

# IMPACTS OF EXTRACTIVE INDUSTRY AND INFRASTRUCTURE ON FORESTS

MEXICO



Denise Humphreys Bebbington and Laura Aileen Sauls

# Assessment and Scoping of Extractive Industries and Infrastructure in Relation to Deforestation and Community Rights: Mexico

Prepared for the Climate and Land Use Alliance by Denise Humphreys Bebbington<sup>1</sup> and Laura Aileen Sauls,<sup>1</sup> with support from Karen Hudlet Vázquez,<sup>1</sup> Anthony J. Bebbington,<sup>2</sup> John Rogan,<sup>1</sup> John Hite,<sup>1</sup> Hannah Silverfine,<sup>1</sup> Caitlin Cassisi,<sup>1</sup> and Marco Millones<sup>3</sup>

December 2018

This report was prepared as part of Contracts # 1607-55271 and #1611-55359 to Clark University Graduate School of Geography (PIs: Denise Humphreys Bebbington and Anthony J. Bebbington, Co-PI John Rogan)

*Funding for this report was provided by the Climate and Land Use Alliance. The authors are solely responsible for its content.*

---

<sup>1</sup> Clark University

<sup>2</sup> University of Melbourne and Clark University

<sup>3</sup> University of Mary Washington

# Table of Contents

<b>ACRONYMS AND ABBREVIATIONS</b>	<b>3</b>
<b>EXECUTIVE SUMMARY</b>	<b>5</b>
<b>A. INTRODUCTION</b>	<b>7</b>
BACKGROUND/CONTEXT .....	7
PURPOSE AND STRUCTURE OF REPORT .....	11
<b>B. EXTRACTIVE INDUSTRY AND INFRASTRUCTURE IN MEXICO</b>	<b>12</b>
OVERVIEW .....	12
EXTRACTIVE INDUSTRY .....	13
LARGE-SCALE INFRASTRUCTURE DEVELOPMENT .....	20
<b>C. KEY DRIVERS OF EII</b>	<b>25</b>
COMMODITY MARKET DRIVERS .....	26
REGULATORY REFORMS .....	26
FINANCIAL DRIVERS .....	33
ILLICIT FACILITATORS OF INVESTMENT .....	35
<b>D. IMPACTS OF EII</b>	<b>36</b>
INTERSECTING IMPACTS ON FORESTS AND COMMUNITY RIGHTS: ILLUSTRATIONS ACROSS MEXICO.....	36
FURTHER IMPLICATIONS FOR COMMUNITY RIGHTS AND LIVELIHOODS.....	40
<b>E. RESPONSES TO EII IMPACTS ON FORESTS AND COMMUNITIES</b>	<b>43</b>
NATIONAL AND SUB-NATIONAL GOVERNMENT RESPONSES.....	43
RESPONSES OF GRASSROOTS, RIGHTS-BASED AND CIVIL SOCIETY ORGANIZATIONS AND NETWORKS .....	45
INTERNATIONAL ORGANIZATIONS AND PHILANTHROPY.....	47
<b>F. SUMMARY OF FINDINGS</b>	<b>48</b>
<b>REFERENCES</b>	<b>50</b>

# Acronyms and Abbreviations

Acronym	
CANIMEX	Cámara Minera de México Mexican Mining Business Council
CCMSS	Consejo Civil Mexicano para la Silvicultura Sustentable Mexican Civil Council for Sustainable Forestry
Ceccam	Centro de Estudios para el Cambio en el Campo Mexicano Center for Studies for Change in the Mexican Countryside
CFE	Comisión Federal de Electricidad Federal Electricity Commission
CMFE	Community-managed forest enterprise
CONABIO	Comisión Nacional para el Conocimiento y Uso de la Biodiversidad National Commission for Biodiversity Knowledge and Use
CONAFOR	Consejo Nacional Forestal National Forestry Commission
EII	extractive industry and infrastructure
EITI	Extractive Industries Transparency Initiative
FDI	foreign direct investment
FPIC	free, prior and informed consent
GIS	geographic information system
ha	hectare
HEP	hydroelectric power
IACHR	Inter-American Commission on Human Rights
IDB	Inter-American Development Bank
IFI	International Financial Institution
ILO 169	International Labor Organization 169 – Convention on Indigenous and Tribal Peoples
MW	megawatt
NIP	National Infrastructure Program
NPA	Natural Protected Area
PEMEX	Petróleos Mexicanos

Acronym	
	Mexican Petroleum Company
PPP	Public-Private Partnership Asociación Público-Privada
RED MOCAF	Red Mexicana de Organizaciones Campesinas Forestales, A.C. Mexican Network of Peasant Forest Organizations
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales Ministry of Environment and Natural Resources
SENER	Secretaría de Energía Ministry of Energy
SGM	Servicio Geológico Mexicano Mexican Geological Survey
UNDRIP	United Nations Declaration on the Rights of Indigenous People
UNFCCC	United Nations Framework Convention on Climate Change

# Executive Summary

This report is part of a larger study commissioned by the Climate Land Use Alliance (CLUA) to explore the impacts of extractive industries and infrastructure (EI) on forest loss and degradation and community rights in the Amazon, Central America, Indonesia, and Mexico.

Forest loss linked to the expansion of agriculture and cattle-ranching, colonization schemes, timber production, and natural resource extraction (minerals and oil) has a long history in Mexico. These activities continue to dominate the rural economy together with migrant remittances from the United States. While states within Mexico experience some differentiation in their principal drivers of deforestation, the expansion of extractive industry and infrastructure development presents new challenges to protecting standing forests and preserving the hard-won rights of forest-based communities. With significant reserves of oil, gas and minerals, Pacific and Atlantic ports, and a regulatory regime for extractive industries that is attractive to foreign investors, Mexico is well positioned to further expand EI activity in the coming years.

Mexico's forests are largely in the hands of rural communities who both protect and make a living from the sustainable management of forest resources. This unique situation arose from historical factors in which the government redistributed land to rural communities to be collectively managed. Later, reforms permitted rural communities to extract timber and non-timber forest resources. Today this highly organized sector engages in a diverse range of activities as community-managed forest enterprises characterized by local control and decision-making over natural resources. The experience is considered a model for the effective deterrence of land clearance and protection of biodiversity and forest resources. Nonetheless, the cumulative effects of two decades of policy reforms have undermined local stewardship of forest resources in significant ways.

Beginning in the early 2000s, successive Mexican governments have promoted the modernization of Mexico's infrastructure and increased logistical capacity, connectivity and competitiveness as a pillar of national economic development. Infrastructure development has long been seen as the way to connect and integrate remote and impoverished regions of the country. In this view, Vicente Fox launched the regional integration Plan Puebla-Panamá. The current National Infrastructure Program (2014-2018) builds upon many of the proposals in the Plan Puebla-Panama. At the same time, governments have supported the expansion of the mining and energy sectors through policy reforms supporting liberalization and increased international investment in natural resource extraction and the geographical expansion of the extractive frontier.

Global prices for minerals and petroleum, while no longer at peak levels, continue to be attractive to foreign investment. At the same time, the opening up of infrastructure projects to private-public partnerships offers businesses new opportunities to propose, invest in, and operate a range of activities. Mexico's significant commitment to develop energy resources (primarily oil and gas but also wind, hydropower and geothermal) and the infrastructure needed to deliver energy, are at the center of national development and investment plans. Thus,

regional energy integration plans with the United States and Central America drive and shape where public and private infrastructure investments take place.

The Mexican experience with EII reflects the complexities of balancing natural resource extraction with inclusive, environmentally sustainable development. It also reflects the government's limited capacity to regulate EII and the factors driving increased social conflict. There is a growing concern that EII will aggravate forest loss and degradation through the diminished rights of forest-based communities, the increased ungovernability of certain areas linked to mining and the presence of criminal gangs, and acts of forced dispossession.

To make Mexico attractive to foreign investors, successive governments pursued reforms that have led to the relaxation of laws governing land use in protected areas, given energy and mining investments priority over other land uses and rights by granting them "public utility" status, and weakened the authority of environmental agencies. The expansion of extractive industry activity has coincided with two important factors: the government's program to reduce drug trafficking, and persistently strong prices for gold. This confluence of factors has produced unanticipated outcomes including the growing militarization of extractive areas where criminal groups vie for control of territories alongside companies, at times with the involvement of corrupt public officials.

Mexico is one of the most dangerous countries in which to defend land and the environment, and resistance and protest have often been met with intimidation and even murder. In 2017, 15 environmental defenders were killed, all but two of whom were Indigenous. Included among those killed was Isidro Baldenegro López, a Tarahumara leader and winner of the Goldman Environmental Prize. Perpetrators of such murders are almost never held to account. Research has also identified the involvement of gangs in mineral and gasoline theft, extortion of mine owners, and sustained intimidation to dispossess people of their land. Observers on the ground note that the impacts of growing illegal activity on forests and forest-based communities, and its intersections with the extractive economy, are serious and yet to be fully appreciated.

# A. Introduction

## Background/context

Unique among Latin American and Caribbean countries, nearly two thirds of Mexico's temperate and subtropical forests are managed collectively by ejidos<sup>1</sup> and Indigenous communities (1). With decades of experience with community-managed forest schemes, rural families have successfully pursued forest-based economic activities as part of their livelihood strategies while sustainably managing forest resources. This accumulated experience reaffirms the importance of community-based forest management in providing effective deterrence to forest clearance and forest degradation in the tropics. The experience also serves as a model for community-managed forest enterprises (CMFEs) beyond Mexico, in Latin America and across the globe. However, despite these hard won gains, Mexican forest communities face serious challenges to their continued management of forest resources. Central government reforms in natural resources sectors have triggered changes that diminish local stewardship of forest resources – changes that researchers and civil society actors claim are happening “largely under the radar” (2).

Covering an area of 1.96 million km<sup>2</sup>, Mexico's territory reaches across a range of forest ecosystems, including temperate and tropical forests, mangroves and forest wetlands, and dry forests (3). According to Chapela (4), Mexico is a “forested or mostly forested country” with more than a third of its territory covered by temperate and subtropical forests.<sup>2</sup> With a growing urban middle class, a relatively low rate of population growth and strong manufacturing sector, the country's deforestation rate is modest, especially when compared to rates in Central America and Amazonia (5). However, recent studies suggest that this rate may be accelerating (6). Moreno Sanchez et. al report increasing fragmentation of remaining temperate and tropical forests (7).

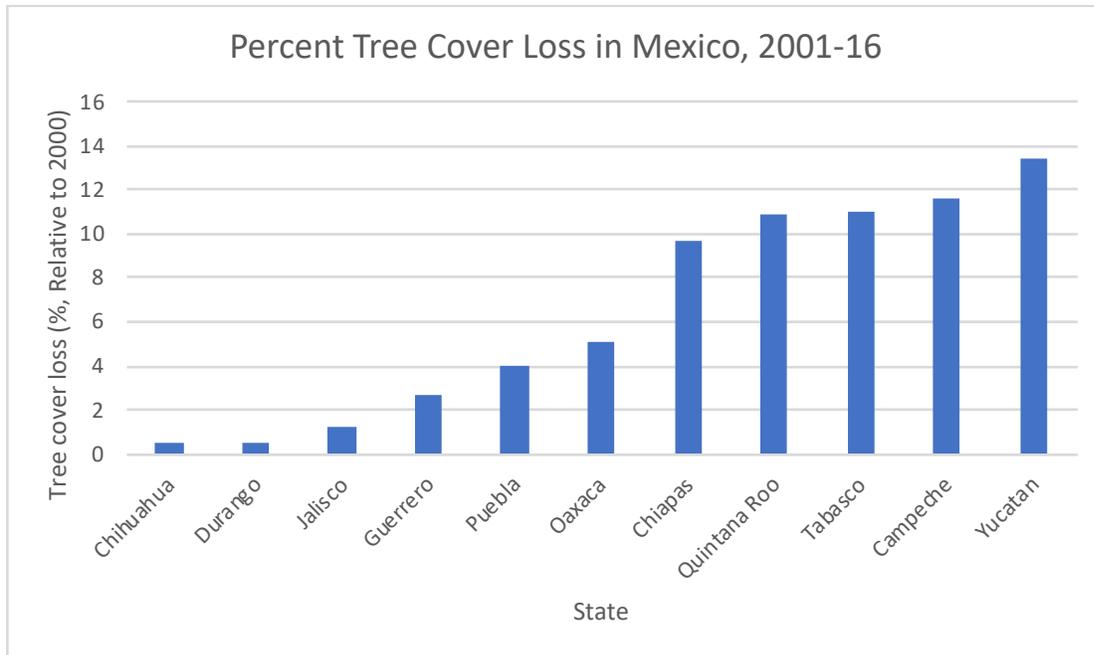
Nonetheless, Mexico does continue to lose forest, particularly in tropical and subtropical zones, including montane forest (6). While subsistence agriculture may have driven deforestation in past decades, commodity agriculture and cattle ranching have played an increasingly significant role, especially in key forested regions such as the Yucatán Peninsula, Chiapas, Oaxaca, and Michoacán (8, 9). While some of the arid and semi-arid parts of the country have gained woody vegetation, forest-rich areas of the country have on the whole experienced deforestation (10). Trends across states vary widely (Figure 1), but certain ones have experienced high rates of

---

<sup>1</sup> Ejidos are collective landholdings of Indigenous and campesino members, legally recognized by the Government of Mexico, in which individual families enjoy rights to farm designated parcels of land.

<sup>2</sup> Chapela (4) notes that other forest countries have more than 50 percent of their national territory covered by forest: such as Bolivia (54.2), Brazil (57.2), and Peru (53.7), among others. He adds that if one considers the vegetation of arid and semi-arid zones in Mexico, the country ought to be considered a forest country.

deforestation, in particular Campeche, Chiapas, Quintana Roo and Yucatán.<sup>3</sup> The iconic Lacandon Jungle of Chiapas, adjacent to forest loss dynamics in Guatemala, now covers only one third of its one-time 1.5 million hectares (11).



**Figure 1. Tree cover loss in selected states in Mexico, 2001-16, relative to forest cover in 2000. Data source: Global Forest Watch (12).**

At the same time as forest cover has been declining, government policy has explicitly sought to expand private and public investment in natural resource extraction (mining, oil and natural gas), agribusiness (oil palm, avocados and soy) and the development of infrastructure. A combination of factors drives these policy commitments. The rapid decline of oil production in Mexico in the early 2000s, and the inability to replace proven oil reserves (which are needed to secure long-term contracts for the sale of oil), led to the liberalization of the sector and policies to attract transnational firms to invest in drilling new wells in the hope that they would identify new reserves. Different governments, especially since 2005, have sought to increase production of other commodities in part to compensate for lost oil revenues (13). One instrument for this has been investment in transport, communications, and energy infrastructure both to support other sectors and in some cases to contribute directly to export income (e.g., through the export of hydroelectric power). These investments are also synergistic with extractive industry as they provide energy sources to support resource extraction (such as mining), improve connectivity from sites of extraction to ports for export, and reduce logistical/transport costs thus improving the competitiveness of firms. While infrastructure investments are Mexico-focused, some

<sup>3</sup> According to Global Forest Watch (2010) the states with the highest percentage of relative tree cover (in order of importance) are: Quintana Roo (69), Campeche (62), Yucatán (56), Chiapas (51), Colima (45), Oaxaca (43), Guerrero (40), Nayarit (38), Michoacán (25) and Sinaloa (34).

projects also promote regional integration with Central America, especially of the energy sector, continuing efforts initially advanced under the Plan Puebla-Panamá.<sup>4</sup>

Expansion of extractive industry activity reveals significant overlaps between extractive concessions, forest and ejido areas, and Indigenous community lands. Changes in legislation linked to promoting the extractive sectors have established mining as a public interest activity. Increased social conflict has been one result, as ejido and Indigenous communities are forced to grapple with the impacts of extractive investments and development projects in their territories.

Extractive industry concessions also reveal significant overlaps with the country's system of natural protected areas (NPA, Áreas Naturales Protegidas). Until recently, few studies have analyzed the overlap of mining sites and protected areas, in large part due to difficulties in accessing databases. Approximately 12 percent of Mexican territory is classified as a federal protected area. Of this amount, 25 percent is affected by mining concessions (16). Of the 175 protected areas, 75 percent were found to have mining concessions inside them, the majority of which were for exploration activities.

Investment in extractive industries is poised to continue to grow over the next five years. The liberalization of the mining, oil and energy sectors has spurred significant interest from international investors. Transparency of natural resource extraction has been a major concern in Mexico. Mexico joined the Extractive Industries Transparency Initiative (EITI) in late 2017. As part of this process, the Mexican government moved to publish contracts to show that all companies would be treated in a fair and open manner.

Large-scale investment in infrastructure also seems likely to continue to increase, as reflected in Mexico's National Infrastructure Program (NIP), 2014-2018 (see Section B) and reinforced by the campaign promises of Andrés Manuel López Obrador.<sup>5</sup> Investment in infrastructure development is considered a strategic priority for promoting economic development and growth. In some cases, investments explicitly support access infrastructure for natural resource extraction.

