



Center for Sustainability
and the Global Environment
NELSON INSTITUTE
UNIVERSITY OF WISCONSIN-MADISON

Zero deforestation palm oil in Colombia

Report by Clare Sullivan, Lisa Rausch, Adisedit Camacho Rojas,
Juan Sebastián Castellanos, Miguel Ángel Vianchá and Holly K. Gibbs



Acknowledgments:

The authors would like to acknowledge funding support from the Norwegian Agency for Development Cooperation's Department for Civil Society under the Norwegian Forest and Climate Initiative. The authors would like to thank Ian Schelly for his support with analysis and graphic design.

Table of Contents

- 1. Executive Summary**
- 2. Oil Palm in Colombia - An Overview**
- 3. Production and Trade**
 - a. Global palm oil production*
 - b. Colombian palm oil sector*
- 4. Supply Chain Dynamics**
- 5. Zero Deforestation Agreements**
- 6. Deforestation in the Oil Palm Supply Chain**
- 7. Public Policies Related to Oil Palm Sector**
 - a. Land use planning and zoning policies*
 - b. Climate adaptation and mitigation policies*
 - c. Biodiesel policies*
- 8. Major Companies and Their Market Shares**
- 9. Conclusions and Recommendations**
- 10. References**
- 11. Appendices**

Please cite as 'Sullivan, C., Rausch, L., Camacho Rojas, A., Castellanos, J.S., Vianchá, M.A., Gibbs, H.K. Zero deforestation palm oil in Colombia. Gibbs Land Use and Environment Report Series. 2020'

1. Executive Summary

Oil palm is a rapidly growing part of Colombia's economy and a vital component of economic development for its rural areas. Production volume has more than doubled and export volume has more than quadrupled over the past decade.¹ Palm production area is expanding across all four major production regions, making it an increasingly important national land use. Colombian palm oil is promoted as "unique and differentiated" in the global marketplace because much of the country's production area replaced land cleared many years ago for other commodity crops or cattle pastures. In this report, we review current production and expansion, and the impacts of the sector on Colombia's forests and biodiversity. We also map oil palm supply chains and evaluate suitable land pools by different land cover types and locate at-risk forests. Lastly, we estimate the market share of major companies and the coverage of the ZDA. The report focuses on environment impacts. However, the social impacts are equally important in evaluating the sustainable expansion of the crop in the Colombian context, where land use and ownership are uniquely complex due to highly unequal landholding and the country's long history of conflict. While the sector's current contribution to national deforestation is low, effective planning and governance of land use will be required for expansion to continue without placing forests and other important ecosystems at risk. There are several public policies designed to ensure that the sector can continue to grow and maintaining its positive environmental reputation. These include Colombia's global climate commitments, public policies at different administrative scales like territorial planning and land use zoning, and supply chain agreements with both public and private support, like a voluntary ZDA designed to be sector-wide. As demand for palm oil and other agriculture commodities continues to grow globally, if these risks can be avoided, Colombian palm production has an opportunity to produce deforestation-free palm that benefits rural producers.


We highlight the following key findings-

- **There is a large pool of previously cleared land that is suitable for the oil palm crop.** Expansion into this land pool could have a lower ecological cost than expansion into forested lands. There are 1,003,678 ha of previously forested, cleared area that are of high or moderate suitability for palm across the whole country. Ninety-five percent of this was cleared prior to 2010. This land is concentrated in the Eastern Zone of production.
- **There is an even larger pool of non-forest land that is suitable for oil palm.** There are 10,952,972 ha of non-forest land that is of high or moderate suitability for oil palm. There is limited data available on how much of this area is natural vegetation vs. more human modified land cover classes. Uncertainty around the land use of this substantial pool of land suitable for oil palm will be important to resolve to ensure that expansion is not converting natural, non-forest ecosystems.
- **Even with public policy protections, forest could still be at risk for clearing.** There are 570,440 ha of forested land that is classed as highly or moderately suitable for oil palm across Colombia; these forests are located mainly in the Eastern and Northern zones.
- **The ZDA is an important addition to Colombia's land governance policy landscape but currently covers only a portion of the sector, between 27-35% of oil palm produced in Colombia.** Coverage of the export market is especially low. In 2017, exports were around 550,000 tons crude palm oil equivalent, only one signatory of the agreement, TEAM (2%) is directly involved in export markets, which are dominated by C.I. Acepalma (43%) and C.I. Biocosta (37%). There is also only one signatory from the Southwestern production zone, which is a national deforestation hotspot (although most of this deforestation is not directly associated with palm).
- **There is a need for advocacy with companies to encourage broader participation.** Inclusion of a handful of larger actors (i.e. C.I. Acepalma (13%), Daabon (8%), C.I. Biocosta (7%), and Indupalma (5%) in the

¹ Exports - 416% increase from 2010 (135,000) to 2018 (697,000) (MT). Production - 116% increase from 2010 (752,089) to 2018 (1,630,000) (MT) (Fedepalma)

ZDA would significantly expand the coverage of the agreement. There are several actors who have 1. international ZDAs (i.e. Colgate Palmolive, Cargill), 2. high RSPO certifications (i.e. Daabon), or 3. suppliers who have signed the agreement (i.e. C.I. BioCosta supplied by Palmaceite S.A.) that may be more likely to sign. Major consumer facing companies like Mondelez and Nestle source from Colombian mills and could also strengthen the ZDA if they signed on.

- **The ZDA will only address oil palm expansion into forested ecosystems.** Colombia is a biodiversity hotspot and has many other important ecosystems such as savannahs, wetlands and grasslands, which are high conservation value and harbor significant carbon stocks.
- **Traceability requirements of the ZDA may pose unique challenges for the many smaller actors active in the sector.** Implementation plans for the ZDA will need to include monitoring tools appropriate for smallholders and grower associations and disincentives for excluding them from markets. Over 5000 smallholder farmers depend on oil palm in Colombia and six grower associations have signed onto the ZDA.

