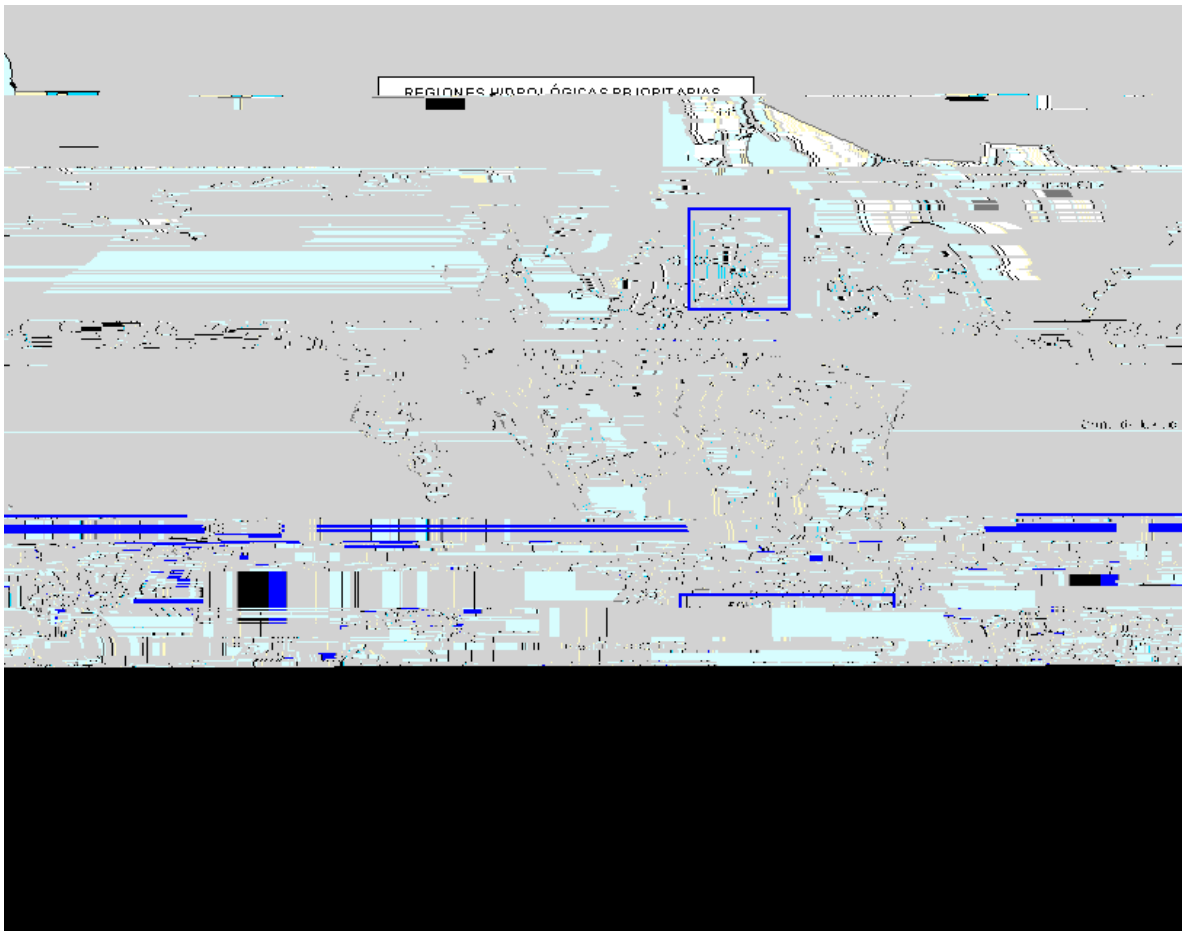
Priority terrestrial regions in Mexico



[430] CONABIO. http://www.conabio.gob.mx/conocimiento/regionalizacion/doctos/Tmapa.html (accessed on 31 October 2019).

Annex 14[431]

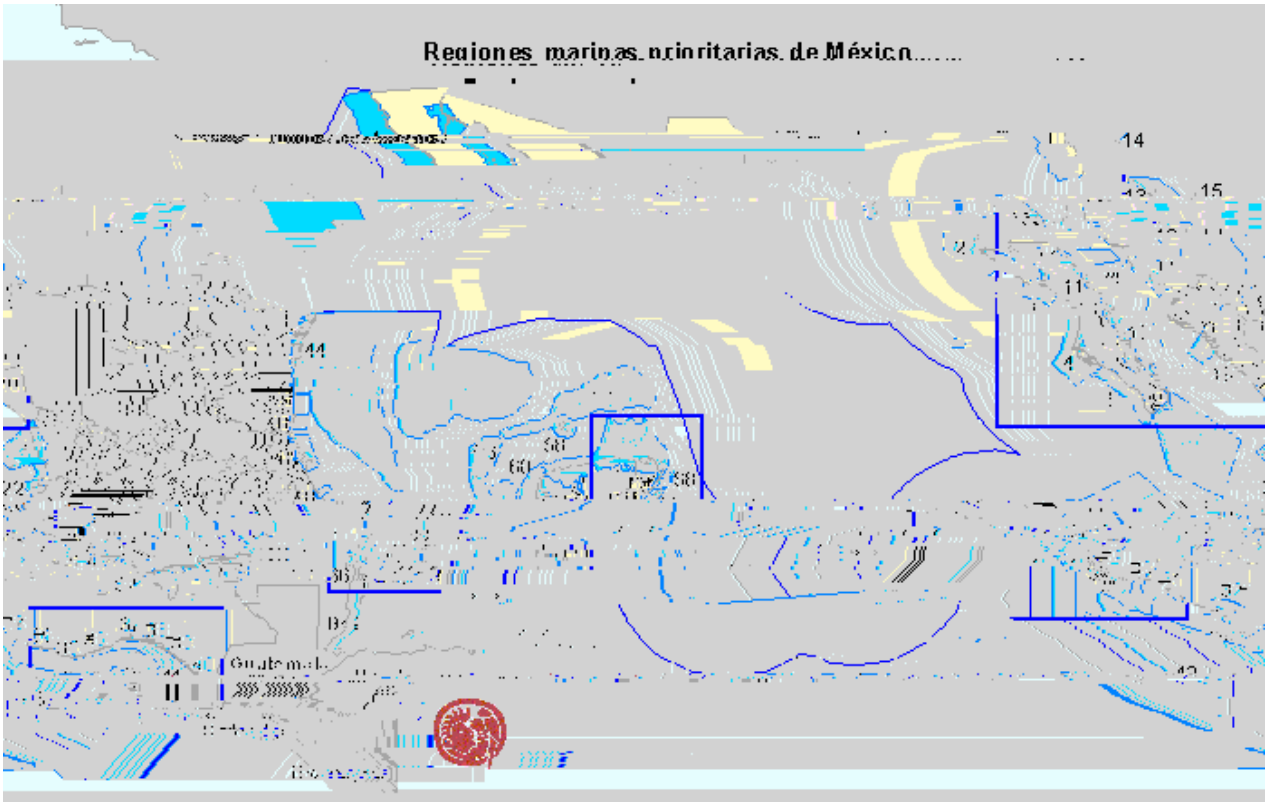
Priority hydrological regions in Mexico



[431] CONABIO http://www.conabio.gob.mx/conocimiento/regionalizacion/doctos/Hmapa.html (accessed on 31 October 2019).

Annex 15[432]

Priority marine regions in Mexico



[432] CONABIO. http://www.conabio.gob.mx/conocimiento/regionalizacion/doctos/Mmapa.html (accessed on 31 October 2019).

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