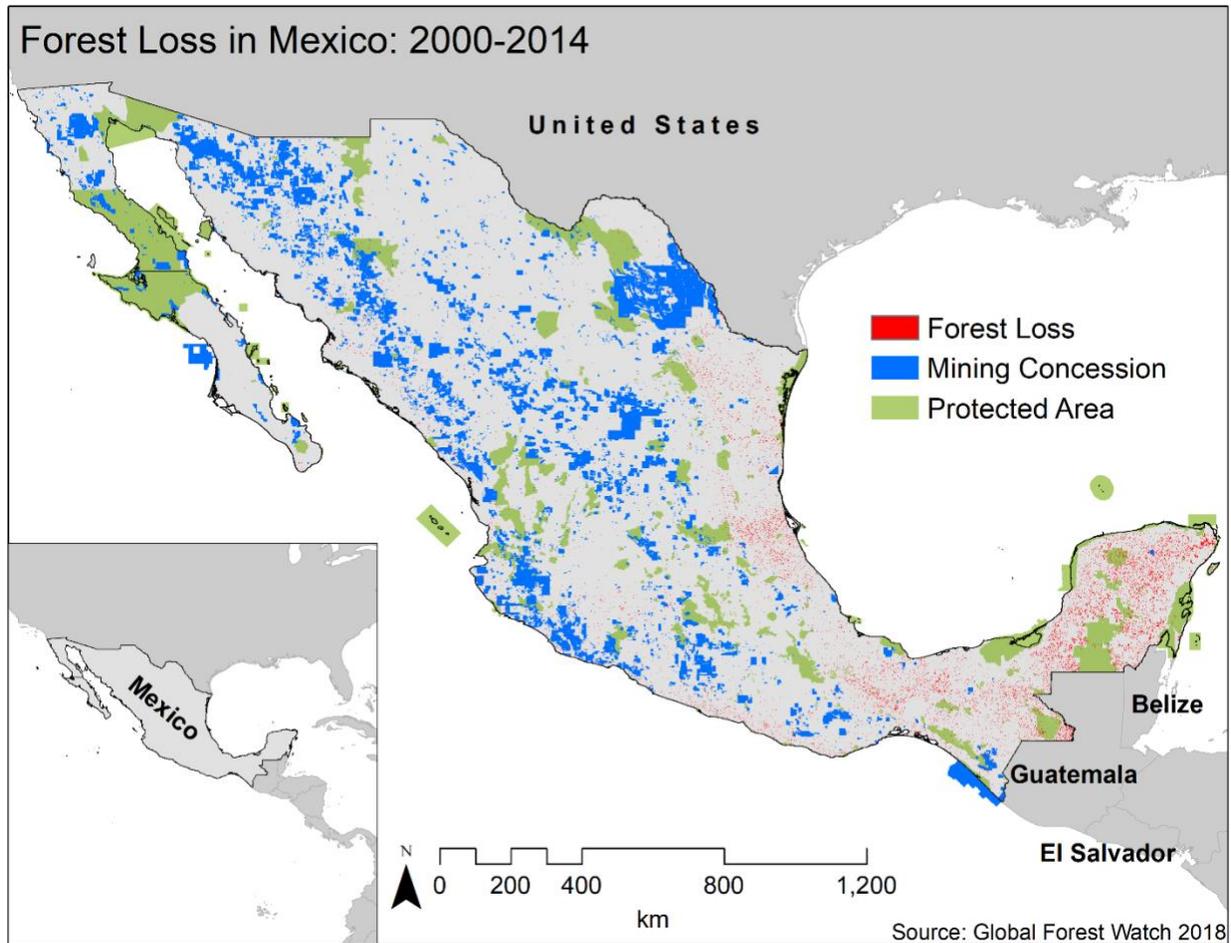
---

<sup>4</sup> Plan Puebla-Panama (PPP), promoted by President Vicente Fox in 2000, proposed investments in a specific geographic region that included all seven Central American countries and the Mexican states of Campeche, Chiapas, Guerrero, Oaxaca, Puebla, Quintana Roo, Tabasco, Veracruz, and Yucatán. PPP generated immediate opposition among grassroots organizations and civil society actors (14, 15)

<sup>5</sup> In July 2018, Andrés Manuel López Obrador, known as AMLO, won a landslide victory and will be Mexico's new President beginning December 2018. It is unclear how national policies promoting EII will change.



Figure 2. The location of the states of Mexico.



**Figure 3: Tree cover loss 2001-2014, and the location of protected areas and mining concessions in Mexico.**

## Purpose and structure of report

The question addressed in this report is what, if anything, these efforts to increase investment in extractive industry and infrastructure (EII) imply for forest cover and the rights of forest communities in Mexico. Given the degree to which community-based forestry in Mexico has been a global point of reference, these potential impacts of EII have significance not only within Mexico but also beyond.

This report builds upon an initial scoping exercise, commissioned in 2016-17 by the Climate and Land Use Alliance, to identify and discuss the drivers behind forest loss and the ensuing impacts on forest communities and Indigenous territories in Mesoamerica. A second round of work extended the lens to explore dynamics within Mexico in order to analyze potential impacts of expanded EII development in the country and to consider the ways in which different organizations have responded to these challenges. This report on Mexico is one of four separate country/regional reports and one global/synthesis report.

The report takes as given that historic drivers of deforestation (logging, cattle-raising and agricultural expansion) continue to be proximate drivers of deforestation across much of Mexico's temperate and subtropical forests. In this study, we ask to what extent investments in extractive industry and large-scale infrastructure also drive forest loss and degradation, greenhouse gas emissions and the loss of rights among forest-based peoples.

The report is organized as follows. In Section B, we identify current and proposed investments in EII in Mexico. In Section C we discuss the drivers of these investments, regulatory reforms, the synergies between extractive industry and infrastructure development, trends in financial flows and financing mechanisms, and consider illicit incentives to EII. Section D describes the impacts of these investments on forest cover and ejido and community rights, and Section E outlines grassroots and civil society organizations' responses to the impacts of EII on forests and communities in addition to government and international organizations efforts to address these impacts. The report closes with a summary of key themes emerging from this analysis in Section F.

The report is based on a review of the academic literature, a review of policy documents, key informant interviews with civil society and public sector informants, geographic information systems (GIS) and remote sensing analysis of concessions and forest cover, and a workshop in Mexico City.<sup>6</sup>

## **B. Extractive industry and infrastructure in Mexico**

### **Overview**

Mexico is a world-class producer of hydrocarbons, generating some 2.1 million barrels per day in 2017. The country also holds significant natural gas reserves estimated at 17 trillion cubic feet and an estimated 545 trillion cubic feet of technically recoverable shale gas (17). The country is also a significant producer of minerals, especially silver, gold, copper and lead. According to the Fraser Institute (18), Mexico ranks 49 out of 91 mining countries (third in Latin America after Chile and Peru) on the Investment Attractiveness Index.<sup>7</sup> In recent years, the Mexican government has moved to promote foreign investment in natural resource sectors through a set of liberal reforms and investments in energy and access infrastructure. While lower international commodity prices have depressed new investment and led to stagnated production since 2013, prices for energy commodities are expected to rise 20 percent and prices for minerals by 9

---

<sup>6</sup> The paper also benefitted from comments from staff and program officers in the Climate Land Use Alliance.

<sup>7</sup> The index measures businesses' assessment of the current policy environment and whether such policies are seen to encourage or discourage investment in mineral exploration. See <https://www.fraserinstitute.org>

percent in 2018 (19). With significant exploration potential in both the mineral and hydrocarbon sectors, and a more permissive regulatory environment in place, Mexico could be a leader in a new commodity cycle in the region.

While the principal drivers of deforestation vary in different states across Mexico, increasing privatization and decentralization of resource governance and infrastructure development pose threats to forests and forest-based communities in all states. In this section, we analyze recent developments in EII, highlighting particular themes and geographical areas of concern. We first discuss mineral extraction, and then turn to the energy sector. We pay particular attention to hydrocarbons but also explore emerging energy schemes around hydro-, wind, and solar power. We then turn to an analysis of the National Infrastructure Program (2014-2018). While space limitations preclude a more comprehensive analysis of activities in individual states, we believe the information provided here reflects current dynamics and suggests potential entry points for work on extractives and infrastructure.

## Extractive Industry

### Mineral extraction

Over the last 15 years, Mexico has become an important player in Latin America's most recent mineral boom. With its large reserves of mineral wealth and perceived 'mining-friendly climate' (20), Mexico is an increasingly attractive country for investors both large and small. Large-scale industrial mining, with a strong national corporate presence, dominates the national mining sector. Mexico's three richest men are owners of the country's top three mining firms.<sup>8</sup> While foreign investment has played an important role in mining sector growth, Mexican mining companies produce over half of all minerals.

Mexico is the world's largest producer of silver and a leading producer of gold, lead, copper and zinc, among other minerals. Importantly, Mexico has significant reserves of minerals yet to be exploited and the government has initiated a program of training and technical assistance to smaller firms interested in developing mines (20). The mining sector contributes 4 percent of GDP, according to industry documents, provides employment to 350,000 workers, and is the fifth largest source of foreign currency. Among international investors, U.S. and Canadian firms are dominant in Mexico – in 2015, the value of U.S. mining assets was \$30 billion while Canadian mining assets totaled \$14.4 billion. Over 70 percent of foreign companies operating in the country are registered as Canadian firms with a large number of junior firms in the mix (22). Mexico produces a limited amount of coal for domestic consumption, although it is ranked 25<sup>th</sup> globally in terms of proven reserves. All coal production takes place in a limited area in Coahuila, and recent years have seen reports of cartel involvement in the sector (23).

---

<sup>8</sup> Known as the mining oligarchs, they are: Carlos Slim Helú, Grupo Carso/Minera Frisco; Alberto Baillères González, Grupo Bal/Industrias Peñoles; and Germán Larrea Mota-Velasco, Grupo México/Southern Copper (21).

According to the research NGO Fundar (24) and based on data from the Ministry of Economy as of December 2017, there were some 947 active projects and 24,709 mining concessions covering an area of about 21 million hectares – although reliable data on this sector is generally lacking. The state of Sonora is the hub of Mexico’s mining industry, with the largest and most important mines. All of the country’s top mining firms have ongoing operations in the state. Sonora leads the country in gold and silver production, reflecting the highly concentrated nature of the sector. Fresnillo-owned La Herradura mine, the country’s most important gold mine, is in Sonora. Other large-scale projects under development in Northern Mexico include the Juanicipio mine (\$305 million gold and silver mine in Zacatecas); Rey de Plata (\$324 million copper and silver mine in Guerrero) and the mega-project Metates (\$4.36 billion gold mine in Durango) (25).

## Mining, Forests and Communities

While gaps in government databases on mining concessions make it difficult to discern between active concessions and those yet to be developed, the data indicate that existing and planned mines overlap or conflict with forested areas in significant ways. Research by the Mexican Civil Council for Sustainable Forestry (Consejo Civil Mexicano para la Silvicultura Sustentable, CCMSS) and the civil society research group CartoCrítica analyzed the list of existing mining concessions and their overlap with forested areas. The study concluded that 22.5 percent of all temperate and tropical forests are under concession or considered of potential interest for mineral development (26). Furthermore, overlaps with forest areas under community control are significant. Of the 11,843 agrarian communities with forested areas (nucleos agrarios forestales), 4,997 have a portion of their territory overlapping a mining concession. Some 8 million hectares of temperate and tropical forest under collective community management are potentially affected by mining concessions (26). Patterns vary, however, between the northern and southern states of Mexico.

The northern states (Chihuahua, Coahuila, Durango, Nuevo León, Sinaloa, Sonora, Tamaulipas, Baja California and Baja California Sur) have seen significant investment in new mining projects over the past 15 years and have some of the highest percentages of forest cover affected by mining concessions in the country. Total area of state territory under concession ranges from 3.7 percent in Tamaulipas to 21.6 percent in Sonora (24). Overlaps between mining concessions and forested areas are particularly significant in the states of Jalisco, Sonora, and Sinaloa, where the area under concession affects over 40 percent of extant forest cover (26). We conducted a focused look at mining concessions in Chihuahua, the largest state and the one with the greatest amount of forest, to explore how mining interacts with forest loss and community rights (see Appendix 1 for more information, as well as similar data for Durango).

Like other historical mining regions in Latin America, Chihuahua has attracted fresh interest to its traditional mining areas, with companies introducing new technologies such as open cast

mining with cyanide heap leaching.<sup>9</sup> Within Chihuahua, the Sierra Tarahumara and the area surrounding the Sierra Madre Occidental epithermal belt are home to some of the richest gold and silver deposits in the world (27). The area has a long history of mineral exploitation. According to Raúl Cruz, Director General of the Mexican Geological Survey (SGM), the region still contains “extensive unexplored epithermal deposits” (28). More than 300,000 oz. of gold have been mined from the region, and there are proven reserves of over 2.3 million oz., indicating that the region will continue to draw investment.

Some 2.83 million hectares in Chihuahua are under mining concessions and 1.54 million hectares of that total are within NPAs. Our analysis finds that concessions overlap with ejido, Indigenous, and agrarian community lands in addition to conservation areas (see Table 1). Of the 2,044 mining concessions in Chihuahua, 943 lie within the Tarahumara Forest Ecosystem Conservation region. The impacts of mining in this region are discussed in Section D.

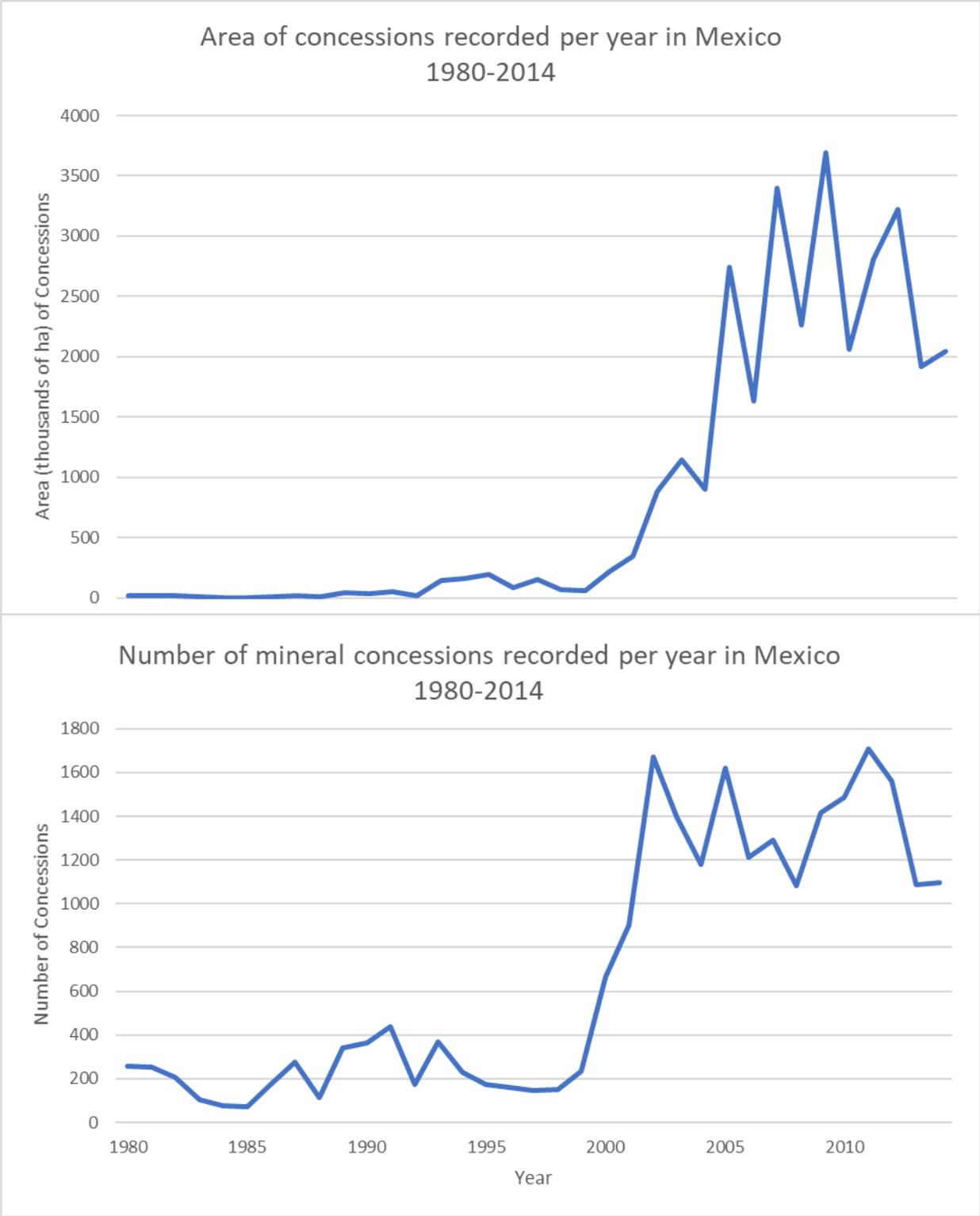
**Table 1: Illustrative list of Mining Concessions present in Ejido Lands and Indigenous and Agrarian Communities in forested areas in the States of Chihuahua, Chiapas, Durango, Guerrero, Oaxaca and Puebla**

State	Ejido	Mine Name	Mining Company
Chihuahua	Piedras Verdes y su anexo Cieneguilla	La Brigida	Minas de La Minas de La Alta Pimeria, S.A. de C.V.
Chihuahua	Palmarejo	Trogan	Aldo Arturo Aguayo Dozal
Chihuahua	Basaeachi	Pinos 5	Compañía Minera La Parreña, S.A. de C.V.
Chihuahua	Jesús del Monte	Pinos Altos	Minerales El Madroño, S.A. de C.V.
Chihuahua	N.C.P.A. Gasachi	Concheño	Minera Meteoro, S.A. de C.V.
Chihuahua	N.C.P.A. Gasachi	La Venganza II	Julio Porras Chavez
Chihuahua	N.C.P.A. Gasachi	Concheño No. 3	Minera Meteoro, S.A. de C.V.
Chihuahua	N.C.P.A. Gasachi	La Venganza	Gabriel Ayon Espinoza Y Soc.
Chihuahua	Huizopa	Silvia	Minera Minefinders, S.A. de C.V.
Chihuahua	Huizopa	Dolores	Compañía Minera Dolores, S.A. de C.V.
Chihuahua	Huizopa	Unificación Real Cananea	Liebano Saenz Ortiz
Chiapas	Comunidad de Grecia, Comunidad Nueva Morelia		Blackfire
Chiapas	Biosfera el Triunfo		21 mining concessions
Durango	Santiagoillo y Anexos	La Seca Fracc. 1	Minera Cosala, S.A. de C.V.
Guerrero	La Parota	Pluton	Servicios Minerometalurgicos de Occidente, S.A. de C.V.

<sup>9</sup> Developed in the 1970s in the USA, cyanide heap leaching is most commonly used to extract gold from low grade ore deposits. It is a low-cost technology that allows companies to process ores that would otherwise not be economically viable.