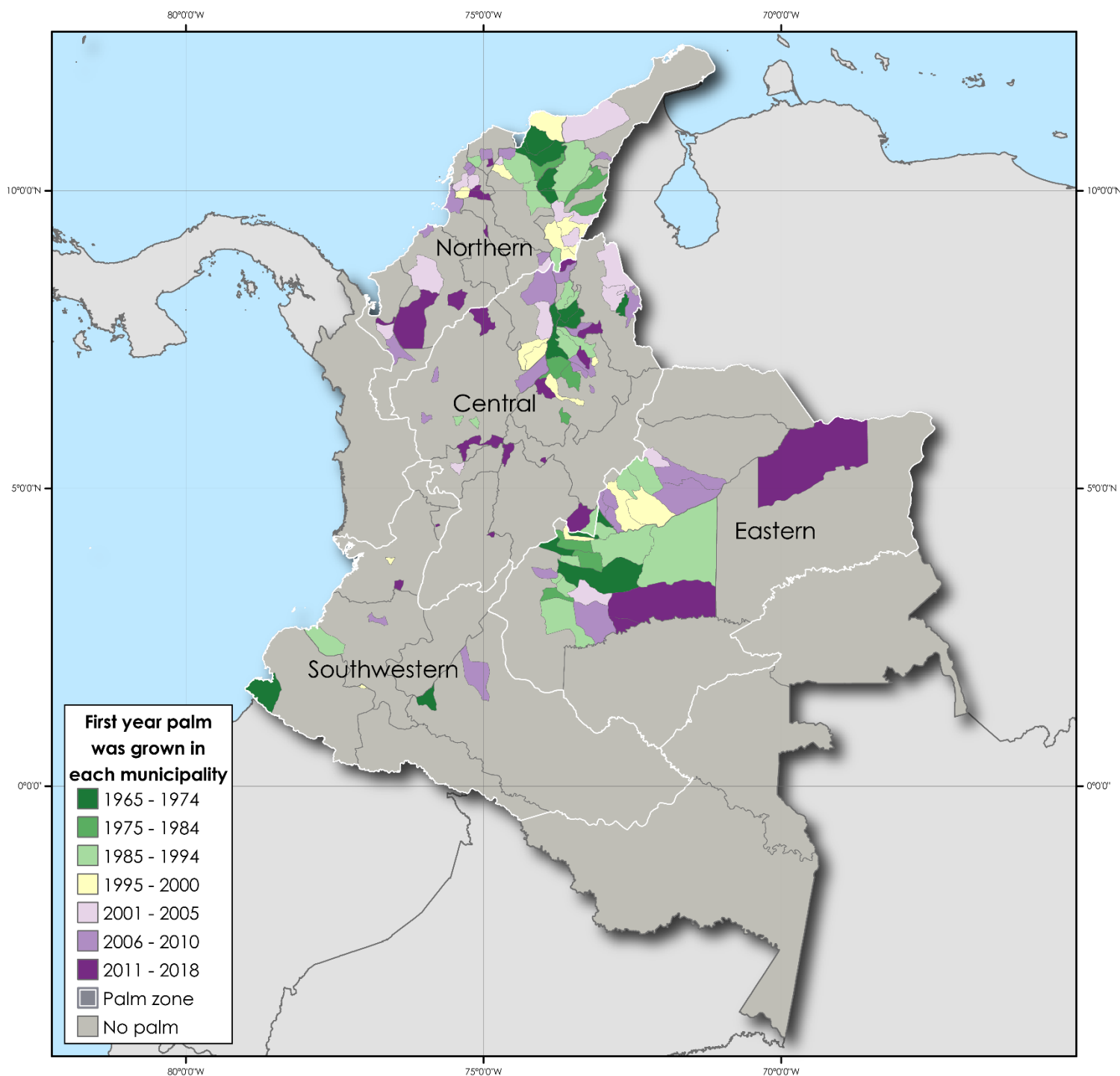


Zero Deforestation Palm Oil in Colombia

2. Oil Palm in Colombia – An Overview

Colombia has the largest oil palm production area in South America (Furumo and Aide 2017) and is the fourth largest producer of oil palm in the world (FAOSTAT 2020). Cultivation of oil palm in Colombia started over 50 years ago, but has recently begun to expand rapidly. Colombian palm is being promoted as “unique and differentiated” in the global marketplace (Michail 2018). Whether the sector can live up to this promise will depend on whether its expansion and growth can continue without accruing environmental costs for Colombia’s forests and other ecologically important ecosystems. The area planted to oil palm has grown by 16% since 2014, to reach 559,983 hectares (ha) nationally in 2020², with 73,577 ha of this area still in the development phase (Fedepalma 2020). Palm plantings in the development phase are not yet mature and do not produce fruit. Time to maturity depends on the palm variety but is typically three years, with peak production in the tenth year.

² Fedepalma has released national totals for 2020; however the most recent data available at finer administrative scales are for the year 2018.



Map 1: Expansion of palm oil cultivation through time (1965-2018) in Colombia.

Biodiesel production, including domestically and abroad, makes up the largest segment of Colombia's palm oil market. Expanding international markets for palm oil-based biodiesel and Colombia's national fuel standard, which currently calls for biodiesel to make up 10% of diesel consumed in Colombia by 2020 (USDA FAS 2018), are among the primary drivers of sector growth. As much as half of the oil produced in Colombia is exported, mostly in crude form, and nearly a third goes to domestic biodiesel production (Fedepalma 2018). Demand for biodiesel is expected to continue to grow. Indeed, some one million hectares (Mha) of oil palm would be needed for the country to meet a more ambitious goal of mixing 20% biodiesel with domestic production alone (Castiblanco et al. 2013); the country's oil palm area would need to nearly double to meet this target. Colombia's Ministry of Agriculture has set out an even more ambitious goal of eventually reaching 3 Mha of oil

palm (from Castiblanco et al 2013, Dermawan 2018). Beyond the fuel standard, several other policies also support the sector's expansion; including economic incentives such as price supports, subsidies, tax exemptions and preferential taxes (Castiblanco et al. 2013).

Oil palm is grown in four main regions in Colombia, with plantings in 21 departments and 161 municipalities as of 2018 (Map 1; Figure 1). The most productive region is the Eastern Zone, where oil palm is grown in 36 municipalities in the departments of Arauca, Casanare, Cundinamarca, Meta, and Vichada, and which produced 41% of the country's crude palm oil in 2018 (670,773 tonnes) (Fedepalma 2019). The planted area in this region has increased by 17% since 2014, to 220,663 ha (ibid 2019). There are 28 mills in this zone. The Central Zone, made up of 45 palm producing municipalities in the departments of Antioquia, Bolívar, Caldas, Cesar, Cundinamarca, Norte de Santander, Santander, and Tolima, produced about a third of the country's total production volume for 2018 (500,083 tonnes) and is home to 14 mills. The area planted in this region has grown by 8% since 2014, to 169,876 ha in 2018 (ibid 2019). The Northern Zone (76 palm producing municipalities in the departments of Antioquia, Atlántico, Bolívar, Cesar, Chocó, Córdoba, La Guajira, Magdalena, and Sucre) produced 423,368 tonnes on 128,874 ha in 2018 (up 7% since 2014), and has 18 mills (ibid 2019). Finally, the Southwestern Zone (3 municipalities in the departments of Caquetá, Cauca, and Nariño) produced 38,190 tonnes on 21,275 ha (up 19% since 2014) for 6 mills (ibid 2019). Detailed infrastructure maps can be found in Section 5.