State	Ejido	Mine Name	Mining Company
<b>Guerrero</b>	La Parota	Pluton III	Servicios Minero Metalurgicos de Occidente, S.A. de C.V.
<b>Guerrero</b>	Chutla de Nava	Titan II	Servicios Minerometalurgicos de Occidente, S.A. de C.V.
<b>Guerrero</b>	Chutla de Nava	Chengdu	Desarrollo Minero Unificado de México, S.A. de C.V.
<b>Guerrero</b>	Carrizalillo	West Block	L.C. Mines, S.A. de C.V.
<b>Guerrero</b>	Zitlalpec, Iliatenco, Paraje Montero and Malinaltepec	La Diana	
<b>Guerrero</b>	Nuevo Balsas	Media Luna	Torex
<b>Oaxaca</b>	Bienes Ejidales de Monte del Toro, San Martín de los Canseco, los Ocotes, El Vergel, Coatecas Atlas, Buena Vista y Cerro de las Huertas		Cuzcatlpan, Minera Aurea, Minera y Metalúrgica Ejutla y Minera Plata Real
<b>Oaxaca</b>	Magdalena Ocotlán, San José del Progreso Monte de Toro, San Martín de los Cansecos	San José	Fortuna Silver
<b>Puebla</b>	Atcolhua		Almaden Minerals

While the total number of mining concessions in Mexico has increased since 1980, from approximately 1,500 to just under 25,000 in 2015, only a small fraction (<10 percent) are located in the southern states of Mexico (Chiapas, Oaxaca, Guerrero, Michoacán, Veracruz and Puebla). Michoacán and Guerrero have the highest percentage of territory under mineral concession (15.5 percent and 12.3 percent respectively), while Oaxaca (5.3 percent) and Chiapas (3.2 percent) have greater overlaps between mining concessions and ejidos and Indigenous communities. The most significant increase in concession activity came in the mid-2000s with the arrival of a number of important projects (see Figure 4).



**Figure 4. Area (in thousands of hectares) and number of mining concessions recorded per year in Mexico, 1980-2014. Source: Global Forest Watch.**

## Oil and gas industry

After decades of state control of the oil and gas industry under *Petróleos de México (PEMEX)*, the Peña Nieto government (2012-18) negotiated comprehensive energy reform legislation in 2013-14 to open the oil and gas sector to private investment. This is a substantial undertaking, which will have wide-ranging impacts on national institutions and finances for decades to come. According to Monaldi (29), a combination of low prices, lagging technology and declining reserves forced the government to adopt a pragmatic response and open up the long closed sector to foreign investment. The government appeared particularly keen to gain technical expertise in order to develop oil reserves in the Gulf and to undertake hydraulic fracturing (fracking) to develop technically recoverable shale reserves in northern Tamaulipas and Coahuila. In addition to investing in oil exploration and production, private investment will help to finance and modernize the country's energy infrastructure which will import natural gas from the U.S. to power the electricity grid (30).

Excitement over Mexico's oil and gas reserves largely centers on exploiting ultra-deep offshore reserves in the Gulf of Mexico. The initial public auctions, and the high prices offered in the bidding rounds, reflect both optimism and patience in developing fields that might only come into production a decade from now. In 2018, dozens of transnational companies invested nearly \$700 million in the sector. Among the companies are Exxon, Chevron, Eni, Royal Dutch Shell and BHP Billiton (31). The auctions have involved 500 hydrocarbon concessions and 11 million hectares. According to a *New York Times* article, "Everybody in the oil and gas sector is interested in Mexico, especially the deepwater" (32).

While traditional areas of oil production – the Gulf of Mexico and the states of Tamaulipas, Veracruz, Tabasco and Campeche – will continue to be sites of new hydrocarbon exploratory activity, there will also be new geographies of hydrocarbon extraction linked to the exploitation of natural gas and shale gas reserves (see Figure 5 below).<sup>10</sup> These nonconventional resources are located in the states of Coahuila, Nuevo León, Tamaulipas, San Luis Potosí, Veracruz, Tabasco, Chiapas and southeastern Oaxaca, with the Burgos Basin in northeast Mexico being the most important for shale gas reserves. The incorporation of these new areas into extractive activity will likely result in increased conflict between local communities and companies.<sup>11</sup> We discuss possible impacts of these developments in Section D.

In recent years, the Sierra Norte del Puebla has found itself in the midst of the fracking debate. One identified area with shale gas potential is Tampico-Misantla. According to a report co-authored by Fundar, the *Tiyat Tlali* Council, and the Mexican Alliance against Fracking (*Alianza Mexicana contra el Fracking*) (33) this basin is a priority area for nonconventional resource

---

<sup>10</sup> The development of shale oil and gas reserves involves hydraulic fracturing (fracking) with significant impacts on freshwater resources. See [www.nofrackingmexico.org](http://www.nofrackingmexico.org) for a detailed discussion of hydraulic fracturing in Mexico.

<sup>11</sup> In traditional hydrocarbon producing areas, most socio environmental conflict is localized where community leaders or *ejidatarios* often confront PEMEX workers and managers directly, often without the support of NGOs or outside legal support.

exploitation.<sup>12</sup> Exploratory drilling in the region is under way; however, the information provided by PEMEX's Unit for Exploration and Production is not clear as to whether the wells involve hydraulic fracking. Upcoming auction rounds will likely open new areas for exploratory activity (see Figure 5 below). Some of these areas might include Tampico, Tuxpan, and Veracruz where basins are structurally more favorable for non-conventional oil and gas reserves (34).

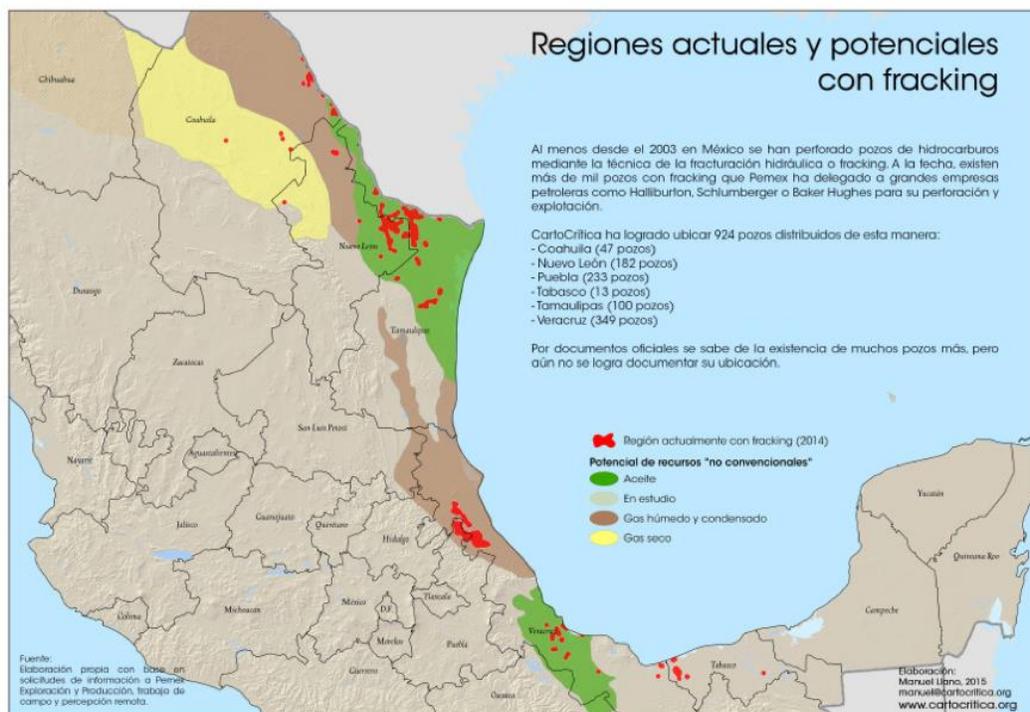
Following the 2015 United Nations Climate Change Conference (COP21),<sup>13</sup> Mexico introduced the Energy Transition Law committed to reducing greenhouse gas emissions by 22-36 percent by 2030, with emissions peaking in 2026 (35). Reforms to the National Electricity Commission (Comisión Federal de Electricidad, CFE) to liberalize the sector are moving the country toward "cleaner" fossil fuels. Private investment is growing in solar, wind and geothermal power sources to generate electricity and modernize the sector. Nonetheless, new investments to develop oil and natural gas reserves, as well as pipelines to import natural gas from the U.S., suggest a continued dependence on fossil fuels and the likelihood that Mexico will not meet its emissions reduction targets. As of 2014, some 78 percent of the country's electricity was still produced from power plants using fossil fuels.

Our initial review suggests that the footprint of oil and natural gas wells does not significantly overlap forest areas. However, the ambitious plan to modernize Mexico's energy infrastructure through the construction of oil and gas pipelines, transmission lines, processing and storage facilities does indicate potential for forest loss and pressure on the rights of ejido and Indigenous forest-based communities.

---

<sup>12</sup> Of significant concern to local residents is what will happen to their water rights.

<sup>13</sup> 2015 United Nations Climate Change Conference. COP21 was the 21st yearly session of the Conference of the Parties (COP) to the 1992 United Nations Framework Convention on Climate Change (UNFCCC).



**Figure 5: Ongoing and potential areas for fracking according to CartoCrítica ([www.cartocritica.org.mx](http://www.cartocritica.org.mx), 2015).** The red areas indicate places where fracking was already taking place as of 2014. According to the caption in the map, PEMEX and affiliated international companies have drilled over one thousand wells, especially in the states of Veracruz, Puebla, and Nuevo León.

## Large-Scale Infrastructure Development

Over the past six years, the Mexican government has improved the country's infrastructure through aggressive plans to build roads, railroads, ports, pipelines, energy plants and other physical infrastructure. The new Andrés Manuel López Obrador (AMLO) government, elected in 2018, will likely maintain the overall goal to improve the country's infrastructure though there may be revisions in specific projects. The current National Infrastructure Program (2014-2018) includes a comprehensive list of 743 projects totaling some \$600 billion, with investments clustered in energy, transportation, telecommunications, water, health and tourism among other sectors (36). About 50 percent of project investment will support 262 projects in the energy sector (with oil and gas development dominating the budget), followed by the transport and communications sectors. Priority projects include the development of a trans-peninsular railway, the drilling of new wells, the extension of the natural gas pipeline network, and a series of electricity generation, distribution and transmission projects.

According to the NIP, projects would be financed by a mix of federal, local and private sources. The promotion of public-private partnerships (PPP) underlies much infrastructure development, in particular where revenue generation opportunities are strong. Federal government funds provided about 46 percent of planned investment and private investors, operators and

concessionaires were expected to contribute 37 percent. The rest was to come from a mix of internally generated funds (revenues from productive state enterprises like PEMEX), subsidies, subnational funds and trust funds. To operationalize the NIP, the government also introduced a series of sectoral reforms which are discussed more fully in Section C. A recent report on the NIP's progress notes that the government will reach only about 73 percent of projected total spending (including both public and private resources) with the energy sector likely to reach 57 percent of projected investment (37).

The discussion below examines NIP 2014-2018 investments in priority sectors and highlights those with potential impacts on forests and forest-based peoples.

## Hydropower

Mexico operates 97 hydroelectric plants with a total capacity of 12,488 megawatts (MW). The sector grew by 2.1 percent yearly from 2005 to 2015. While the hydroelectric power (HEP) sector is challenged by prolonged drought and policy directives that declining reservoirs must prioritize water for human consumption and agricultural purposes, the Ministry of Energy (SENER) still proposes to add 4,492 MW of hydroelectric capacity for the period 2016-2030. As of 2016, 653 MW was under construction while another 3,598 were authorized projects, new projects or in the process of seeking permits. Another 241 MW were projects awaiting bidding (SENER, 2016: 45-46). AMLO's initial goals for the energy sector include expanded HEP capacity (38).

Mexico's southern states hold 68 percent of the country's water resources while the more heavily populated north-central regions hold only 32 percent. In recent years, the state of Chiapas has become a magnet for hydropower investments as it holds some 40 percent of the country's superficial water resources.

The largest hydroelectric plant in the country is the Manuel Morenos Torres Dam (2,400 MW), part of the Chicoasén I complex in Chiapas. Two other dams in the same basin, the Malpaso and Angostura dams, generate 1,080 MW and 900 MW of power respectively. According to the NIP, Chicoasén II (240 MW) and Chiapan (Angostura II) (136 MW) are on the list of hydroelectric investments set to go forward. Chicoasén II will be built by a consortium of companies including Sinohydro (Power China Group). This will be Sinohydro's first hydroelectric project in Mexico and it will act as both contractor and investor. The local Comité Ejidal of Chicoasén is actively opposed to the Chicoasén II project.

## Wind Farms

Renewable energy projects form an additional part of the government's energy strategy and Mexico has the second largest wind market in Latin America.<sup>14</sup> The government hopes to increase wind capacity to 19,000 megawatts by 2028 – a significant increase over its current

---

<sup>14</sup> See <http://www.amdee.org> (Last Accessed 23 Nov 2018).

capacity. Mexico’s wind farms are relatively few and new, and are concentrated in southern states where conditions are considered more favorable (see Figure 6). Investments in wind projects have already generated concern and resistance among local Indigenous communities in southern Oaxaca.

Investments to expand wind power in Oaxaca will more than double from 2,360 megawatts in 2015 to 5,500 megawatts by 2018 (39). Currently, the location of existing and proposed wind farms does not directly impact forest areas; however, proposed expansion in the Yucatán, Oaxaca and Chiapas, as part of the 2018 plan, should be monitored carefully. In the Yucatán peninsula, some 15 sustainable energy projects (9 wind farms and 6 solar plants) pursued by private companies have been identified. In total, these projects will occupy a total of 9,000 hectares.

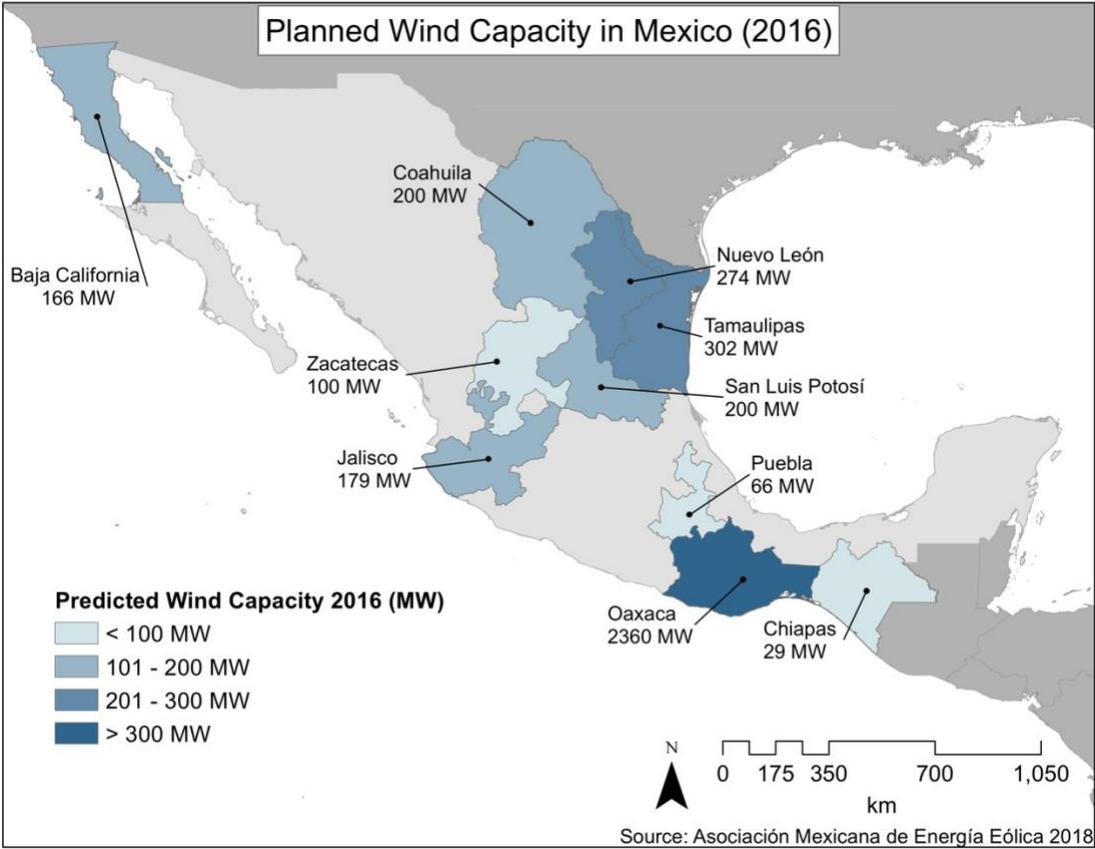


Figure 6: Map of wind farm investments expected by state as of the end of 2016 (40).

**Access infrastructure**

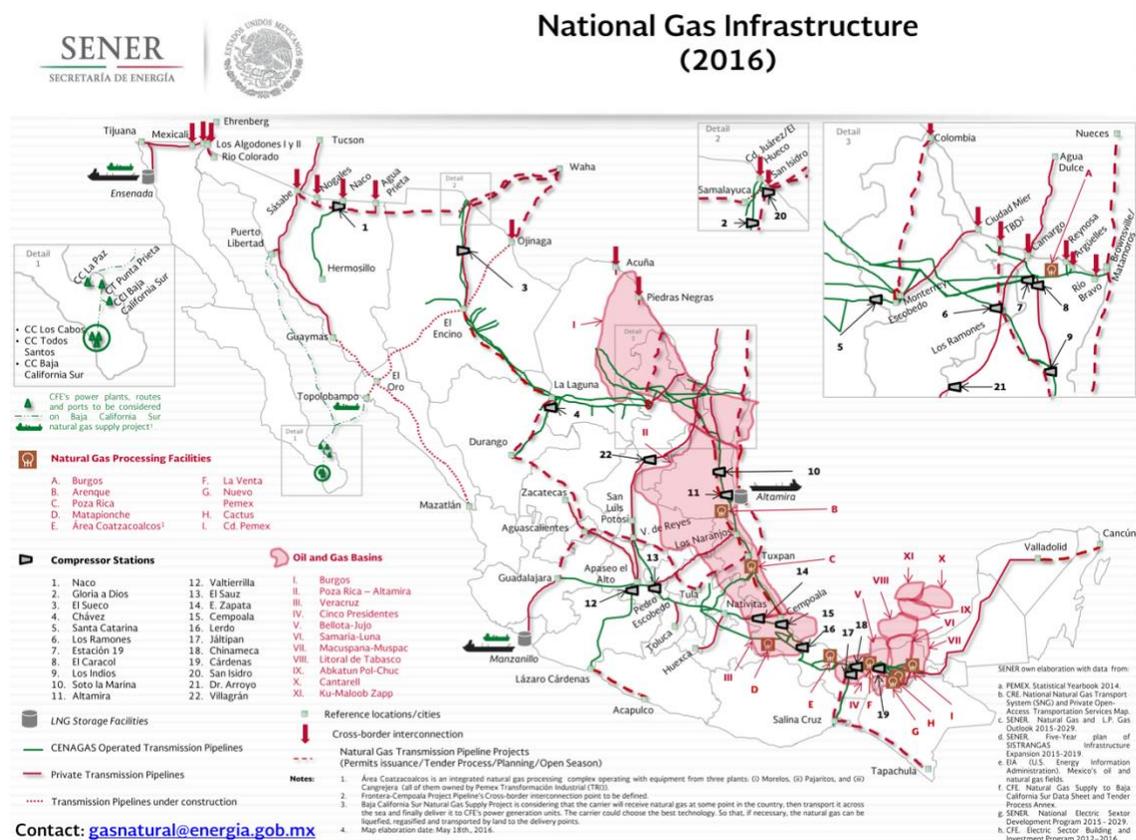
From 1994-2013, various administrations sought to convert Mexico into a competitive logistics platform through the construction, modernization and privatization of the country’s highway system. With some 93 percent of the country’s bulk cargo transported on the national highway

system (41), roadbuilding is a major focus of national infrastructure investment. The NIP (2014-2018) called for investments of \$193.8 million in 151 highway projects of which 78 are considered strategic. Projected spending in the transport and communications category, overseen by the federal Secretary of Communications and Transport, is estimated to reach 80 percent of proposed investment over the course of the plan (37). In addition to improving the road network, the plan promotes the construction of ports, airports and railways with a view to promoting multi-modal transport corridors. This shift away from a purely road-building oriented policy should improve energy efficiency, reduce logistical costs, and address air pollution and road congestion. Among the list of signature projects are ones to construct new roads and upgrade existing highways in Oaxaca, Chiapas, and the Yucatán Peninsula. Further study is needed to determine exactly where road routes might potentially impact forest areas and communities.

The Peña Nieto administration also prioritized investment in the upgrading and expansion of the rail network with a view to increasing the country's competitiveness. The strategy links railways with improved port facilities for export in order to reduce logistics costs. The NIP included 13 major rail projects with total investment of \$10 billion though most of these projects have not moved forward. Included among the signature projects is the reactivation of the Chiapas-Mayab rail network (\$42 million) and the rehabilitation and expansion of a rail line from Cancún to Escárcega via Mérida and Campeche. The latter project would include a passenger train service that connects to the Mesoamerican regional integration initiative known as the Maya World (Mundo Maya), a series of cultural and tourist sites in Mexico, Belize and Guatemala (42). Notwithstanding promises to improve passenger service, most railway investments seek to reduce transport times and logistical costs for freight, in particular through railways connecting northward to U.S. markets, but also to Pacific and Gulf of Mexico ports. The 930 mile Tren Maya would handle passenger travel by day and freight at night, for example. The AMLO government has indicated it will prioritize this project (43). The line would transport heavy fuel oil and spur further development in logistical capacity including a future PEMEX fuel terminal.

The opening up of the country's hydrocarbon and electricity sectors to private investment is a driver of infrastructure investment, which in turn encourages and makes viable further energy development. For example, a U.S. cross-border pipeline network into Mexico is growing, driven by growing demand in Mexico's power generation sector as oil is replaced with cheaper natural gas imports from the U.S. However US-Mexico pipeline construction has been delayed by conflict with Indigenous communities over rights of way. As of June 2018, six pipelines were under construction. These pipelines are considered strategic to Mexico's domestic network and form part of the Ministry of Energy's (SENER) five-year plan (Figure 7). Competition between liquid natural gas (LNG) imports from Mexico's west coast and natural gas delivered via pipelines is fierce and the delays largely favored the LNG sector. The states set to receive natural gas include Chihuahua, Nuevo León, Sonora and Sinaloa where energy demand is projected to increase over the next ten years (44). Further research is needed to explore the

links between the expansion of mining (in the Northern states), increased energy demand, forest areas and pipeline construction routes.<sup>15</sup>



**Figure 7: SENER’s map outlining its priority pipeline projects, including hydrocarbons basins, processing facilities, and storage sites (45).**

One controversial strategic project that affects the Sierra Norte del Puebla is the Tuxpan-Tula gas line, a project operated by TransCanada (also involved in the Keystone XL pipeline in the U.S.). When completed, the 283 km gas line will transport natural gas from southern Texas to central Mexico to fuel power generation plants in Veracruz, Puebla, Hidalgo and beyond.<sup>16</sup> The gas line passes through 22 municipalities and the Mesófilo de Montaña Forest, affecting sacred landscapes of Otomí communities (46).

<sup>15</sup> For example, Carlos Slim’s Grupo Carso has the tender to construct and operate between Samalayuca (Chihuahua) and El Sasabe (Sonora) which links to a pipeline coming from the U.S. border. Slim’s mining firm, Minera Frisco, holds mining assets in both states.

<sup>16</sup> CFE’s website provides useful data sheets on all proposed energy projects. For information on the Tuxpan-Tula Gas Pipeline see <http://aplicaciones.cfe.gob.mx/tm/fichas/EN/FTTuxpanTulaEN.pdf>

CONABIO<sup>17</sup> (the National Commission for Biodiversity Knowledge and Use) considers the area a priority for conservation given its rich biodiversity and the intact state of the forest. An earlier project, the Morelos gas line project through Puebla, Tlaxcala and Morelos generated significant community resistance. The pipes were laid in communities in a high-risk area of the Popocatepétl volcano. Other large-scale infrastructure projects in the region include the Tuxpan-Atotonilco gas line, the Tuxpan-Arco Norte-Tula pipeline and the Puebla hydroelectric complex (47).

The Tuxpan-Tula gas line illustrates how regional integration, via the exploitation and export of key commodities, remains an important feature of Mexico's economic development plans. The expansion of Mexico's natural gas pipeline network will deepen U.S.-Mexico energy integration in the coming decade and open up possibilities to further expand the gas pipeline network and extend the flow of natural gas towards Central America (48, 49).

## C. Key drivers of EII

A confluence of market forces, key actors, and visions of development are encouraging greater investment in mining, oil and gas development and infrastructure as the path to economic growth in Mexico. These investments are located not only in historical mining and oil producing regions but also seek to expand extractive frontiers, inducing changes in how ejidos, Indigenous, and other forest-based communities manage natural resources. In this section we discuss some of the key drivers of these investments: commodity market dynamics, regulatory reforms, financial drivers and illicit incentives. Particularly important among these are changes made to regulatory frameworks that establish minerals, oil and gas, and electricity production, transport, and distribution as “public utilities” that take priority over other forms of land use, ownership, and rights – irrespective of previous collective or conservation land holding or use status. In addition, new financing mechanisms allow the Mexican government to harness private sector financing for complex, large-scale infrastructure investments that complement EI investments, making those investments financially viable.

At the same time, the 2018 election of AMLO may challenge further liberalization efforts. During the campaign, AMLO made clear that he wanted to reverse the 2013-2014 Energy Reform that opened the oil and gas industry to private, foreign investment. He specifically called out the longstanding practice of corrupt collaboration between political and business elites (50). He has also promised more economic growth and increased public spending for social programs. Pulling off this ambitious agenda may prove difficult, however, in light of the experience of progressive governments in South America who quickly found that moving away from reliance upon extractive industry revenues would mean empty state coffers for social spending. Those governments each ended up further deepening investment in resource extraction, often in forested areas and Indigenous territories.

---

<sup>17</sup> Comisión Nacional para el Conocimiento y Uso de la Biodiversidad

## Commodity Market Drivers

Investment in Mexico's extractive industries is being driven by global demand for minerals, oil and natural gas, together with commodity prices that, though soft since 2012, still offer profits. The ongoing economic liberalization in the mining, hydrocarbons and electricity sectors, along with recent changes to forestry laws, are expanding opportunities for investment and driving the new frontiers of extraction and physical infrastructure development discussed in the previous section. After more than 70 years under state control, the national oil company, PEMEX, no longer enjoys monopoly control of the hydrocarbons sector. The potential impacts of opening Mexico's vast oil reserves to private investment are significant, including important knock-on effects in the development of transport, processing, storage and shipment facilities for oil and gas over the next decades (51). The energy sector, including hydrocarbons, was budgeted to receive approximately 63 percent of planned infrastructure investment through 2018.<sup>18</sup> Some of these investments directly impact Indigenous and ejido management of land and resources, including forest-based communities.

While analysts have debated whether the current period might mark the end of the mineral 'supercycle' (13), there is evidence to suggest that in Mexico it may be more of a pause than an end. Investors, both Mexican and foreign, have scooped up natural resource concessions, in some cases moving forward with projects while in other cases waiting for a return to stronger prices.<sup>19</sup> While foreign direct investment (FDI) in mining declined in Mexico in the past year (52), the decline was much smaller than in other Latin American countries and the number of projects under development remains strong. Furthermore, mine operations will be able to reduce operating costs with cheaper sources of electricity coming online from imported natural gas. In Mexico, investments in infrastructure development will strengthen the viability of extractive projects.

Price volatility does not affect the investment of large corporations in energy projects in the same way as in mining. Mexico's deals are attractive to international investors who generally have longer time horizons to bring complex projects into operation. Furthermore, Mexico is considered to hold some of the world's largest known reserves of shale gas. The proximity of both shale gas reserves and conventional oil reserves to the world's top refinery center and to Atlantic and Pacific ports makes Mexican hydrocarbons a very attractive investment for oil companies.

## Regulatory Reforms

Regulatory reforms across different sectors and over a period of nearly three decades have laid the basis for increased investment in EII. Reforms related to land ownership in the 1990s were an important precursor. More recently, regulatory reforms related to the mineral, hydrocarbon,

---

<sup>18</sup> A recent report notes that the energy sector will only receive 57 percent of total projected spending by the end of 2018 (37).

<sup>19</sup> Analysts suggest similar dynamics are at play in Brazil and Peru.

energy and forestry sectors have facilitated increased private investment in these sectors. We discuss each in turn, and Table 2 at the end of the section summarizes the key elements of these various reforms.

## Land governance reforms

Beginning in the 1990s, with trade liberalization and North American integration initiatives, an important package of reforms was introduced in Mexico. Among them were changes to Article 27 of the Constitution that dealt with state ownership and control over the country's natural resources. It permitted ejidos and agrarian communities to change their collective land tenure arrangements by certifying land for private ownership and in the process opened up the possibility of leasing or selling land to third parties. This measure both relaxed longstanding protections on collective lands while creating new, private land markets in Mexico. At the time, it was seen as a crucial reform towards modernizing rural areas and attracting new investment. In 1992 more than half of the land area, and approximately 80 percent of Mexico's forest resources, were covered by ejidos. The implementation of land titling programs linking access to services underlay a broader move towards decollectivizing land rights.

## Mining Sector Reforms

Amendments to the Mining Law (1992) aimed to increase incentives to attract foreign capital to the mining sector. The current Mining Law regulates all mining activity and the granting of concessions. All mineral reserves are owned by the Mexican state and private parties may obtain rights to conduct exploratory activities and concessions to exploit minerals. In Mexico, the Ministry of Economy extends concessions for mineral exploitation. The Mining Law of 1992 and subsequent amendments:

- Established mining as a public utility, superseding all other activities (except energy)
- Lifted restrictions on foreign ownership of Mexican companies
- Eliminated mining royalties and taxes to attract private investment in the sector (although this was revised in 2014)
- Allowed foreign companies to invest in mines with the stipulation that they legally incorporate in Mexico and establish a corporate presence in the country
- Eliminated the obligation to partner with national companies
- Allowed private companies access to concessions in natural protected areas
- Expanded concession periods from 25 to 50 years
- Reaffirmed the federal government's power to impose taxes on mineral production (53).

As noted above, the package of land governance reforms permitted ejidos to sell portions of their lands – opening the door to opportunities for private investment within ejidos. Investors, including foreign companies, are allowed to partner with *ejidatarios* to exploit resources without

acquiring the land. Conversely, firms can purchase land with the consent of 100 percent of the *ejidatarios* in the first Ejido Assembly, or with 51 percent consent ten days later.

Articles 19 and 26 of the Mining Law establish rights to expropriation, temporary occupation, and right of way over land to develop mining activities. According to the Law, Indigenous communities have first rights to a mining concession within their recognized lands, if they can equal the best proposal from a mining company. Because Mexico is a signatory to the International Convention on Indigenous and Tribal Peoples (ILO 169), Indigenous communities must be consulted before any exploratory activity takes place. The extent to which the law is followed is directly dependent upon the communities' understanding of their rights, company policy and the ability of community leaders to negotiate and navigate intimidation. As the Mining Law declares this activity in the public interest, mining trumps other activities and does not require consultation or permission from non-Indigenous communities. In the case of temporary occupation or imposed right of way over ejido or communal lands, a federal agency can determine whether groups are entitled to compensation.

In 2014, the government introduced modifications to the Mining Law including a new royalty of 7.5 percent on company net profits (on all metals) and an additional 0.5 percent levy on precious metals with a view to capturing greater revenues. The federal government collects this royalty and directs funds to communities in municipalities where mining is taking place. The result is that mining companies are reducing their own direct contributions to community projects in favor of a government-administered scheme. In this way, government seeks to reduce conflict between communities and mining companies by channeling resources through local authorities.

Environmental regulation of the mining sector falls to the Ministry of Environment and Natural Resources (SEMARNAT). Companies must obtain environmental impact permits from SEMARNAT before they can engage in exploratory work. However, observers note that the asymmetries of power between Mexico's budget-constrained environmental agencies and the powerful economic groups that dominate the sector result in lax environmental oversight (54). Furthermore, the Mexican government, together with transnational mining companies and the Mexican Mining Business Council, CANIMEX, have sought to promote self-regulation through adherence to voluntary certification schemes such as ISO14000 (of the International Standards Organization) and the Clean Industry Certificate (Certificado de Industria Limpia) awarded by the Federal Prosecutor for Environmental Protection (Procuraduría Federal de Protección al Ambiente, PROFEPA), as well as through company-provided information about their social and environmental responsibility programs and policies.

Mexico's mining law allows companies to carry out exploration and exploitation activities in NPAs with a special permit. The procedure is detailed in the General Law of Ecological Equilibrium and Environmental Protection, though critics point out that allowing such activity contravenes the law's intent. Regarding water rights, the law establishes in Articles 19 and 124 that mining companies can use surface and subterranean water resources to support exploration and exploitation activities. Companies are not required to pay for water rights within concession areas.

One limitation on mineral exploration activity reflects the dominance of the hydrocarbon sector in the country. Before a potential concession area can be released and titled for mineral exploration, PEMEX must first confirm that the area does not have potential for oil or gas extraction. Mining industry officials indicate that this has led to a slow-down in the number of new exploration titles issued (25).

## Hydrocarbon Sector Reforms

Hydrocarbon reform has taken much longer than reform in the mineral sector, nonetheless the constitutional amendments proposed by Peña Nieto and approved by Congress in 2014 reflect the most important modifications to sector policy since hydrocarbons were nationalized in 1938.

State-run PEMEX no longer holds a monopoly on oil, natural gas and petrochemical production in the country. Private investment, both domestic and international, can now bid on and operate projects independently or in partnership with PEMEX. The opening up of the country's hydrocarbon reserves, through organized auctions, signals a new era of exploration and exploitation, including the expansion of related infrastructure such as refinery and port facilities, pipelines and processing plants.

The constitutional amendments also reaffirm that the nation's mineral wealth is owned by the country, and so while private companies can now bid on projects, the state and PEMEX retain important roles. Thus, the government has the authority to assign contracts to private companies, either directly or through PEMEX, and PEMEX can partner with domestic and international companies to develop projects.

Article 96 of the Hydrocarbons Law (2014) reaffirms the dominance of oil and gas extractive activities:

Exploration and extraction activities are of social and public order interest and therefore will have preference over any other activity that necessitates access to the surface area or to the subsoil.<sup>20</sup>

Given that hydrocarbons have the highest level of priority, landowners whose properties are affected by hydrocarbon activity have 180 days to negotiate a contract with the company, or the government will assign a negotiator on their behalf. The implications of these declarations for Indigenous communities and ejidos are yet to be fully understood. The constitutional reforms expressly specify that collective lands of ejidos and communities are subject to potential occupation for energy projects. In such cases, SENER must conduct consultations with affected Indigenous communities and the company must conduct a social impact evaluation; however, the law's provisions make it clear that communities do not have the option to say no to energy projects (55).

---

<sup>20</sup> Authors' translation

In terms of social and environmental regulations, which PEMEX largely worked around for decades (relying on extra-official agreements), the 2014 Hydrocarbons Law and enabling legislation incorporates conditions to address community concerns such as the right of residents to be consulted prior to any activity, and to be compensated for the use of community lands or extraction. Less clear is what will happen to the many PEMEX fuel storage and petrochemical operations located throughout the country, many of them in densely populated, low-income neighborhoods and cities (47, 55). The accumulated environmental liability from decades of poor management, shoddy operations and little environmental oversight is likely to drive urban-based social mobilizations seeking resolutions to health crises linked to contamination. In this sense, environmental justice questions surrounding extractive industries might be expected to become increasingly urban.

## Electricity and Renewables

The Industrial Electricity Law (2014) established energy as a public utility and gives private companies permission to enter occupied lands to conduct activities related to the generation, transmission and distribution of energy through rights of way (*servidumbre*). Even though the law recognizes the rights of ejido and community landholders, priority is given to energy sector projects – implying that an agreement between energy companies and landowners must be reached. If an agreement cannot be reached, the federal government may initiate a mediation process – and/or apply the right of way.