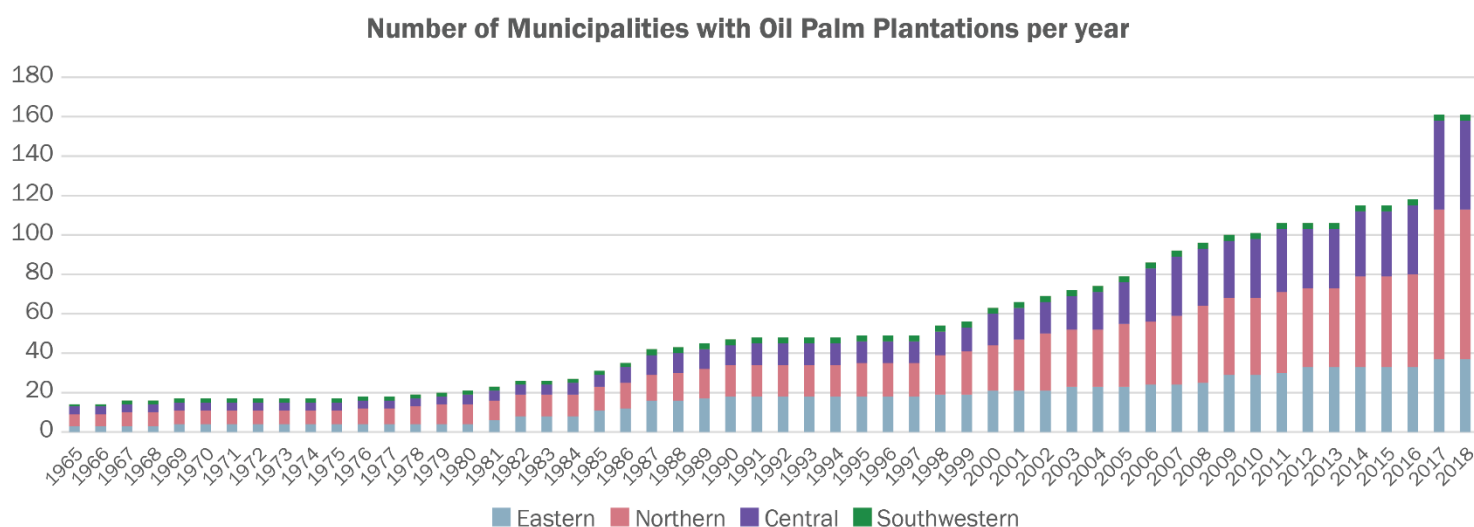
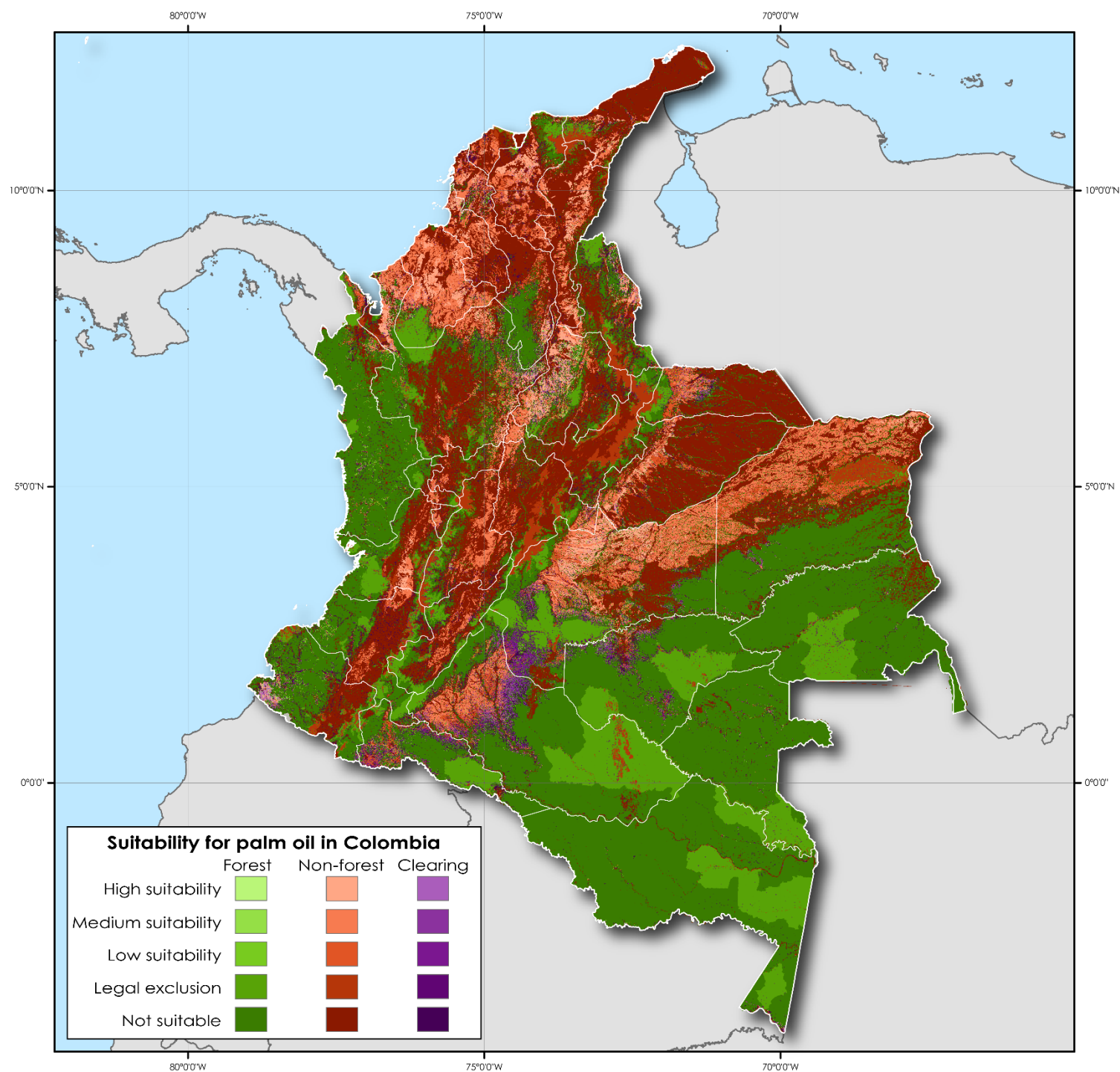


Figure 1. Number of municipalities with oil palm plantations by FEDEPALMA's production zones (1965-2018)
Source: FEDEPALMA 2019

There are 16,188,248 ha suitable for oil palm production in Colombia, with nearly 13 Mha of land classed as highly or moderately suitable and outside of both current production areas (UPRA 2016) and legal exclusion zones, which include protected areas, and the legal boundary that limits the expansion of the agricultural frontier.³ We combined this suitability classification with the most recent year (2016) of IDEAM's publicly available forest and forest change classifications (Table S1). About 1 Mha are located on previously cleared forest areas (cleared before 2016). Most of this suitable area (nearly 11 Mha, 87% of the total highly and moderately suitable areas) is located on non-forest areas, including both areas that have been previously used for agriculture and native habitats such as grasslands and shrublands (Map 2). Currently available land cover maps do not permit an assessment of how much of this suitable area is covered with native vegetation or how

³ UPRA is updating this suitability classification in conjunction with FEDEPALMA to reflect recent expansion and update the legal exclusion zones. Further, it is important to note that the classification refers to commercial palm potential, although palm is also grown non-commercially.

much native vegetation is being converted for palm in these areas. Non-forest areas with suitability for oil palm are most prevalent in the Eastern Zone, where the recent rapid expansion has been occurring. Approximately 570,000 ha of 2016 forests nationally are classed as suitable for oil palm.



Map 2: Forest, non-forest, and cleared areas suitable for oil palm cultivation in Colombia

Source: UPRA 2016; IDEAM 2018

3. Production and Trade

3a. Global Palm Oil Production

Palm oil is now the most important industrial vegetable oil product in the world. Tropical countries have the greatest production potential and participation in this growing market remains dynamic. This dynamism is due to the increasing urbanization of the world's population that has induced a change in food customs, as consumers adapt to the pace of life in cities where they tend to consume more canned, fried, and processed foods, all of which are often high-fat products (Chamber of Commerce of Cartagena, 2010).

In 2017, world production of vegetable oils amounted to 189,160,000 tonnes (Statista, 2019), of which 64,870,000 tonnes was palm oil, representing 34.2% of the world's total vegetable oil consumption. The main palm oil producers worldwide are five countries: Indonesia, Malaysia, Thailand, Colombia and Nigeria. Colombia contributed 1.7% of the world's production. While total global production has increased, the rank of each of these five countries has not varied significantly since 2010, and Indonesia and Malaysia consistently maintain a dominant position (Table 1). The value of palm oil exports reported for 2017 for the main exporting countries are: Indonesia (\$16.6 billion), Malaysia (\$7.86 billion), the Netherlands (\$1.22 billion), Colombia (\$448 million) and Germany (\$335 million); the value of the oil palm imports by the main importing countries are: India (\$6.42 billion), China (\$3.14 billion), Pakistan (\$2.05 billion), the Netherlands (\$1.67 billion) and Spain (\$1.28 billion) (BACI 2017).

Table 1: Principle global producers of oil palm 2010-2018 (tonnes)

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Indonesia	21,958,120	23,995,973	26,015,519	26,895,500	29,278,189	31,070,015	31,487,986	36,000,000	40,567,230
Malaysia	16,993,717	18,911,520	18,785,030	19,216,500	19,667,016	19,961,581	17,319,177	18,900,000	19,516,100
Thailand	1,287,509	1,650,000	1,780,000	1,970,000	1,854,000	1,832,900	1,820,300	2,500,000	2,776,800
Colombia	753,039	804,838	973,039	945,064	1,109,586	1,275,000	1,146,000	1,627,552	1,630,000
Nigeria	970,820	930,000	940,000	960,000	910,000	940,000	960,000	970,000	1,050,000

Source: Carrasco 2018; FAOSTAT 2020

3b. Colombian Palm Oil Sector

Colombia's production increased from 753,039 tonnes in 2010 to 1,627,552 tonnes in 2017 (Table 1), or a 54% increase in seven years. Although it is the largest producer in Latin America, and the fourth largest producer in the world, it is still a relatively small player in the global palm oil market. As a result, Colombia has less market power than the dominant countries of Indonesia and Malaysia, which increases its vulnerability to production shocks or price variations, as well as its ability to compete for buyers in countries such as the United States, the European Union or China (Zavala Gómez, 2016).

There are at least nine oil and derivative products that are commercialized in the national and international market, including: crude palm oil, crude palm kernel oil, palm kernel meal, refined palm oil, refined palm kernel oil, high oleic palm oil, palm stearin, palm olein, unrefined glycerine, and refined glycerine. Crude palm oil and crude palm kernel oil are the most important and result from the initial processing stage.

- Crude palm oil: Extracted from the mesocarp of the oil palm fruit by mechanical extraction or by solvents. It has high stability to oxidation and does not require hydrogenation.
- Crude palm kernel oil: Extracted from the oil palm kernel by mechanical extraction or by solvents. It is yellow and semi-solid at room temperature (Acepalma 2020).

Like production, palm oil export volume from Colombia is steadily increasing, with a 46% increase between 2016 and 2018 (Table 2). The Netherlands imports the bulk of Colombia's export volume (39%); the other top importing countries (in 2018) are Brazil (17%), Spain (16%), Mexico (10%) and Germany (8%) (Table 2). Most

of the palm oil for export leaves via the ports in Baranquilla or Santa Marta (Trase 2020), making it likely to come from the Central or Northern production zones. Major importers include Wilmar Europe Trading, M. Dias Branco, Wilmar Europe Trading, Golden Ag. International, Pasternak, Baum and Co., Cargill, and Bunge (Trase 2020).⁴

Table 2. Palm oil importing countries by volume (2016-2018)

Importing Country	2016 (tons)	2016 (%)	2017 (tons)	2017 (%)	2018 (tons)	2018 (%)
Netherlands	188,041	50%	268,131	48%	272,244	39%
Brazil	30,047	8%	67,031	12%	117,015	17%
Spain	27,745	7%	26,780	5%	110,871	16%
Mexico	54,606	15%	59,429	11%	70,755	10%
Germany	23,431	6%	31,895	6%	53,775	8%
Chile	10,936	3%	13,442	2%	15,908	2%
Dominican Republic	16,276	4%	24,756	4%	12,282	2%
Venezuela	NA	NA	NA	NA	10,300	1%
Ecuador	NA	NA	NA	NA	7,831	1%
Zona Franca	8,501	2%	NA	NA	NA	NA
United States	4,949	1%	10,769	2%	NA	NA
Italy	NA	NA	19,345	3%	NA	NA
Other	8,784	2%	32,987	6%	31,828	5%
Total	373,316		554,564		702,809	

Source: Trase 2020

4. Supply Chain Dynamics

Fedepalma identifies four types of production models that are typical in Colombia. These are: 1) large scale plantations, 2) plantation-allied or productive-alliance smallholders, 3) association-allied smallholders, and 4) independent producers. Large scale plantations (>500ha) are typically owned by a company, which may also own a mill. Plantation-allied or productive-alliance smallholders are akin to scheme smallholders in Southeast Asia; they contract with a large plantation and mill that is nearby for the lifespan of their palms in exchange for benefits like extension, credit and sometimes property access. Another significant subset are association-allied smallholders, which make up 35% of smaller producers (Potter 2020). The farmers join producer organizations that provide them with some of the benefits that others obtain from their relationship with a mill, though they retain more flexibility. Independent producers, who sell directly to mills, make up 4% of producers (ibid 2020).

There is little public data available on the characteristics of oil palm plantation properties but what is available paints a picture of considerable disparity within the sector. A 2011 study by Fedepalma states that while 84% of properties are less than 50 ha, this covers just 13% of the area planted; in contrast, while properties greater than 1000ha make up just 1.5% of properties, they cover 45% of area planted (Fedepalma in ibid 2020). In 2011, the properties smaller than 50 ha were managed by approximately 4,000 small scale palm producers, whose livelihoods depend on economic opportunities and risk associated with the crop (Serrano 2020), this has grown to 5,105 smallholders in 2019 (Fedepalma 2020). Among the small scale producers, the majority (61%) are plantation-allied/production-alliance smallholders (Potter 2020).

⁴ Exporting companies can be found in Section 6, Table 5.

The production models and phases of production are shown in Figure 2. There are three phases in the oil palm supply chain: 1) the agricultural and processing phase, 2) the industrial processing phase of oils and fats, and 3) the oleochemical industry phase.

Agricultural and processing phase: this phase consists of the establishment, maintenance and harvesting of the crop and that of the initial processing of the fresh fruit bunches at palm oil or palm kernel oil mills. The outputs of this are: crude palm oil, palm kernel oil, palm kernel meal and palm kernel.

Industrial processing phase of oils and fats: This phase consists of the elaboration of raw materials and intermediate industrial products and the elaboration of basic consumer goods and supplies that are important inputs for other industries, or products.

Oleochemical industry phase: This phase refers to the incorporation of these industrial oils and fats into consumer products.