The Law also introduces certain new social protections for ejidos and communities. For instance, it calls for a process of negotiation between companies and communities (including a consultative process with Indigenous communities), an environmental and social impact evaluation before the authorization of any project, and the possibility of including independent monitors (“social witnesses”) during a negotiation. The consultation process is the responsibility of SENER in coordination with the Ministry of Interior and other relevant sub-agencies. Public companies, such as the CFE, can initiate a consultation process. The environmental and social impact evaluation must include the identification, characterization and valuation of all social impacts that could result from energy-related activities, as well as a plan for the mitigation of those impacts. As with hydrocarbons, if an agreement is not reached within 180 days, the company undertaking the project can request state mediation or a right of way to move the project forward. Importantly, the law does not contain any prohibition of energy-related activity in NPAs or internationally protected wetland areas under the Ramsar Convention (1971).

**Table 2: Summary of Key Reforms by Sector: Mining and Energy**

	Mining	Oil and Gas	Electricity/ Infrastructure	Renewables
Constitution	Article 27 Allows the Mexican state to transfer ownership of land and water rights to private persons including foreign investors.	Article 25, 26 & 27 (1938) All hydrocarbon operations can only be performed by state run companies. PEMEX is created.		
Sectoral Laws	Ley Minera 1992	Ley de Hidrocarburos (Hydrocarbons Law) and 9 additional laws modified (2014)  Ley de Ingresos de Hidrocarburos (2016) (Hydrocarbons Income Law)	Ley de Agua (Water Law) and Ley de Industria Eléctrica (Electric Industry Law)	2008 Ley del Aprovechamiento de energías renovables y financiamiento de la Transición Energética (LAERFTE) Renewable Energy and Financing of Energy Transition Law Ley para el aprovechamiento sustentable de la Energía (LASE) Sustainable Energy Law
Reforms	Reforma a la Ley (Mining Law Reform) 1996  Establishes royalty 7.5% and extra .5% on precious metals (2014)	Reforma Energética (Energy Reform) 2014	Ley de Agua (Water Law) 2015 (under discussion)	Reforma Energética (Energy Reform) 2014, includes the Law of Energy Transition (2015) Ley de Energía Geotérmica (Geothermal Energy Law)

## Forestry Law reforms

In March 2017, the Mexican Congress overwhelmingly approved a new General Law of Sustainable Forest Development, showing support for the proposal of Mexico's Green Party (Partido Verde Ecologista de México, PVEM). However, more than a year later the proposed law remains stuck in the Senate and has drawn negative reactions from a group of prominent civil society and forest groups' representative organizations. The proposed law would eliminate some of the consultative bodies and also discard language affirming respect for Indigenous and forest peoples' rights – potentially in violation of the Mexican Constitution. As civil society groups describe it, the proposed law would also fail to address important gaps in the existing law, including the fact that 35 percent of *ejido* lands are managed by women and others whose rights are not recognized by the state (56). The PVEM drafted the proposed law and brought it before Congress for a vote without adequate consultation with the groups that would be most affected by the proposed changes. Observers suggest that the PVEM's push for approval in the Senate has been equally rushed and opaque.

In response to the PVEM's proposed law, civil society organizations have called for a full consultation process that recognizes the pivotal role of forest communities in managing forests for timber and ecosystem services, including biodiversity conservation and carbon sequestration (57). A strong press offensive coupled with social media campaigns have created public support for a consultation process, with a Change.org petition receiving over thirty thousand signatures (58). While there is general agreement that the current law requires reform, the process surrounding the PVEM proposal, as well substantive issues, induced significant resistance to proposed reforms.

Those supporting the PVEM law argue that the main civil society groups opposing it, including the major small-scale and community forestry groups (such as CCMSS and Red MOCAF<sup>21</sup>), are significant beneficiaries of international funding and thus are not acting in the best interests of Mexico's forest or forest-based peoples (58). Proponents of the reform argue that it would provide much-needed updates to forest management criteria and support forest peoples to meet those criteria. Further, it would regulate how international funds for forestry and forest conservation are used, to ensure that such programs benefit forest peoples (59).

An analysis of the proposed law conducted by Mexican environmental rights and legal organizations, including the Centro Mexicano de Derecho Ambiental (Center for Mexican Environmental Law, CEMDA), finds that the law would make decision-making around forest management and the allocation of resources more opaque. Specifically, the new law would reduce the role of the multi-stakeholder Consejo Nacional Forestal (National Forest Council, CONAFOR), which is responsible for advising, supervising, monitoring, and enforcing forest policy. It would also reduce the role of the multi-stakeholder committee of the Fondo Bosque (Forest Fund), part of Mexico's REDD+ architecture, resulting in less transparency around benefits-sharing and funding decisions (56). Other groups allege that greater state control over

---

<sup>21</sup> Red Mexicana de Organizaciones Campesinas Forestales, A.C. (Mexican Network of Peasant Forest Organizations)

forest management and resource allocation would make the privatization of forest resources easier and would benefit private owners over ejido and Indigenous forest communities (58). PVEM has also proposed a new Biodiversity Law alongside the Forest Law, which forest and Indigenous groups have denounced for its failure to consult with potentially affected communities and for infringing on the rights of those communities (60). Some academics and activists have criticized the proposed Biodiversity Law for potentially opening the door to the privatization of genetic resources and of the associated Indigenous and traditional knowledge of those resources.

## Financial Drivers

### Investment patterns

Mexican financial institutions are set to participate in financing energy infrastructure projects and Banamex, Banorte, Santander, HSBC and BBVA have all expressed interest. Mexican construction firms such as ICA, Grupo Carso, Cemex, Mexichem and Grupo México, SAB are participating in NIP projects. These companies have been named in lawsuits presented by communities and NGOs claiming human rights abuses connected to their infrastructure and extractive projects

In the period 2013-2015, Mexico's mining sector received over \$17 billion in investment, comparing very favorably to other Latin American countries in a period in which overall investment in mining in the region was in decline. Mexico's share of global foreign investment in mining grew from 4.6 percent in 2005 to 6.6 percent in 2014. Foreign investment in mining is dominated by Canadian mining firms (65 percent), followed by the United States (17 percent), China (5 percent) and Japan (2 percent).<sup>22</sup>

Investment in gold production continues to dominate, with some \$1.4 billion invested in 2016. Looking ahead, another 14 gold projects will be in operation by 2021. The production of gold is highly concentrated in Mexico and 50 percent comes from three companies: Goldcorp (Canada), Fresnillo (Mexico) and Minera Frisco (Mexico). A number of mining projects are on stand-by as companies wait for better prices.

Silver is also attracting significant attention. Pan American Silver (Canada) will expand its La Colorada operation in Zacatecas with an investment of \$140 million. Goldcorp Peñasquito (Canada) has plans to construct a new treatment plant in Piratas, investing \$420 million. Fresnillo (Mexico) will invest an additional \$515 million in the San Julian project on the Chihuahua/Durango border. New exploratory projects have pushed the mineral frontier further into remote areas, especially into Indigenous communities (62).

According to the Oxford Business Group (25), Canadian firms are set to further increase their influence in the sector. In 2017 Canada and Mexico signed a memorandum of understanding

---

<sup>22</sup> Companies are listed by the address of their home base, according to Fundar (61).

(MOU) focused on enhancing technology exchange and promoting corporate social responsibility. A representative of Mexico's mining ministry noted that less than a third of Mexican territory has been explored. Both companies and ministry officials see signs of increased investment in the sector but argue that more guarantees and continued reforms are needed to encourage investor interest.

Foreign investment in the hydrocarbons sector is expected to lead all sectors as liberalization plans move forward. Round 1 of the country's hydrocarbons auctions resulted in 28 foreign companies moving into the sector, setting the stage for the coming transformation of the hydrocarbon industry. BHP Billiton (better known for mineral extraction) successfully bid to develop the deep-water Trio block (gas and oil) together with PEMEX. BHP's winning bid was \$624 million. The active participation of multi-national oil firms in Mexico's auctions signals that low international oil prices did not discourage the development of new reserves.

Chinese investment in Mexico has been relatively modest largely due to direct competition between Mexican and Chinese manufacturing sectors.<sup>23</sup> Still, Chinese investment, mostly through state-owned enterprises (SOEs), is set to expand investment in the mining sector (especially copper) and hydrocarbon sector, and in developing infrastructure projects (Chicoasen II). There are two significant joint funds to support energy development: the China-Mexico Energy Fund of \$1 billion; in addition to the larger China-Mexico Investment Fund of \$2.4 billion (63). Finally the CELAC-China Investment Fund for Infrastructure holds \$5 billion.

## Public Private Partnerships

Large-scale infrastructure projects require large-scale investments backed by access to substantial financial resources and with longer time horizons (41). In Mexico, the government has overcome the infrastructure financing bottleneck through two routes: public debt and the creation of financial instruments such as trusts and public-private partnerships. To that end, Mexico passed a Public Private Partnership Law (Ley de Asociación Público-Privada, 2012 - LAPP) to provide a legal framework for greater private investment in infrastructure development. The new law created the legal framework for various modalities to operationalize PPPs, such as Service Delivery Projects (Proyectos de Prestación de Servicios) at both the national and state levels. The Inter-American Development Bank has played an important role in promoting PPPs.<sup>24</sup>

---

<sup>23</sup> Mexican policy makers have spent decades trying to diversify the country's economy away from primary commodities. In 2013, Chinese FDI in Mexico was just under \$50 million. That increased to \$140 million in 2014. For comparison, Chinese FDI in Brazil was \$311 million and \$730 million respectively.

<sup>24</sup> PPPs fundamentally change the role of the State from that of direct service delivery to one of regulator and supervisor of third-party service delivery. In this way, the State no longer bears the cost of building and operating public infrastructure and instead concentrates on its efficient administration. Risk is shared and activities are distributed between the government and private firms with governments assuming regulatory, social and environmental risks. In addition to Mexico, PPPs have been adopted in Brazil, Chile, Colombia, Peru, and Trinidad & Tobago among others (64).

According to some observers (41), LAPP completely transforms the legal framework that regulates relationships between the public and private sectors. Also of interest is that the law contains a clause allowing companies to submit unsolicited proposals – that is, investors can propose and argue for infrastructure projects to the Mexican government based on their interests and financial incentives, even if these projects do not appear in government plans.

## Public sector revenue considerations

Historically, oil has played a leading role in the national economy. For decades, oil's contribution to public revenues averaged 30 percent. Given that oil, natural gas production, and related byproducts were under state control via PEMEX, revenues generated from oil were an important contributor to government coffers which in turn sustained a larger work force and public spending. Until recently, PEMEX was also among the world's top ranked companies in oil production. However, with the dramatic decline of yields from key oil fields beginning in 2005, and a sharp drop in proven reserves, the sector entered into crisis. Since then, revenues from oil and gas have continued to decline to 15 percent of public income, though analysts believe that production has now stabilized and is set to increase, albeit slowly, with new fields coming into production.<sup>25</sup> On the other hand, mining revenues deliver few resources to public finances. Payments of fees for mining rights are minimal and companies have been given fiscal stability agreements as part of government schemes for promoting investments (24). Only in 2014 did the Mexican government introduce royalty payments on minerals, which coincided with declines in international prices.

## Illicit facilitators of investment

In the mining sector, the administration of concessions has been characterized as chaotic, error-ridden and suffering from a series of irregularities including failure to collect fees and to properly register companies with the Ministry of Finance (24). Corruption has also been an issue. In a 2010 report, a national audit found that less than one third of mining companies in Mexico submitted annual reports and no sanctions were applied to those that failed to do so. The cost of mining concessions was described as symbolic, with the government taking in only a small percentage of the total value of mineral production (53).

Discussions with Mexican civil society organizations highlighted concerns over the nexus between local government, national government and criminal networks in illegal activities and the resulting “dispossession by force” of local populations. There is specific concern that rising violence is creating ungovernable spaces with negative impacts on communities and forests. There are also reports of “irregular mining” in which companies pay extortion fees to organized criminal gangs (65–67). In such cases, projects are authorized by local authorities without any permitting, review or public consultation. Threats of dispossession and violence are used

---

<sup>25</sup> One interesting observation about the drop-off in oil-related public revenues is that the Mexican government was able to replace revenues lost from extraction with increased tax revenues. That is, citizens paid more in taxes (24).

against community members to silence dissent. The hydrocarbons sector also reports rising criminal behavior. According to one report, by 2014 gasoline theft amounted to \$1.13 billion in losses to PEMEX (55, 68).

## D. Impacts of EII

Historically, mining in Mexico has been concentrated in the north of the country, the north-central highlands, and the state of Guerrero. Many of these longstanding mining districts have been substantially deforested over decades and indeed centuries. In contrast, the hydrocarbon industry has been concentrated in the Huasteca region (which includes parts of Tamaulipas, Veracruz, Puebla, Hidalgo, San Luis Potosí, and Querétaro) and the states of Veracruz, Tabasco, and Chiapas. Veracruz and Tabasco in particular demonstrate accumulated problems of contamination and environmental impact.

In this section, rather than focus on historical accumulated impacts, we consider emerging impacts in areas in which the hydrocarbon and mining frontiers are expanding and deepening as a result of new or anticipated investments. Given that these are more recent phenomena related in particular to the regulatory changes noted in the preceding section, the primary indicator of impact is the overlap of concessions with existing forests and communities. The recent nature of this expansion also means that it is hard to discern substantial impacts on land cover and difficult to disentangle impacts on forests and impacts on community rights as there are overlaps with each. Data are limited and often based on the experiences of particular communities, frequently reported on through the work of NGOs and journalists rather than in-depth research.<sup>26</sup>

With these caveats in mind, our discussion hinges on local illustrations of tendencies that we suspect are more widespread but not necessarily reported on, not least because of the danger involved in such reporting. We first present instances of intersecting impacts on forests and community rights in the presence of extractive industry and then infrastructure. We then discuss impacts on rights and governance more generally.

### Intersecting impacts on forests and community rights: illustrations across Mexico

#### Extractive industry impacts

While much of the expansion of the hydrocarbon frontier will be offshore, recent rounds of bidding for hydrocarbon concessions have also highlighted competing claims over land use. Some of the territories made available by these auction rounds are agrarian lands under ejido or

---

<sup>26</sup> See Pickell et al. for a discussion of the challenges of monitoring forest areas undergoing rapid energy development (69).

communal property. Fundar's analysis of bidding rounds observed that 1,899 agrarian areas were potentially affected under Round Zero, resulting in overlaps with up to 1.6 million hectares of ejidal or communal lands. Some 13 different Indigenous groups might be affected. Similarly, Round One reflected overlaps with 6,711 ejidos and communities (61). The overlapping, competing land uses and the lack of respect for Indigenous rights triggered protests and resistance by residents. Indeed, during Round Two, community protests led the government to postpone the auction of two additional areas until processes of free, prior and informed consent (FPIC) were implemented. Although SENER adopted regulations requiring consultations before exploratory activity moves forward, in the future, FPIC processes could transform the longstanding practices of PEMEX officials and local authorities of engaging in off-stage negotiations, deal-making and suppression of socio-environmental protest.

Overlaps with forested community lands are more extensive for mining than for hydrocarbons. For instance, according to the SGM (2015), there are 46 active mines in Chihuahua, 11 of which are located in the Tarahumara Forest Ecosystem Conservation region, and 38 out of 73 new mineral explorations are within the Sierra Madre Occidental. The Sierra Tarahumara is a mountainous region that forms part of the Sierra Madre Occidental. It is composed primarily of pine-oak forest and is one of the most extensive forested areas in North America. Almost half of the population of the Sierra Tarahumara lives in extreme poverty. Since 2004 the World Wildlife Fund and the Ricoh Corporation's Corporate Social Responsibility program have been actively working with communities to support local livelihoods while simultaneously protecting the region's biodiversity. In 2014, the Mexican government joined their efforts to create the "Proyecto Tarahumara Sustentable"(70).

Just north of the Sierra Tarahumara region are the Tutuaca and Papigochi Protected Areas. Created in 2001, these protected areas are designated as sustainable use regions, where agriculture and natural resource extraction are permitted but are under careful management to ensure that no over-exploitation occurs (71). Much of the land is ejido land and is under forest management or agricultural development, while some smaller parcels are highly protected reserves. Lying within the Tutuaca Protected Area are several different use regions, including special land use regions where mining activity is going forward, and a small preserved area in which no land use of any kind is permitted. Zoning of the area can be changed at any time by SEMARNAT (71), and given the existence of 943 different mining concessions within the region, future mining exploitation is possible.

Community efforts to defend forests and territory in the Tarahumara region have been met by violence. On January 15, 2017, Isidro Baldenegro, a prominent environmental leader and a 2005 recipient of the prestigious Goldman Environmental Prize, was shot and killed. Baldenegro was a farmer and a community leader of Mexico's Indigenous Tarahumara people, defending forests in a region characterized by violence, corruption, and drug trafficking (72).

Along with those in Northern Guatemala and Belize, the forests of Chiapas and Campeche comprise the Selva Maya forest complex, with a long history of oil extraction. The region has also seen a recent increase in mining activity. A report prepared by the Center for Human Rights "Fray Bartolomé de Las Casas" (73) identified 26 major mining projects in the state of

Chiapas, and a report by the rural research organization Ceccam (74) finds that four natural protected areas in Chiapas (Volván Tacaná, El Triunfo, La Encrucijada, and Playa de Puerto Arista) are potential mining areas. In the areas of La Encrucijada and el Triunfo, rural families have protested against 21 titanium concessions, arguing that such mining would negatively affect water resources and the health of communities (75).

Another case of conflict between mining companies and local residents involves the company Blackfire in Chicomuselo, which resulted in the killing of Mariano Abarca in 2009 in connection with exploratory activities linked to the company's "Payback" mine in Chiapas. Abarca, a community leader, had told Canadian Embassy officials about armed workers being used to intimidate peaceful protesters. Despite an international campaign to demand his safety, Abarca was murdered. The suspects in his killing revealed links to the Canadian mining company (76, 77). According to Galicia Luna, opposition to mining companies in Chiapas has also sometimes led to the creation of mining cooperatives that are supported by the government and mining companies (78). These cooperatives sell their mineral production to the mining companies.