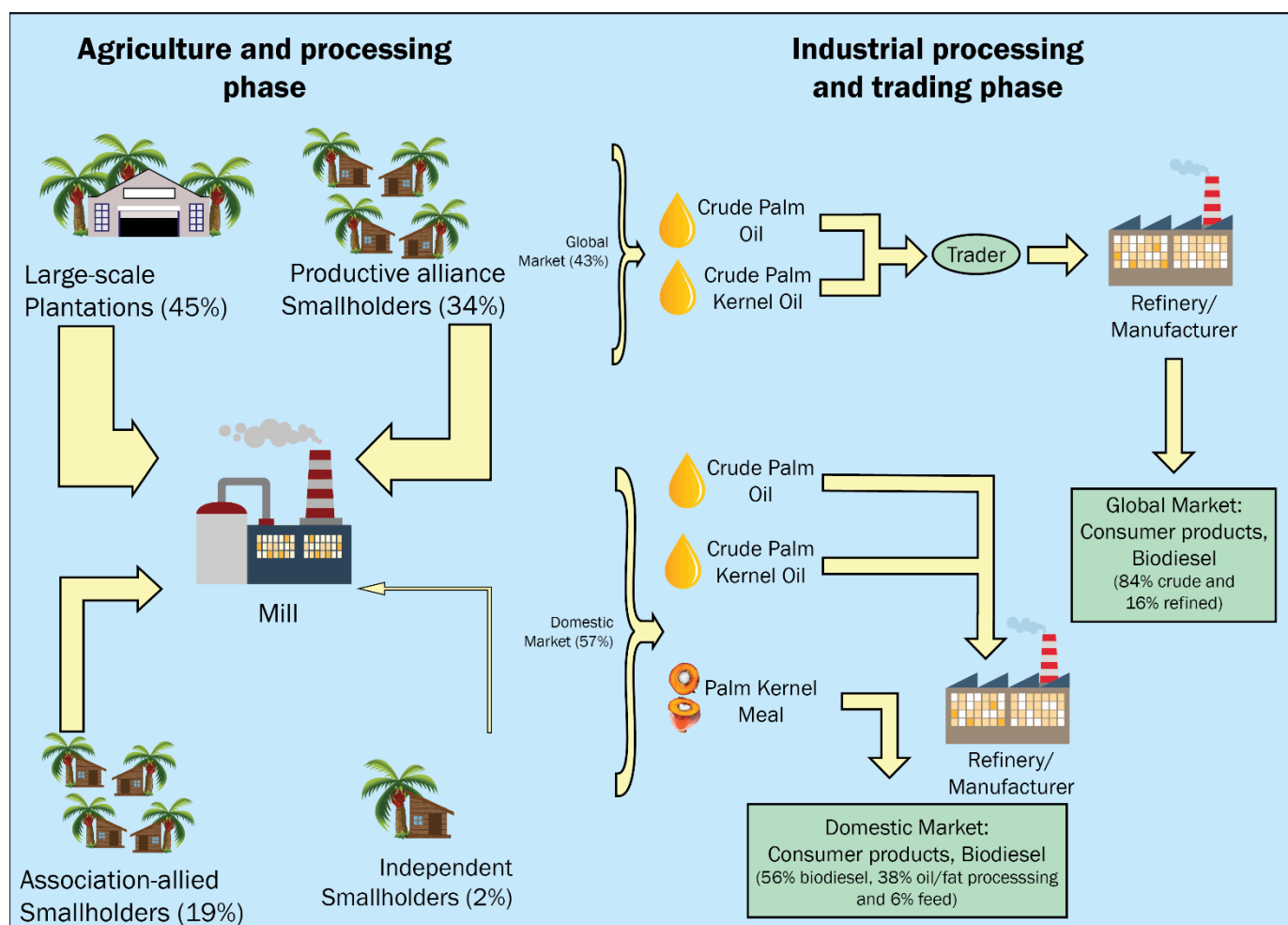


Figure 2: Oil palm supply chain

Source: adapted from Fedepalma 2019; Furumo et al. 2020

5. Zero Deforestation Agreements

To promote expansion in the sector that is not at the expense of forests, a zero deforestation agreement (ZDA) was developed for the palm sector and signed on November 28, 2017 (MADS 2017). The Ministry of the Environment and Sustainable Development (MADS) led this agreement but it was developed with input from many stakeholders. There are presently forty-eight actors that have signed the commitment, with thirty-two

signatories from the private sector, while the rest are government agencies, non-profits, international governments and academic institutions (Appendix 1). The signing of the voluntary agreement for the oil palm sector represents, in essence, a collective commitment to transform the value chain and hold it to a higher standard of competitiveness, social responsibility, and business. In this sense, it has united these diverse actors.

The ZDA starts with the definition of a forest⁵ used by the Instituto de Hidrología, Meteorología y Estudios Ambientales (Institute of Hydrology, Meteorology and Environmental Studies - IDEAM), and also uses their definition of forest change, which includes any loss in this forest area that is greater than 1 ha. The ZDA sets a baseline date of January 1, 2011. For palm oil to comply with the agreement, it must be produced on land free of deforestation since that baseline date. The annual maps (30m resolution) and quarterly alerts (250m resolution) produced by IDEAM's Sistema de Monitoreo de Bosques y Carbono (System for Monitoring Forests and Carbon - SMBYC) will form the basis of monitoring for the agreement.

Colombia is the first country in the world to successfully create a cross-sector zero deforestation commitment and the ZDA signals the country's aspiration to distinguish its palm oil from other sources of the tropical commodity. Signatories span the supply-chain, but are predominantly growers, grower associations and mills (Table 3). There are also three well-known consumer goods manufacturers (Team, Grupo Éxito, and Unilever), and two biodiesel producers (BioD S.A. and Manuelita Aceites and Energía). Grupo Éxito, the largest retailer in Colombia, plans to begin to implement its commitment by using only zero-deforestation palm within its own store-branded products. Nineteen of these signatories are also Roundtable on Sustainable Palm Oil (RSPO) certified for at least part of their operations.⁶ Studies on RSPO certification have found that smallholder management is relatively informal with limited record-keeping, which can make it difficult to have the traceability and transparency necessary for certifications (Furumo et al. 2020). Similar traceability will be required to implement the ZDA, and may pose challenges for the many smallholders active in the sector or for companies with significant numbers of smallholders in their supply bases. There are several grower associations signed onto the ZDA, and implementation plans for the ZDA will need to include monitoring tools appropriate for smallholders and disincentives for excluding them from markets.

Table 3. Role in the supply chain of ZDA signatories

Types of companies	Quantity
Mill and trader	10
Grower with mill	9
Growers associations	6
Consumer goods manufacturer (non-biodiesel)	3
Consumer goods manufacturer (biodiesel)	1
Grower with mill, and consumer goods manufacturer (biodiesel)	1