As in other states, communities in Puebla living adjacent to mining areas also face a range of challenges. In April 2017, a group of local residents in the municipality of Ixtacamaxitlán denounced Almaden Minerals (Canada) for publicly announcing plans to proceed with exploratory activities even though SEMARNAT denied the company a permit to carry out proposed work. The company is also under investigation by PROFEPA after a complaint was filed by the Unión de Ejidos y Comunidades en Defensa de la Tierra, el Agua, y la Vida, Atcolhua. The investigation centers on the company having conducted exploratory activities without a permit, working outside of the designated area, and potentially affecting the aquifer. Local residents are particularly concerned about the proposed use of cyanide leaching technologies for the open cast mine and the potential for water and soil contamination.<sup>27</sup> The Tuligtic claim involves gold and silver and is located about 70 miles north of the Pachuca Mine, one of the country's largest gold and silver deposits. Almaden has been conducting exploratory activity in this area since 2001.

In Oaxaca, a growing number of mining concessions directly overlap with Indigenous community forests and their biodiversity protection initiatives. Such initiatives are seen as key to preserving the state's forests and reducing deforestation from 2007-2014, though there are indications of an uptick in forest loss beginning in 2015 (80). As of February 2017, 24 voluntary conservation areas<sup>28</sup> had identified existing mining concessions. Concessions also overlap with

---

<sup>27</sup> Local residents also accuse Almaden Minerals of misrepresenting to shareholders the company's ability to obtain the necessary permits and of encouraging clientelist relations with community members by supporting village festivals in exchange for their support of the mine. For more on the Ixtaca gold and silver deposit see: <http://www.almadenminerals.com/PROJECTS/Ixtaca.html> (79).

<sup>28</sup> These conservation areas are not part of the formal federal or state natural protected areas. In some cases, communities may pursue their own initiatives to protect natural resources as federal conservation programs can restrict what communities can do within federal reserves. At the same time, the loss of decision-making over activities such as mining creates an atmosphere of distrust. See Pskowski (81) for a discussion of the case of Capulápan.

two of the state's ten federal natural protected areas (Santo Domingo Tonalá y San Marcos Arteaga and Santa María Tonameca). Besides competition for land, mining has also created competing claims over other resources, such as water. In the Valles Centrales region, Oxfam and local NGOs requested information on the use of water by the mining company Cuzcatlán de San José del Progreso. The company's access to water resources stands in stark contrast to the lack of permits granted to local producers for other uses (82).

As elsewhere in Latin America, the presence of informal artisanal mining, mostly gold mining, is expanding in Mexico, though information about its extent and impacts on forests is largely anecdotal. However, mercury (one of the main inputs into informal gold mining) is mined in several Mexican states. A recent study on the health impacts of small-scale mercury mining in the State of Queretaro highlighted the health hazards to local residents. Mexico produced about 40 million tons of mercury from 2007-2009, most of it by small-scale producers using low technology methods (83). However, as demand grows for mercury, driven by artisanal gold mining in Andean countries, Brazil and Guyana, production is increasing along with toxic wastes.

## Infrastructure impacts

Mexico has experienced significant social conflict linked to proposed and ongoing infrastructure investments. Under the Fox administration (2000-2006) and Plan Puebla-Panamá, the government confronted social movements opposed to the construction of a new airport for Mexico City, the proposed hydroelectric complex La Parota (Guerrero), and the Escalera Náutica tourism mega-project that would impact the states along the Gulf of California. For subsequent governments, social protest around megaprojects has grown and presents an important challenge to ambitious government plans to increase connectivity, competitiveness and export-led economic growth.

In Chiapas, a number of mega-projects are in various stages of development: 11 dam projects, two road projects, two oil projects, one tourism project and one wetlands project (73). Critics see these projects as a top-down, state-led imposition on ejidos and Indigenous communities. This is especially the case with energy sector projects which are seen to erode ejidos and community lands and weaken collective management of natural resources. One of the most problematic projects is Chicoasén II (municipalities of Chicoasén and San Fernando) which follows the construction of the Manuel Moreno Torres dam (known as Chicoasén I), itself a highly conflictive project. Hydroelectric power is seen as providing clean energy to the region and catalyzing economic growth, but these projects will necessarily displace communities in the municipalities of Palenque (Chiapas) and Tenosique (Tabasco).

Highway projects have also spurred social conflict. A review of the proposed highways in the Selva Maya argued that the project would increase deforestation to 311,000 hectares over 30 years, in addition to facilitating the movement of drugs north to Cancun (84). The México-Tuxpan Highway (Mexico 132D) linking Mexico City to the Port of Tuxpan (Veracruz), one of the most ambitious federal roadbuilding projects to date, traverses both tropical rainforest and pine forest. Rural communities complained of environmental damage to soils, forest and water

resources linked to this highway's construction. More than 700 workers were laid off when the company was forced to pay to relocate a number of families, setting in motion an extended labor dispute. However, the conflict-plagued highway was finally opened in 2015.

## Further implications for community rights and livelihoods

### Regulatory changes, rights, and conflict

Regulatory reforms in Mexico have created incentives for private investment in mining and oil and gas development, but in ways that reduce longstanding protections of ejido and Indigenous lands, limit local participation in discussions about natural resource use, and establish preference for extractive activities over other forms of land use. Reforms created the possibility for communally held lands to introduce private ownership, opening up once intangible lands to private investment, and facilitating company negotiations with ejidos and Indigenous communities to gain access to the subsoil. The adoption of these reforms, and the increasingly vertical nature of decision-making, have adverse implications for Mexico's accumulated experience with collective forest enterprises and for other community-based sustainable production initiatives.

Reforms to the mining law and to energy and hydrocarbon regulations, and potential changes to the forestry law, establish preferential status for projects of 'national and public utility' over other forms of land use – collectively managed forest areas do not enjoy the same status. Projects given such status allow private companies, supported by government, to invoke national interest arguments to force communities to provide surface access and rights of way. While reforms recognize the need for greater community participation in decision-making and for more transparency from companies and governments, communities are often confronted with significant challenges and pressures when they attempt to exercise these rights. Such pressures can range from withholding of funding, surveillance and being labelled as anti-development, to physical threats, criminal charges, and detention of community leaders and protestors (85, 86). Looking ahead, the issue of community rights is likely to be further complicated by the passage of the Internal Security Law (2017) which could further justify and encourage government practices of criminalizing social protest, limiting public protest and increasing repression of protestors.<sup>29</sup>

Conflicts over the infringement of community rights have typically been more significant around mining projects than oil and gas investments. Historically, PEMEX experienced little organized resistance to its operations as the public largely accepted the negative social and environmental

---

<sup>29</sup> A review of the Internal Security Law by the Washington Office on Latin America (WOLA) notes that the law grants Mexico's armed forces "the unchecked power to design and implement security policies in Mexico, from identifying domestic security threats to leading security operations and collecting information from civilian institutions," and sets up a possible pathway for social protest to be classified as an "interior security threat" (87).

impacts of the industry as part of the nation's development model. However, some analysts suggest that this may change with the liberalization of the hydrocarbons sector, and that private companies will encounter an operating environment in which local residents may become less tolerant of private sector hydrocarbon projects in their communities. Reported cases of water and soil contamination and health concerns might also shape the attitude of communities to oil extraction by private companies.

A persistent problem that increases the risk of social conflict is that the government has few effective mechanisms to anticipate and manage environmental and social harms resulting from EII activity. Historically PEMEX did not have a policy to compensate communities for damages linked to its operations, much less provide communities with information about the nature and extent of environmental accidents. Indeed, PEMEX's operations are characterized by a long history of opacity and poor company-community relations (88). While the right to information as a fundamental right (Article 6) is enshrined in the Mexican Constitution, the government has failed to operationalize this right for ejido and Indigenous communities impacted by EII (83).

That said, PEMEX's long history of limited transparency may be coming to an end. Suárez Ávila notes that the liberalization of Mexico's energy sector along with

...a public opinion that is more critical of the socio-environmental impact of energy and extraction activities, and greater transparency in the sector, will make it possible to foresee the emergence of a social context with greater conflict, which will bring Mexico closer to a scenario similar to cases in other parts of Latin America (89).

In this context, the advancement of FPIC in Mexico as a right to consultation is an important avenue that can be used to address irregular practices by business and government authorities (such as granting mineral concessions in protected areas, attempting to rush projects through without required permits). The risk is that government will turn consultation processes into a vertically-oriented mechanism that fulfills administrative requirements but has little impact in addressing substantive issues with project design (85, 90).

A poorly handled consultation in Yaqui territory provides one example how these risks can lead to significant inter-community violence. In 2016, a proposal to construct a natural gas pipeline from Guaymas (Sonora) to El Oro (Sinaloa)<sup>30</sup> provoked a violent confrontation – at the doorstep of a village school – over differences about whether the project should go forward. One person was killed, ten people were injured, and vehicles were torched. The confrontation followed SENER's prior consultation process with eight Yaqui communities – seven of which approved the project and one that did not. Despite the order by a federal judge to halt work on the pipeline in June 2017, the company continued work and completed the pipeline, which was subsequently damaged by the holdout community. That community also filed an injunction

---

<sup>30</sup> The 200+ mile pipeline forms part of the larger Sonora pipeline developed by a consortium of companies including IEnova (Mexico) and Sempra Energy (USA). The pipeline will connect Northeastern Mexico to the National Pipeline system and forms part of the National Energy Strategy 2013-2027. See Sobranes (91) for additional information about the conflict.

against company officials from entering Yaqui territory. As of March 2018, the pipeline is on standby, awaiting a court decision (92). Relations among Yaqui communities remain tense and resulted in another violent confrontation in May 2018 (16). This conflict is one of many that highlight the fraught relationships between companies and Indigenous communities documented by human rights organizations in Mexico (86, 93).

## Governance, illegality and organized crime

Mexico is one of the most dangerous countries in which to defend land and the environment, and resistance and protest has often been met with intimidation and even murder, as noted above. Global Witness's annual report on the killings of environmental defenders has expressed concern about increasing murder rates in Mexico (94). Multiple internationally recognized environmental leaders have been killed or threatened in Mexico, including Goldman Environmental Prize winner Isidro Baldenegro López. Perpetrators of such murders are almost never held to account. Criminalization of protest is also becoming increasingly common, along with an alarming escalation in the use of torture against environmental defenders.<sup>31</sup>

While it is not necessarily the case that extractive industry companies are directly linked to such violence, mining and hydrocarbon activities are often accompanied by growing militarization of extractive areas in which criminal groups vie for territorial control alongside companies. Researchers have identified some important links between extractive activity and organized crime. These can include: narco-traffickers investing in mines as a means of money laundering, mineral theft and extortion of mine owners, organized efforts to dispossess people from their land, and the outright theft and trafficking of hydrocarbons (67, 95). CANACERO, Mexico's industry group for iron and steel, said it has lost \$1.3 billion from mineral theft and illegal mining (23).

Analysts point to the potential for criminal activity linked to new hydrocarbon projects, especially in states such as Tamaulipas, Coahuila, Chihuahua, and Veracruz where organized crime networks are well developed (55). Criminal gangs target Mexican pipelines to steal oil, often provoking explosions resulting in loss of life and environmental damage. PEMEX has reported a surge in illegal fuel taps and oil smuggling in recent years with losses amounting to \$800 million in 2014 (96).

While Mexico's mining sector is dominated by legal large-scale operations that are regulated by the state, reports of increasing criminal activity linked to mining (in the form mineral theft, extortion and threats of violence) suggest that illegality has stretched beyond state control. About 9 percent of gold production is considered illegal (67). Organized crime is reported to be firmly embedded in a number of states (including Chihuahua, Guerrero, Michoacán, Morelos and Tamaulipas) with organized crime "controlling the right to mine" (67). At least one mine owner openly admitted to cutting deals with criminal groups: "We ask the mafia for permission... and we are able to [operate]" (66). In Michoacán, an iron ore mine was caught up in open violence between local militias and the Templars gang. Jaime Martínez Veloz, former activist

---

<sup>31</sup> See Mining Watch: [www.miningwatch.com](http://www.miningwatch.com) (Last Accessed 23 Nov 2018).

and now head of the government's Commission for Dialogue with Indigenous People, decried the ties between Mexico's mines and organized crime and the harm it is causing to Indigenous communities and ejidos (65).

The full scope of these problems of illegality is yet to be appreciated. Activists consulted during this study frequently referred to narco involvement in mining and the implicit approval of authorities. More data collection and analysis is needed on the impacts of criminal mining on communities and the environment, especially to support community efforts to maintain control over their land and forest resources.

## **E. Responses to EII Impacts on Forests and Communities**

Broad coalitions of grassroots Indigenous and campesino organizations, nongovernmental organizations, academics and environmentalists have responded forcefully to proposed regulatory changes and the intensification of EII activity on ejido, agrarian and Indigenous lands. For its part, the Mexican government has sought to promote and expand extractive industry activity and related investments in infrastructure development while at the same time adopting some social and environmental safeguards to address the concerns of populations impacted by investments. International organizations and the philanthropic sector have a long history of supporting community forest management in Mexico but share concerns that recent reforms may place unfair burdens on forest communities and community-managed forest enterprises and trigger new rounds of fragmentation and deforestation.

### **National and Sub-national Government Responses**

Outwardly, government policy continues to support the sustainable management of the country's forest resources and a reduction in emissions from greenhouse gases. Yet recent regulatory reforms and national plans aggressively promote the expansion of the mining and hydrocarbon sectors through the adoption of more permissive land use regulations in the name of public interest. Changes to land use regulations in natural protected areas, relaxed to support strategic EII investments, reflect the political power of private investors. Observers note that the direction of current government policy is out of sync with public commitments to protect forests. Instead of building on successes in community forest management, the government is steadily rolling back the rights of ejidos and agrarian communities to exploit their own natural resources (97).

With the opening up of the energy sector to private investors, the government requires companies to conduct FPIC processes with affected communities, though the implementation of such processes has varied significantly across project type and place. The coordination of laws, protocols and oversight mechanisms linked to formal consultation has yet to be adequately developed. Companies see FPIC as adding red tape to an already complex set of laws around

access to the subsoil. Critical observers note that consultation processes are aggravating intra-community tensions and failing to adequately address the concerns of affected populations.

One strategy to build support for mining and hydrocarbon projects at the local and state levels is the creation of directed funds that recognize and compensate for the social and environmental impacts of extraction. As part of the mining and energy reforms, the Mexican government created two funds to address the social and environmental impacts of extractive industry on local populations and ecosystems and to promote local development. The larger of the two, the Fondo para Entidades Federativas y Municipios Productores de Hidrocarburos (Fondo for Federated Entities and Municipal Producers of Hydrocarbons, FEFMPH) receives financial resources from a new tax established under the Hydrocarbons Income Law (2016).<sup>32</sup> Among the potential uses of the fund are projects that preserve and restore natural areas, including reforestation projects, and the rehabilitation of rivers and other water sources. Critics complain that there is little transparency around FEFMPH's operations and that it may provide incentives for state and local governments to discourage, or otherwise repress, the public's right to protest hydrocarbon operations in their jurisdictions (24).

The second fund, the Mining Fund for Sustainable Regional Development (Fondo Minero) became operational in 2014 as part of the Federal Rights Law (2016). The fund channels financial resources to municipalities affected by mining, though it remains unclear how the financial resources of this fund will be distributed. According to Fundar's 2016 report on extractive industry, the Fondo Minero received \$259 million in 2014-2015 (61).

As with FEFMPH, the Fondo Minero prioritizes investments in physical infrastructure that produce positive social and environmental impacts and support urban development in regions and localities where mineral extraction takes place (24). The Fondo Minero's resources are derived from company payments to the federal government to acquire mining rights.<sup>33</sup> The law earmarks 62.5 percent of the Funds' resources for municipal governments where extraction occurs, with the remaining 37.5 percent going to the corresponding state government.<sup>34</sup>

In both cases, EI companies contribute to a central fund that provides support for decentralized efforts to address the social and environmental impacts of extractive activity and promote development where extraction takes place. These funds channel significant financial resources to both municipal and state governments; however, given endemic corruption and patterns of

---

<sup>32</sup> According to de la Fuente (24), FEFMPH's purpose is to finance projects that address social and environmental impacts from oil and gas operations. In practice, the fund attempts to both recognize and compensate states and localities directly impacted by providing a flow of financial resources, as well as gain public support for continued operations.

<sup>33</sup> The regime of payments linked to different rights is laid out in the Federal Rights Law (2016). For more about the organization and management of the Fondo Minero's resources see Olivera (24).

<sup>34</sup> An analysis of the geographical distribution of funding by Olivera (24) reflects the significant concentration of resources at both the municipal and state levels. Five northern states (Sonora, Zacatecas, Chihuahua, Durango and Coahuila) accounted for 80 percent of Fondo Minero resources. At the municipal level, nine of 233 mining municipalities accounted for 50 percent of the Fondo Minero's disbursements, a pattern sustained since 2014.

criminalization of community leaders by local government authorities, it is unclear the degree to which the mechanisms adequately address social and environmental impacts. Further research is needed to identify projects that specifically address forest and watershed protection and the extent to which the projects are effective mechanisms for supporting ejido and Indigenous forest-based communities.

## **Responses of Grassroots, Rights-based and Civil Society Organizations and Networks**

Well-developed networks of forest-based communities, civil society organizations, researchers, Indigenous organizations, and producer groups have effectively promoted an alternative, productive vision for the country's forests and rural forest-based communities, based on decades-long successful experiences with forest management. This alternative view of development suggests that forest-based communities can live with dignity while sustainably managing forest resources. Research on forest-based communities in southeastern Mexico shows that deforestation rates compare positively with those of protected areas (98). Nonetheless, proposed legislative changes to the Forestry Law and efforts to relax social and environmental regulations around EII activities reflect the fragile nature of these gains and the importance of actively defending rights over natural resources. Networks such as Red MOCAF and CMSSS are important actors for promoting this cause at the national level.