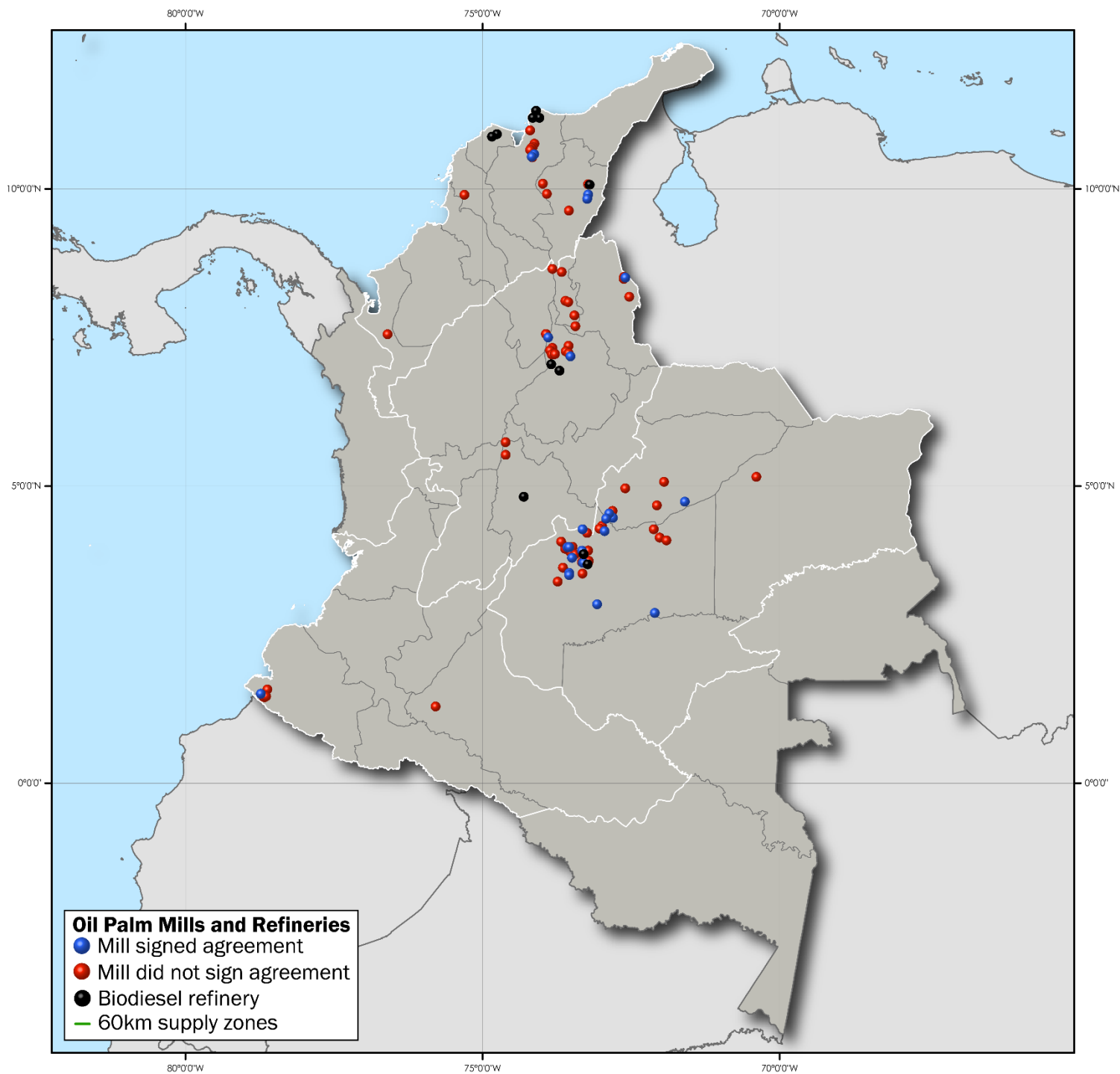
Source: Elaborated from CENIPALMA 2020; FEDEPALMA 2017

Of the twenty-seven signatories, that fall within the oil and edible fats sector, twenty-two of them were also part of the top 100 companies in the sector in 2018.⁷ Twenty-four mills are associated with these signatories (Map 3-7, Appendix 2 Table S3). Signatory mills are concentrated in the Orinoquia and northern Andean biomes, and mostly split between the Northern, Central and Western production zones.

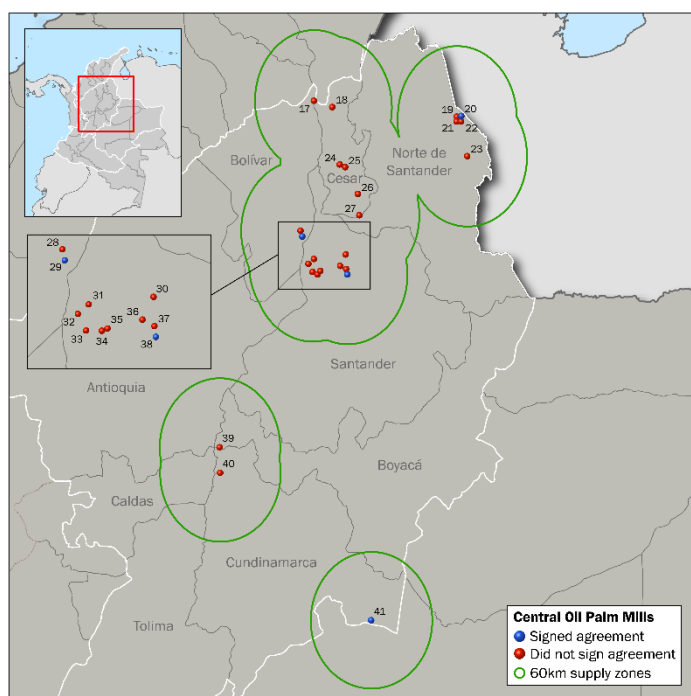
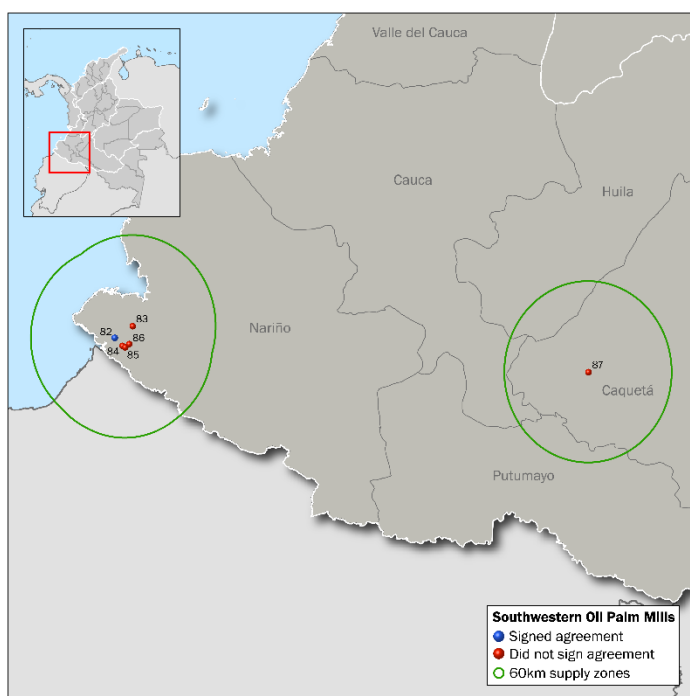
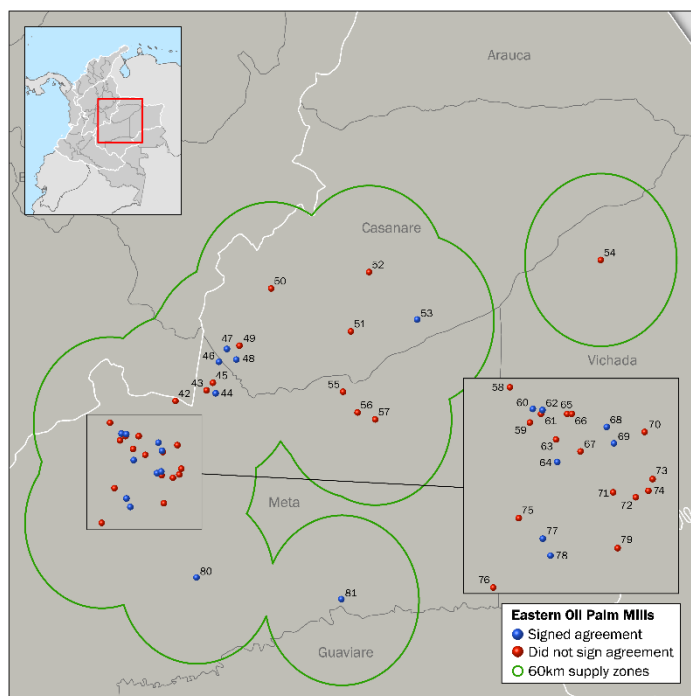
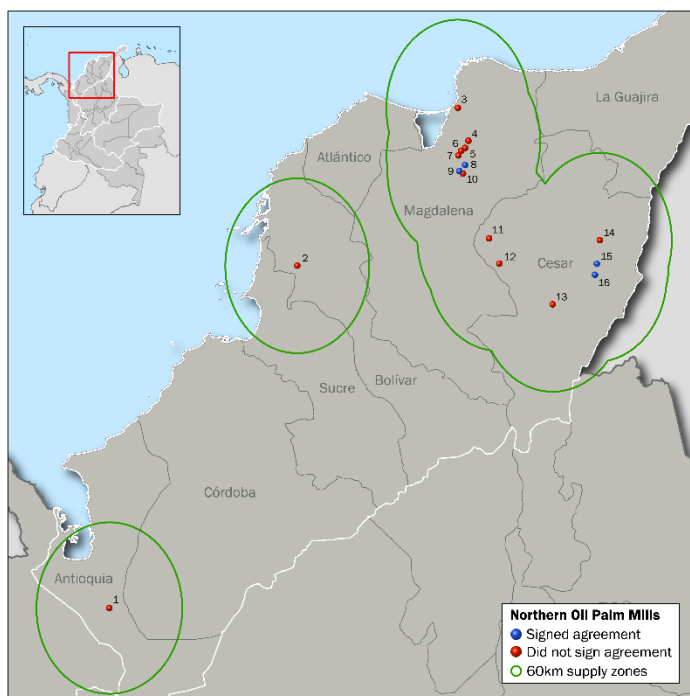
⁵ The forest class represents any area with trees, shrubs, palms, vines and grasses in which trees have a minimum density of 30%, a minimum height of 5m, and a minimum area of 1ha. Commercial forests are excluded.

⁶ RSPO currently cover 60,904ha and 117,840 tons of palm oil in Colombia, with many other growers and processors in process to receive certification (RSPO 2018).

⁷ There was no information on Palmas Oleaginosas de Casacará, Palmeras La Carolina, Prestige Colombia or Extractora Cimarrones.



Map 3: Oil Palm Mills and Refineries, Signatories and Non-Signatories to the Zero Deforestation Agreement
Source: CENIPALMA 2020



Map 4-7: Oil Palm Supply Chain Infrastructure, Signatories and Non-Signatories to the Zero Deforestation Agreement⁸

Source: CENIPALMA 2020

6. Deforestation in the Oil Palm Supply Chain

In contrast to Asia, where the expansion of oil palm has resulted in large-scale losses of primary tropical forests, oil palm plantations in Latin America have so far principally replaced land uses like pastures or croplands. In Colombia, between 2001-2014, a period where the industry expanded rapidly, remote sensing based estimates found 12,500 ha (or nine percent) of the oil palm planted replaced forests (Furumo and Aide 2017). Colombia has large areas suitable for oil palm

⁸ A list of mill names as well as full land use and land cover change for mill supplysheds can be found in Appendix 2 Table S3.

production, some of which were cleared decades ago, while others are natural grasslands, or savannahs. This distinct land change trajectory is possible because of ample open land due to a long legacy of expansive clearing for pastures beginning during the colonial era (Van Ausdal 2009) and continuing for export-oriented agriculture. The palm industry is seen as a potentially profitable substitute for some of these previously important export-oriented cash crops like bananas and cotton, as well as for the extensive pastured cattle production, which occupied much of this cleared area. Drivers of deforestation and inefficient land use in Colombia are linked to social problems and the history of conflict in the country. These can manifest in many ways, such as forced displacement, land grabbing that have been correlated with greater intensity with activities such as illegal mining, livestock activities and sometimes oil palm. Many studies from both academia and non-governmental organizations have evaluated the relationship of this crop with forced displacement and dispossession in Colombia (Castiblanco et al. 2015; Centro Nacional de Memoria Histórica 2018; Potter 2020; Rey Sabogal, 2013).

The palm sector is also an important part of the national government's plan to promote agricultural investment in conflict zones as part of the peace accord and as alternatives to illicit crops. The availability of suitable open land and this link to the peace process could be an opportunity to differentiate Colombian palm oil in global markets and to provide a global model for more sustainable palm oil production. Can this crop, typically grown in large-scale monocultures, expand without putting forests or Colombia's other unique ecosystems and fauna at risk? Can the sector support livelihoods and peace building efforts in former conflict areas or will larger actors take advantage of uncertainty around land ownership in these zones to acquire large expanses?

To evaluate the link between deforestation and the palm sector itself, IDEAM was tasked in the ZDA with producing a geographically explicit assessment of deforestation from the ZDA's baseline year (2010). Although this data is not publicly available, they created a map of palm extents using satellite imagery trained with spatially explicit oil palm extent data from Cenipalma (the research branch of Fedepalma, the palm oil trade union) for 2018 in combination with the SMBYC forest change layers (2010-2012, 2013-2014, 2014-2015, 2015-2016, 2016-2017, 2017-2018).⁹ They identified 554,252 ha of oil palm in 2018 (IDEAM 2019). Between 2010-2017, over a million hectares of forest were lost in Colombia. During this period, IDEAM found only 4,455 ha of forest converted to oil palm plantations (i.e. forest directly replaced by oil palm) (IDEAM 2019). An additional 17,132 ha of forest area was converted within properties that contain oil palm plantings (IDEAM 2019). Forest loss to oil palm plantings is less than .4% of the deforestation that occurred nationally during this time period, and considering deforestation within properties with oil palm amounts to only 1.5% of the national total. Fourteen percent of deforestation was in the department of Nariño. Fifty-five percent of this deforestation was in one palm-producing zone, the Central region, which includes both the Andes and the Magdalena Medio, and most of this deforestation was in three departments, Bolivar, Norte de Santander and Santander (which are split between the Central and Northern palm zones (IDEAM 2019). While there are several agreement signatories in this region, there are numerous mills that have not signed onto the ZDA. This analysis supports government and industry assertions that recent expansion has not been a direct driver of forest change. However, it could still be an indirect driver of land use if land uses like pasture or croplands are being displaced into forested landscapes or settlements expand.

Our analysis reports lower deforestation due to direct conversion than most other studies over similar time periods, although there is a consensus that pastures and croplands are the primary source for new oil palm plantation land. Nationally, estimates of the amount of land converted from forests, woodlands, or wetlands ranged from 0% from 1989-2013 (Vargas et al 2016); 9% from 2001-2014 (Furumo and Aide 2017); and 16% from 2002-2008 (Castiblanco et al. 2013). Regional studies focused on the Eastern region (Orinoquia) and found forest, woodland and wetland conversion rates ranging from 13% from 1987-2000 and 19% from 2000-2007 (Romero-Ruiz et al. 2012) to 25% from 2001-2005 (Ministry of the Environment 2008).

Oil palm area is expanding rapidly and in 2018, Fedepalma's annual report on the sector identified newly planted areas totaling 540,887 ha and immature or "in development" areas totaling 76,021 ha (Fedepalma 2019). The Eastern Zone, which largely falls in the Orinoco, constitutes the majority of this expansion. There are 220,663 ha of newly planted areas in the Eastern Zone, 128,874 ha in the Northern Zone, 168,876 ha in the Central, and 21,275 ha in the Southeast (ibid 2019). There are 38,148 ha of immature/in development in the Eastern Zone, 14,294 ha in the Northern Zone, 19,586 ha in the Central, and 3,996 ha in the Southeast (ibid 2019).