In Mexico, grassroots mobilization shapes policy and governance arrangements at the federal, state and local levels and with private companies. The rise of territorially-based social movements contesting EII activities has forced both government and private firms to adopt consultation processes and address community concerns. Red MOCAF plays an important role in voicing local concerns over changes that are seen as favoring private interests and limiting citizen rights. Communities have called for “projects of life, in place of projects of death.”<sup>35</sup> Indeed, the driver of much social protest is the lack of adequate consultation at project initiation. Protests have coalesced around proposed mine sites but also around proposed infrastructure development including airports, gas pipelines, drilling sites, hydroelectric plants, wind energy schemes and roadbuilding. Companies involved in building the national gas pipeline network report delays and stoppages linked to right of way disputes with Indigenous communities around the country (91, 99). In response, local, state and national authorities have responded by criminalizing protest (86).

## **NGOs, Research Institutes, Networks and Observatories**

Research and dissemination about extractive activities have helped to identify the new frontiers of mineral extraction as well as the geographies of mineral extraction, infrastructure development, ejido and Indigenous forest communities, and the potential for forest loss going forward. Research has contributed to a greater understanding of the role of ejidos and Indigenous communities in forest protection (4, 100, 101). More recently efforts have turned to

---

<sup>35</sup> Mexico roundtable, Mexico City, March 21, 2017

understanding proposed regulatory reforms and potential impacts on the rights and safeguards of forest-based communities. Fundar, CCMSS, Ceccam, CartoCritica all provide important research on extractive industries and public policy, the importance of community-managed forests, and the potential conflicts that overlapping land uses and claims could provoke. Data gathering, analysis and dissemination about EII in Mexico is important to understanding the future impacts of individual investments as well as the larger, interrelated impacts of multiple investments – and this is especially important at the sub-national level, where access to information can be limited.

There is far less analytical work and public information on infrastructure development than on extractive industry. Poder's launching of Colaboratorio<sup>36</sup> is an opportunity to expand coordinated strategic research and dissemination on proposed and ongoing infrastructure development investments. Such an effort could coordinate with extractives researchers to analyze the larger, synergistic effects of extractive and infrastructure investments within territories and their impacts on community-managed forests. Dissemination of such information across scales would support the development of strategies to respond to EII expansion and support efforts for greater transparency of EII activities

In Mexico, communities and their allies have made use of the courts to contest proposed investments, to insist on prior consultation, and to address social and environmental impacts linked to EII. Strategic litigation related to specific cases of territorial defense have been successful at slowing or stopping projects from going forward.<sup>37</sup> While this is an important tool within a broader strategy, observers note that it cannot replace the organizational work, awareness-building, and training with communities to improve their knowledge of their legal rights and existing social and environmental safeguards. In the Capulálpam community-managed forest area in Oaxaca, the community assembly filed a legal challenge against a company to prevent a mining project from going forward on the basis of health and environmental concerns and lack of prior consultation, and has been able to keep mining from proceeding for now. Communities across the country have used similar legal arguments to slow or stop gas pipeline construction, airport construction and other EII projects (80, 91).

Media strategies include the preparation and dissemination of documentaries, such as *Ejidos* (102), which shows the pressures experienced by forest-based communities from the illegal timber trade.<sup>38</sup> An international media campaign to stop a Grupo Mexico copper mine from going forward in Michoacán's Monarch Butterfly Reserve included a highly visible opinion piece

---

<sup>36</sup> Poder (Project on Organizing, Development, Education and Research) works on issues of corporate accountability and transparency in Mexico. Colaboratorio is a collaborative effort to research and disseminate information about business EII activities in Mexico. See Poder's website for additional information <https://www.colaboratorio.org/> (Last Accessed 4 November 2018).

<sup>37</sup> According to Miguel Pulido of the anti-corruption NGO Antifaz, during a presentation on strategic litigation at the Ford Foundation in Mexico City on 21 March 2017.

<sup>38</sup> The short documentary *Ejidos* follows residents of the Cruz de Ocote ejido in the Sierra Norte de Puebla and their efforts to address illegal logging and wood laundering and sustainably manage their forest resources.

in The New York Times (103). Investigative journalists' coverage of illegal mining and trade in illegal commodities shines a spotlight on the growing links between the mining industry, organized crime, corrupt public officials, and money laundering, and more specifically on the growing presence of Mexico's cartels in the mining sector and gang activity related to the theft of hydrocarbons (65, 67).

## International Organizations and Philanthropy

The international community has been a strong supporter of Mexico's CMFEs and has partnered with the Mexican government in initiatives to promote sustainable forest management and biodiversity protection. These efforts have generated an internationally recognized model of community forestry. The World Bank's Forests and Climate Change Project in Mexico (2012) invested in the sustainable management of 1.8 million hectares and assisted 1,000 ejidos and agrarian communities through support to National Forestry Commission programs. For almost two decades, the World Bank has provided funds to the government of Mexico in support of CMFEs, including through the Forest Carbon Partnership Facility (FCPF) programs to reduce carbon emissions in the states of Campeche, Chiapas, Jalisco, Quintana Roo and Yucatán (104).

International human rights organizations play an important role in highlighting the need for the Mexican government to adhere to international conventions and social and environmental safeguards in order to protect vulnerable populations. Rising levels of violence around EII investments have prompted international agencies to voice concern over human rights violations in Mexico. The Inter-American Commission on Human Rights (IACHR) found:

Serious human rights violations against Indigenous peoples and communities in Mexico occur in two main areas: violence in the context of mega-projects on ancestral lands and territories authorized without due process of free, prior and informed consent; or in the context of title claims affecting their land, and the lack of due process in criminal matters (93).

The report goes on to discuss the criminalization, exclusion and violence experienced by environmental defenders in the context of their opposition to the concession and environmental permit granting processes and the lack of consultation and lack of appropriate state action to guarantee the rights of vulnerable populations.

International agencies have issued more general calls to address the actions of criminal networks and high levels of insecurity and violence, and to adopt stronger commitments to anti-corruption efforts, including directly addressing state-company collusion.

## F. Summary of Findings

Protected areas, ejido, and Indigenous lands play a key role in the defense of Mexico's forests. Mexico is unique in the world in that some two thirds of its forests are collectively managed by communities; however, the expansion of mining, oil, and gas concessions in recent years as well as plans for large-scale infrastructure development in forest areas pose significant challenges to protecting standing forests and the rights of communities. Current mining, oil and gas operations do not appear to be significant drivers of deforestation, as the highest areas of forest loss do not necessarily overlap with mineral and hydrocarbon concessions. Further, the existence of overlapping drivers in fast-changing landscapes makes it difficult to attribute forest loss to a single cause. Nonetheless, we do find evidence that EI activity and infrastructure investments are eroding the rights and social cohesion of rural families and communities in ways that could negatively impact the future sustainability and governance arrangements of Mexico's forests.

Proposed changes to forest policy and land use within natural protected areas could induce a return to higher rates of deforestation and degradation in two important ways. Policy reforms may render decision-making around forest management and the allocation of resources more opaque. By establishing greater state control over forests, these reforms may also facilitate the privatization of natural resources, favor the rights of private owners over those of ejido and Indigenous communities, and create a more permissive environment for business activity. At the same time, reforms to the mineral and hydrocarbon sectors have been designed to reinvigorate investment in these sectors, and to facilitate expansion into regions with little history of mining, oil or gas extraction, including forested and ejido lands.

Mexico's national development and infrastructure plans emphasize investment in southeastern states that are among the country's poorest, most Indigenous and most forested, and include the construction of roads and rail lines, hydroelectric plants, gas pipelines, and storage and port facilities. National policy classifies these strategic investments as being of "public utility" which means that these projects will have preference over all other land uses, opening the door to ejido and Indigenous community loss of land use rights and the potential for increased social conflict over rights of way. These infrastructure projects are bundled with government proposals to expand energy production, suggesting important implications for tropical forests and forest-based populations of the Yucatán peninsula, Oaxaca and Chiapas. These states already had the highest levels of deforestation in the 2000-2014 period. There are also significant pressures on the pine forested regions in the north of Mexico related to industrial mining.

In Mexico, the synergies between energy development, mining and infrastructure, and their impacts on forest cover and forest communities are yet to be fully explored. Elsewhere we find that the development of infrastructure makes EI investments more financially viable. At the same time, the expansion of infrastructure reduces the transport and energy costs of extractive projects, encouraging further expansion. In northern states, the expansion of gas pipelines will fuel power plants which in turn will provide cheap sources of power to mines. In Mexico, much

analysis of EII activity is project-based or focused on localities, but there is a need for more strategic assessment of the combined, synergistic impacts of EII activities on territories.

The nexus of sub-national government, national government, business and criminal networks in illegal activities is fueling the violent dispossession of local populations. Evidence of involvement of these criminal networks in extractive industry investments, laundering money, protection rackets, and seeking to capture natural resource rents also suggests a direct threat to the governance and community control of forests.

Territorially based social movements have emerged to contest the expansion of EII activities and to call upon businesses and the government to respect social and environmental safeguards. On the one hand, increasing external pressure may translate into stronger efforts to address impacts on the part of EII companies and government proponents, especially to avoid violence and rights violations. On the other hand, given the ambitious plans for expanding EII activity in Mexico and the overlaps with protected areas, forests and forest-based communities will experience an intensification of pressures on their resource base and increased risks of social conflict.

# References

1. Madrid L, Nunez JM, Quiroz G, Rodriguez Y (2009) La propiedad social forestal en Mexico. *Investigacion ambiental* 1(2):179–196.
2. Skutsch M, et al. (2018) Increasing Inequalities in Access to Forests and Forest Benefits in Mexico – CLAG. Available at: <http://clagscholar.org/increasing-inequalities-in-access-to-forests-and-forest-benefits-in-mexico/> [Accessed September 30, 2018].
3. Segura G Mexico's Forests Sector and Policies: A General Perspective. 27.
4. Chapela F (2012) *Estado de los Bosques de Mexico* (Consejo Civil Mexicano para la Silvicultura Sostenible A.C., Mexico City).
5. Humphreys Bebbington D, Verdum R, Gamboa Balbí C, Bebbington A (Forthcoming) Assessment and Scoping of Extractive Industries and Infrastructure in Relation to Deforestation: Amazonia.
6. Armenteras D, Espelta JM, Rodríguez N, Retana J (2017) Deforestation dynamics and drivers in different forest types in Latin America: Three decades of studies (1980–2010). *Global Environmental Change* 46:139–147.
7. Moreno-Sanchez R, Buxton-Torres T, Sinbernagel K, Moreno Sanchez F (2014) Fragmentation of the forests in Mexico: *Realidad, Datos y Espacio Revista Internacional de Estadística y Geografía* 5(2):14.
8. Bonilla-Moheno M, Aide TM, Clark ML (2012) The influence of socioeconomic, environmental, and demographic factors on municipality-scale land-cover change in Mexico. *Reg Environ Change* 12(3):543–557.
9. Soberanes R (2018) Illegal cattle ranching deforests Mexico's massive Lacandon Jungle. *Mongabay*. Available at: <https://news.mongabay.com/2018/03/illegal-cattle-ranching-deforests-mexicos-massive-lacandon-jungle/> [Accessed November 23, 2018].
10. Aide TM, et al. (2013) Deforestation and Reforestation of Latin America and the Caribbean (2001–2010). *Biotropica* 45(2):262–271.
11. UNAM (2013) Selva Lacandona. Available at: <http://www.fundacionunam.org.mx/ecologia/selva-lacandona/> [Accessed October 24, 2018].
12. World Resources Institute (2018) Mexico. *Global Forest Watch*. Available at: <http://www.globalforestwatch.org/country/MEX> [Accessed March 20, 2018].
13. Campodónico H (2018) Sector hidrocarburos y presion sobre los territorios y recursos.

14. Call W (2007) Plan Puebla Panama. *NACLA*. Available at: [/article/plan-puebla-panama](#) [Accessed October 3, 2018].
15. McElhinny V, Nickinson S (2005) *Plan Puebla-Panamá: recipe for development or disaster* (InterAction, Washington DC) Available at: <http://www.bankinformationcenter.org/proxy/Document.9840.pdf> [Accessed August 25, 2016].
16. Armendáriz-Villegas EJ, et al. (2015) Metal mining and natural protected areas in Mexico: Geographic overlaps and environmental implications. *Environmental Science & Policy* 48:9–19.
17. export.gov (2018) Mexico - N. Oil and Gas. Available at: <https://www.export.gov/article?id=Mexico-Upstream-Oil-and-Gas> [Accessed November 23, 2018].
18. Stedman A, Green KP (2018) *Fraser Institute Annual Survey of Mining Companies 2017* (Fraser Institute, Toronto).
19. World Bank (2018) *Commodity prices to rise more than expected in 2018* Available at: <http://www.worldbank.org/en/news/press-release/2018/04/24/commodity-prices-to-rise-more-than-expected-in-2018-world-bank> [Accessed November 23, 2018].
20. Mexico's Sonora State Leads the Way in National Silver and Gold Production (2018) *Investing News Network*. Available at: <https://investingnews.com/daily/resource-investing/precious-metals-investing/gold-investing/mexicos-sonora-state-leads-the-way-in-national-silver-and-gold-production/> [Accessed September 21, 2018].
21. Barry T (2014) Border Lines: Mexico's Three Mining Giants. *Border Lines*. Available at: <http://borderlinesblog.blogspot.com/2014/12/mexicos-three-mining-giants.html> [Accessed November 23, 2018].
22. Alper A, Taylor S (2017) Mexico owes Canada miners over \$360 million, led by Goldcorp - documents. *Reuters*. Available at: <https://www.reuters.com/article/us-mexico-mining-tax-exclusive-idUSKBN18Z15Z> [Accessed November 23, 2018].
23. Yagoub M (2014) Doubling of Mexico Mining Losses Sign of Growing Criminal Involvement. *InSight Crime*. Available at: <https://www.insightcrime.org/news/brief/doubling-of-mexico-mining-losses-sign-of-growing-criminal-involvement/> [Accessed May 13, 2018].
24. Olivera B, de la Fuente A, Llano M, Benumea I, Sandoval A (2018) *Las actividades extractivas en Mexico: minería e hidrocarburos hacia el fin del sexenio. Anuario 2017* (Fundar, Centro de Analisis e Investigacion, A.C.) Available at: <http://fundar.org.mx/mexico/pdf/AnuarioExtractivas2017.pdf> [Accessed August 23, 2018].

25. Rises in commodity prices could set Mexico's mining industry on new path (2017) *Oxford Business Group*. Available at: <https://oxfordbusinessgroup.com/overview/breaking-ground-rise-prices-could-set-mining-industry-new-path> [Accessed October 5, 2018].
26. Ortiz Aranda MX, Madrid Zuirán S, Llano M, Ortega A (2017) *Territorios forestales comunitarios amenazados por la minería en México* (CCMSS, Ciudad de México, México).
27. Society of Economic Geologists (2010) *Northern Sierra Madre Occidental Gold-Silver Mines, Mexico* Available at: <https://pubs.geoscienceworld.org/books/book/1850/northern-sierra-madre-occidental-gold-silver-mines> [Accessed November 23, 2018].
28. Mexico Business Publications (2017) *Mexico Mining Review 2017* Available at: <http://mexicominingreview.com/2017/index.html> [Accessed August 23, 2018].
29. Monaldi F, Magno M, Morán R (2015) First Take: Latin America's Oil and Gas. *ReVista: Harvard Review of Latin America* Fall. Available at: <https://revista.drclas.harvard.edu/book/first-take-latin-america%E2%80%99s-oil-and-gas> [Accessed May 13, 2018].
30. Vietor R, Sheldahl-Thomason H (2017) Mexico's Energy Reform. *Harvard Business School* (717-027):1-30.
31. Financial Times (2018) Governments need to publish oil and gas contracts. *Financial Times*. Available at: <https://www.ft.com/content/7291710e-8a80-11e8-bf9e-8771d5404543> [Accessed October 24, 2018].
32. Malkin E, Krauss C (2016) Oil and Gas Industry Leaders Eagerly Take Stakes in Mexican Offshore Fields. *New York Times*. Available at: <https://www.nytimes.com/2016/12/05/business/energy-environment/oil-and-gas-industry-takes-stakes-in-mexican-offshore-fields.html> [Accessed August 23, 2018].
33. de la Fuente López A, Llano M (2016) *La fracturación hidráulica en la Sierra Norte de Puebla: una amenaza real para las comunidades* (Fundar, Centro de Análisis e Investigación, A.C.) Available at: <https://www.scribd.com/doc/310185703/La-fracturacion-hidraulica-en-la-Sierra-Norte-de-Puebla-una-amenaza-real-para-las-comunidades> [Accessed March 19, 2017].
34. Tunstall T, et al. (2015) *Economic Impact and Legal Analysis Shale Oil Gas Activities Mexico* (UTSA, UANL, AEM, UANL, Woodrow Wilson Center) Available at: [https://www.wilsoncenter.org/sites/default/files/Economic\\_Impact\\_Legal\\_Analysis\\_Shale\\_Oil\\_Gas\\_Activities\\_Mexico.pdf](https://www.wilsoncenter.org/sites/default/files/Economic_Impact_Legal_Analysis_Shale_Oil_Gas_Activities_Mexico.pdf) [Accessed January 28, 2018].
35. Government of Mexico (2015) Intended Nationally Determined Contribution - Mexico. Available at:

- <http://www4.unfccc.int/submissions/INDC/Published%20Documents/Mexico/1/MEXICO%20INDC%2003.30.2015.pdf> [Accessed May 29, 2017].
36. Presidencia de la República, México (2015) *Programa Nacional de Infraestructura 2014-2018* (Government of the Republic of Mexico, Mexico City) Available at: <http://cdn.presidencia.gob.mx/pni/programa-nacional-de-infraestructura-2014-2018.pdf?v=1> [Accessed November 4, 2018].
  37. Centro de Estudios Economicos del Sector de la Construccion (2018) *Estimado Avance del Programa Nacional de Infraestructura 2014-2018.pdf*. Available at: [http://www.cmic.org.mx/cmhc/ceesco/2018/Avance%20del%20Programa%20Nacional%20de%20Infraestructura\\_2014-2018.pdf](http://www.cmic.org.mx/cmhc/ceesco/2018/Avance%20del%20Programa%20Nacional%20de%20Infraestructura_2014-2018.pdf) [Accessed October 24, 2018].
  38. Visicidi L (2016) Mexico and Brazil's Crude Politics – Foreign Policy. Available at: <https://foreignpolicy.com/2018/10/16/mexico-and-brazils-crude-politics/> [Accessed October 24, 2018].
  39. Burnett V (2016) Mexico's Wind Farms Brought Prosperity, but Not for Everyone. *The New York Times*. Available at: <http://www.nytimes.com/2016/07/27/world/americas/mexicos-wind-farms-brought-prosperity-but-not-for-everyone.html> [Accessed October 25, 2016].
  40. AMDEE (2016) *Inventario de Parques Eólicos en Mexico*. Available at: <https://www.scribd.com/document/316734039/AMDEE-Inventario-Parques-Eolicos-Mexico-2016-VSocios-160601> [Accessed November 23, 2018].
  41. Flores Rangel J (2015) *Infraestructura carretera: construccion, financiamiento y resistencia en Mexico y America Latina*. *Revista Transporte Territorio* 13:122–148.
  42. Trinidad C, Martínez V (2009) ECLAC-Mesoamerica Project cooperation: Support for the facilitation of trade and transport in Mesoamerica. Available at: <http://repositorio.cepal.org/handle/11362/36306> [Accessed August 23, 2016].
  43. González Dzul JA (2018) Nueva ruta del TREN MAYA de AMLO, con dos estaciones en Yucatán: Mérida y Valladolid. *Milenio Novedades*. Available at: <https://sipse.com/milenio/cambian-ruta-proyecto-tren-maya-yucatan-307400.html> [Accessed November 5, 2018].
  44. U.S. Energy Information Administration (EIA) (2016) New U.S. border-crossing pipelines bring shale gas to more regions in Mexico. *Today in Energy*. Available at: <https://www.eia.gov/todayinenergy/detail.php?id=28972> [Accessed November 5, 2018].
  45. SENER (2016) *Natural Gas Outlook 2016-2030*. Available at: [https://www.gob.mx/cms/uploads/attachment/file/236863/NG\\_Outlook\\_2016-2030\\_P.compressed.pdf](https://www.gob.mx/cms/uploads/attachment/file/236863/NG_Outlook_2016-2030_P.compressed.pdf) [Accessed November 6, 2018].

46. Martínez AA (2017) Gasoducto Tuxpan-Tula: comunidades otomíes denuncian que afectará la biodiversidad en la sierra de Puebla. *Mongabay*. Available at: <https://es.mongabay.com/2017/03/gasoducto-tuxpan-tula-comunidades-otomies-denuncian-afectara-la-biodiversidad-la-sierra-puebla/> [Accessed March 26, 2017].
47. Llano M (2017) Por donde circulan los hidrocarburos en Mexico? Available at: [http://www.cartocritica.org.mx/wp-content/uploads/2017/07/CartoCr%C3%ADtica\\_HBS\\_MapaDuctos\\_ALTA.pdf](http://www.cartocritica.org.mx/wp-content/uploads/2017/07/CartoCr%C3%ADtica_HBS_MapaDuctos_ALTA.pdf) [Accessed November 6, 2018].
48. Critchley A (2015) Honduras se suma a gasoducto México-Guatemala. *BNamericas*. Available at: <https://subscriber.bnamericas.com/es/noticias/honduras-se-suma-a-gasoducto-mexico-guatemala1?position=1&aut=true&idioma=en> [Accessed May 7, 2018].
49. BNamericas (2017) Project Profile: Mexico-Guatemala Pipeline. *BNamericas*. Available at: <https://www.bnamericas.com/project-profile/en/mexico-guatemala-pipeline-gasoducto-mexico-guatemala> [Accessed May 7, 2018].
50. Wood D (2018) Changing the Guard in Mexico: AMLO's Opportunity and Challenges. *Wilson Center*:1–23.
51. Cypher J (2018) Energy Privatization and Land Grabbing: The Scope and Contradictions of the Mexican Neoliberal Oil Mega-initiative. *Social Environmental Conflicts in Mexico* (Palgrave Macmillan), pp 43–77.
52. Comisión Económica para América Latina y el Caribe (CEPAL) (2018) La Inversión Extranjera Directa en América Latina y el Caribe 2018. 213.
53. Tetreault D (2016) La política minera mexicana y los movimientos de resistencia y reforma. *Política Minera y Sociedad Civil en América Latina*, ed Cisneros P (Editorial IAEN, Quito, Ecuador). 1st Ed.
54. Arredondo Ó, et al. (2017) *Minería: un laxo marco normativo e institucional* (Fundar, Centro de Análisis e Investigación, A.C., México, D.F) Available at: <http://fundar.org.mx/mexico/pdf/1.2.Miner%C3%ADaUnLaxo.pdf> [Accessed February 20, 2018].
55. Payan T, Correa-Cabrera G (2016) *Security, the Rule of Law, and Energy Reform in Mexico* (James A. Baker III Institute for Public Policy of Rice University) Available at: <http://www.bakerinstitute.org/files/11197/> [Accessed May 30, 2017].
56. Carrillo JC (2017) La Ley forestal del Verde da la espalda a los bosques y sus habitantes, alerta Cemda. *SinEmbargo*. Available at: <http://www.sinembargo.mx/21-03-2017/3177816> [Accessed June 4, 2017].

57. Enciso A (2017) Demandan consulta previa a aprobación de ley forestal. *La Jornada San Luis*. Available at: <http://lajornadasanluis.com.mx/nacional/demandan-consulta-previa-aprobacion-ley-forestal/> [Accessed June 3, 2017].
58. Mena M (2017) Exigen consulta pública de Ley Forestal. *El Sol de Puebla*. Available at: <https://www.elsoldepuebla.com.mx/local/exigen-consulta-publica-de-ley-forestal> [Accessed June 2, 2017].
59. Carrasco P (2017) Urgen académicos e investigadores mejorar marco legal de actividades forestales en México. *La Prensa*. Available at: <https://www.la-prensa.com.mx/mexico/174337-urgem-academicos-e-investigados-mejorar-marco-legal-de-actividades-forestales-en-mexico> [Accessed June 2, 2017].
60. Lira I (2017) El Verde está por privatizar los recursos naturales del país: Poniatowska, Aguayo, Greenpeace y decenas más. *SinEmbargo*. Available at: <http://www.sinembargo.mx/19-04-2017/3196183> [Accessed June 2, 2017].
61. de la Fuente A, et al. (2017) Las Actividades Extractivas en México: estado actual. Anuario 2016. Available at: <http://fundar.org.mx/categoria/publicaciones>.
62. Tetreault D (2012) La Minería Mexicana en el Contexto Internacional. *Observatorio del desarrollo* 1(3):18–20.
63. Gallagher KP, Kamal R, Jin J, Chen Y, Ma X (2018) Energy development finance? The benefits and risks of China's development finance in the global energy sector. *Energy Policy* (122):313–321.
64. Alborta G, Stevenson C, Triana S (2011) *Asociaciones publico-privadas para la prestacion de servicios. Una vision hacia el futuro* (Inter-American Development Bank).
65. Corcoran P (2016) Illegal Mining a Golden Opportunity for Mexico Crime Groups. *InSight Crime*. Available at: <https://www.insightcrime.org/news/analysis/mexico-crime-groups-increasing-involvement-illegal-mining/> [Accessed October 20, 2018].
66. Lohmuller M (2015) Mining Company Admits to Relationship with Mexico Organized Crime. *InSight Crime*. Available at: <https://www.insightcrime.org/news/brief/mining-company-admits-relationship-mexico-organized-crime/> [Accessed May 13, 2018].
67. Global Initiative against Transnational Organized Crime (2016) *Organized Crime and Illegally Mined Gold in Latin America* (Global Initiative against Transnational Organized Crime, Geneva).
68. Semple K (2017) In Mexico, an Epidemic of Fuel Thefts Becomes a Crisis. *The New York Times*. Available at: <https://www.nytimes.com/2017/04/26/world/americas/mexico-fuel-theft-crisis.html> [Accessed November 23, 2018].

69. Pickell P, Gergel S, Coops N, Andison D (2014) Monitoring Forest Change in Landscapes Under-Going Rapid Energy Development: Challenges and New Perspectives. *Land* 3:617–638.
70. WWF (2004) WorldWildlife Fund and Ricoh Corporation Sign Agreement to Advance Forest Conservation in Mexico. *World Wildlife Fund*. Available at: <http://www.worldwildlife.org/press-releases/world-wildlife-fund-and-ricoh-corporation-sign-agreement-to-advance-forest-conservation-in-mexico> [Accessed January 15, 2017].
71. Segob alerta que contratos mineros ponen en riesgo a pueblos indígenas (2014) *Excélsior*. Available at: <https://www.excelsior.com.mx/nacional/2014/01/19/939125> [Accessed October 20, 2018].
72. Malkin E (2017) Isidro Baldenegro, Mexican Environmental Activist, Is Shot to Death. *The New York Times*. Available at: <https://www.nytimes.com/2017/01/18/world/americas/mexico-environmental-activist-shot-sierra-madre.html> [Accessed November 23, 2018].
73. Los Caminos de la Resistencia - Informe Frayba (2016) (Centro de Derechos Humanos Fray Bartolome de Las Casas, AC) Available at: [www.frayba.org.mx](http://www.frayba.org.mx).
74. Vázquez DS (2015) *Conservación Oficial y Extractivismo en México* (Centro de Estudios para el Cambio en el Campo Mexicano) Available at: <http://ceccam.org/sites/default/files/Extractivismo.pdf>.
75. Soberanes R (2017) Comunidades se oponen a 21 proyectos mineros en la Sierra Madre de México. *Mongabay*. Available at: <https://es.mongabay.com/2017/10/no-la-mineria-la-lucha-conservar-la-sierra-madre-mexico/> [Accessed November 5, 2018].
76. Munson J (2018) Canadian Diplomats Under Scrutiny in Anti-Mining Activist's Death. *bna.com*. Available at: <https://www.bna.com/canadian-diplomats-scrutiny-n57982092713/> [Accessed November 23, 2018].
77. Mining Watch Canada (2013) *Corruption, Murder and Canadian Mining in Mexico: the Case of Blackfire Exploration and the Canadian Embassy*.
78. Galicia Luna V (2016) Cartografías del deseo en Chiapas: Entre la conservación y el extractivismo. Dissertation (El Colegio de la Frontera Sur). Available at: [http://aleph.ecosur.mx:8991/exlibris/aleph/a22\\_1/apache\\_media/C33J147365R97UIGAPFR3PUJLHFI2.pdf](http://aleph.ecosur.mx:8991/exlibris/aleph/a22_1/apache_media/C33J147365R97UIGAPFR3PUJLHFI2.pdf) [Accessed January 28, 2018].
79. Proyecto sobre Organización, Desarrollo, Educación e Investigación (PODER) (2017) Almaden Minerals cotiza nuevas acciones para financiar su actividad minera en Puebla, sin contar con permiso de exploración. Available at: [https://www.projectpoder.org/wp-content/uploads/2017/04/Almaden\\_BP\\_final.pdf](https://www.projectpoder.org/wp-content/uploads/2017/04/Almaden_BP_final.pdf) [Accessed November 4, 2018].

80. Pskowski M (2016) Mexican conservation success threatened by wave of mining concessions. *Mongabay*. Available at: <https://news.mongabay.com/2016/04/mexican-conservation-success-threatened-wave-mining-concessions/> [Accessed October 31, 2016].
81. Pskowski M (2016) Mexican conservation success threatened by wave of mining concessions. *Conservation news*. Available at: <https://news.mongabay.com/2016/04/mexican-conservation-success-threatened-wave-mining-concessions/> [Accessed February 21, 2017].
82. Oxfam México (2017) Comunicado del Día Mundial del Agua: Defienden comunidades indígenas de Oaxaca el derecho al agua. Available at: <https://www.oxfamMexico.org/sites/default/files/Comunicado%20Di%CC%81a%20Mundial%20del%20Agua.pdf> [Accessed November 5, 2018].
83. Camacho A, et al. (2016) Mercury Mining in Mexico: I. Community Engagement to Improve Health Outcomes from Artisanal Mining. *Annals of Global Health* 82(1):149–155.
84. Conde DA, Burgués I, Fleck L, Manterola C, Reid J (2007) Análisis ambiental y económico de proyectos carreteros en la Selva Maya, un estudio a escala regional. Available at: [http://findresearcher.sdu.dk/portal/en/publications/anlisis-ambiental-y-economico-de-proyectos-carreteros-en-la-selva-maya-un-estudio-a-escala-regional\(7c83d6e3-3648-4117-9575-d538a4ef867b\).html](http://findresearcher.sdu.dk/portal/en/publications/anlisis-ambiental-y-economico-de-proyectos-carreteros-en-la-selva-maya-un-estudio-a-escala-regional(7c83d6e3-3648-4117-9575-d538a4ef867b).html) [Accessed September 25, 2016].
85. Terwindt DC, Schliemann C *Tricky Business: Space for Civil Society in Natural Resource Struggles* (Heinrich Boll Foundation/European Center for Constitutional Human Rights) Available at: [https://www.boell.de/sites/default/files/tricky-business.pdf?dimension1=division\\_demo](https://www.boell.de/sites/default/files/tricky-business.pdf?dimension1=division_demo).
86. Grupo de Trabajo sobre Empresas y DDHH (2016) *Mexico: Empresas y Derechos Humanos* (Mexico, D.F.).
87. Suarez-Enriquez X, Meyer M (2018) Multiple Sectors Push Back Against the Implementation of Mexico's New Internal Security Law. *WOLA*. Available at: <https://www.wola.org/analysis/five-key-arguments-reject-internal-security-law-mexico/> [Accessed November 23, 2018].
88. Moreno R (2012) *Mexico: A Moment of Opportunity* (Revenue Watch Institute & Transparency and Accountability Initiative).
89. Suarez Avila A (2017) The Implementation of the Energy Reform and Socio-environmental Conflicts Regarding Hydrocarbons in Mexico. Available at: [http://www.bakerinstitute.org/media/files/files/53cbec3e/MEX-pub-RuleofLaw\\_Avila-030317.pdf](http://www.bakerinstitute.org/media/files/files/53cbec3e/MEX-pub-RuleofLaw_Avila-030317.pdf) [Accessed May 30, 2017].

90. Dominguez Virgen JC (2011) Megaproyectos, infraestructura y los limites de la democracia delegativa. *Revista Legislativa de Estudios Sociales y Opinion Publica* 4(7):33–62.
91. Soberanes R (2018) Mexico: pipeline divides Yaqui communities and triggers wave of violence. *Mongabay*.
92. S&P Global Platts (2018) Mexico's Guaymas-El Oro natural gas pipeline waiting on court to resume operation: sources. Available at: <https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/030818-mexicos-guaymas-el-oro-natural-gas-pipeline-waiting-on-court-to-resume-operation-sources> [Accessed October 19, 2018].
93. Inter-American Commission on Human Rights (2015) *The Human Rights Situation in Mexico* (Washington DC) Available at: <http://www.oas.org/en/iachr/reports/pdfs/mexico2016-en.pdf> [Accessed October 25, 2018].
94. Global Witness (2018) *At What Cost? Irresponsible business and the murder of land and environmental defenders in 2017* (Global Witness, London) Available at: <https://www.globalwitness.org/en/campaigns/environmental-activists/at-what-cost/> [Accessed August 5, 2018].
95. Alvi S (2014) Un “pequeño olvido” en la Reforma Energética: Nada sobre cómo detener el robo masivo a Pemex. *SinEmbargo MX*. Available at: <http://www.sinembargo.mx/01-08-2014/1075085> [Accessed June 5, 2017].
96. Associated Press (2015) To combat fuel theft, Pemex reduces gasoline and diesel pipeline shipments. *Fuel Fix*. Available at: <https://fuelfix.com/blog/2015/02/17/668741/> [Accessed November 5, 2018].
97. Gaworecki M (2018) Critics say proposed changes to Mexico's Forestry Law threaten sustainable forest management by local communities. *Mongabay*. Available at: <https://news.mongabay.com/2018/04/critics-say-proposed-changes-to-mexicos-forestry-law-threaten-sustainable-forest-management-by-local-communities/> [Accessed November 23, 2018].
98. Gaworecki M (2018) Mexico's ejidos are finding greater sustainability by involving youth and women. *Mongabay*. Available at: <https://news.mongabay.com/2018/06/mexicos-ejidos-are-finding-greater-sustainability-by-involving-youth-and-women/> [Accessed November 23, 2018].
99. Buchanan R (2017) Mexico Pipelines Facing Delays Like Lower 48, Canada as Native Stakeholders Dissent. *NGI Mexico*. Available at: <https://www.naturalgasintel.com/articles/112640-mexico-pipelines-facing-delays-like-lower-48-canada-as-native-stakeholders-dissent> [Accessed October 20, 2018].

100. Boege E (2012) *La importancia de los Territorios de los Pueblos Indígenas y la cubierta Forestal*. (Consejo Civil Mexicano para la Silvicultura Sostenible A.C., México, D.F).
101. Hodgdon BD, Chapela F, Bray DB (2013) *Mexican Community Forestry: Enterprises and Associations as a Response to Barriers* (Rainforest Alliance, Mexico City).
102. Redman P (2017) *Ejidos: Successful community managed forests in Mexico* (Mexico) Available at: <https://ifnotusthenwho.me/films/community-managed-forests-mexico/> [Accessed October 25, 2018].
103. Fagin D (2016) A Mine vs. a Million Monarchs. *The New York Times*. Available at: <https://www.nytimes.com/2016/05/01/opinion/sunday/in-a-poor-mexican-town-saving-butterflies-or-creating-jobs.html> [Accessed November 23, 2018].
104. World Bank (2016) In Mexico, forests deliver for jobs and climate commitments. *World Bank*. doi:<http://www.worldbank.org/en/news/feature/2016/05/10/in-mexico-forests-deliver-for-jobs-and-climate-commitments>.