We mapped 91 palm oil mills or other processing plants (see Section 4, Map 3-7; Cenipalma 2020) and evaluated deforestation and already cleared, palm suitable land in a 60km radius supply shed around the infrastructure (IDEAM

⁹ Data was corrected to account for misalignment in the time periods and area adjustments across datasets.

2018; UPRA 2020). Five mills have more than 7,000 ha of deforestation in IDEAM's most recent deforestation data (2015-2016) and have increasing deforestation since 2012, and 20 have between 2,000-7,000 ha since the ZDA's baseline. The ten mills with the highest deforestation in their supply sheds can be found in Figure 3 and complete deforestation data for supply sheds can be found in Appendix 2 Table S3.

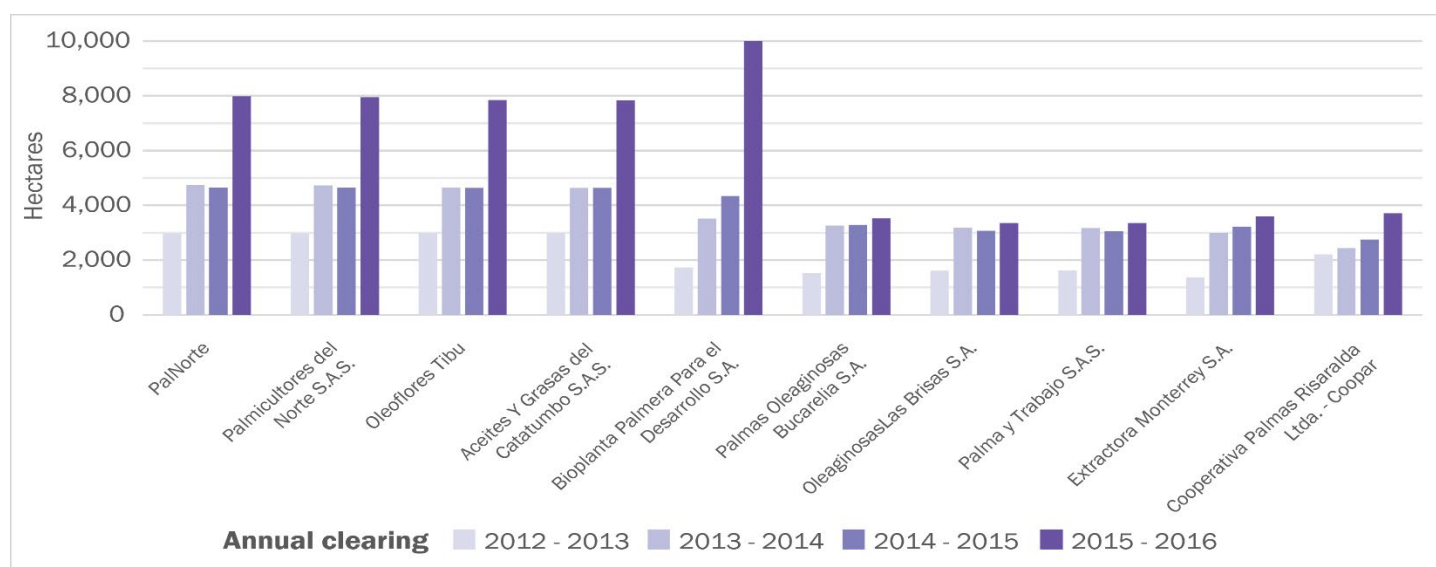


Figure 3. Ten oil palm mills with the highest deforestation in their supply sheds (2012-2016)

Source: CENIPALMA 2020; IDEAM 2018

Numerous studies have found negative impacts on biodiversity across taxa from oil palm expansion in South Asia. As a result, there is concern about the effect of oil palm's rapid expansion on Colombia's diverse ecosystems either through direct or indirect land use change. A weakness of the ZDA is that it only covers forested ecosystems, while neglecting ecosystems such as non-forested savannahs, wetlands and grasslands. Much recent expansion is concentrated in the Eastern region, which has low forest cover but high biodiversity and soil carbon stocks. Few studies have explored the relationship between oil palm, biodiversity and land use change in Colombia and many of these have limitations due to a reliance on rapid assessment methodologies (Vargas et al. 2015).

There is optimism that expansion on already open lands could minimize negative impacts. A study using a chronosequence¹⁰ to evaluate impacts of land use change where oil palm plantations replaced pastures in Eastern Colombia found no net change in ecosystem carbon stocks over more than 50 years; soil carbon stocks decreased in the first decades, but stabilized and recovered, while higher aboveground biomass in palm plantations made the system carbon neutral over the period studied (Quezada et al. 2019). There is also little overlap (3%) between suitable land for oil palm (mostly lowlands) and distributions of threatened and endemic vertebrate populations (mostly associated with complex topography) (Ocampo-Peñuela et al. 2018). A study of "soundscapes"¹¹ in different land uses in the Northern zone found that oil palm had more in common with forests than other crop production systems; yet forests were distinct and more diverse than all of the agricultural classes (Furumo and Aide 2019). A comparison of species richness of ants, birds, dung beetles, and amphibians in plantations, pastures, and forests found that plantations had equivalent or higher species richness of across all four taxa relative to pastures (Gilroy et al. 2015). Palm plantations therefore may be a small improvement for biodiversity over the agricultural land uses that they most commonly replace. However, in Casanare, mammalian species richness overall was found to be 47% lower in plantations compared to riparian and gallery forest (Pardo et al. 2018). Aquatic, forest and grassland bird species were lower in richness and abundance in oil palm plantations compared to savanna. If expansion into forests and natural land covers like savannah or gallery forests, begins to occur, it's likely that there will begin to be the negative impacts on biodiversity that have been seen in other geographies.

¹⁰ An empirical method that substitutes space for time, in this case using a set of sites that share similar attributes but represent different ages since land use conversion.

¹¹ Recordings that are used to study biodiversity by characterizing sounds with species of insects, birds, amphibians and mammals.

7. Public policies related to oil palm sector

A framework of diverse policies structures, the regulatory and planning context for the Colombian oil palm sector and includes the following types of policies: constitutional mandates, international commitments, rules and regulations related to the development of all links in the oil palm value chain (compiled in Appendix 3), policy guidelines or planning instruments for the oil palm sector, and regulatory or planning instruments from other sectors that are directly or indirectly related to the development of the palm sector.

A subset of the most important public policies related to the palm sector are described below. These are organized in three categories, land use planning and zoning policies, climate adaptation and mitigation policies, and biodiesel policies.



Land use planning and zoning impacts all agricultural sectors and subsectors, making it important for the sustainable management and expansion of oil palm. These planning and zoning processes aim to ensure that the location of agricultural development is informed by the physical attributes and suitability of the landscape. These efforts are motivated in part by the government's perspective that there is a national land use conflict; in this sense, the term 'conflict' refers to the idea that land is being used (typically underused, overused, poor cropping choices) in ways that differ with its optimal use.

For the past two decades, the country has developed actions that define not only the national regulatory framework, such as with constitutional mandates, but also the general policy of land use planning. Law 388 of 1997, Law 1454 of 2011 or Organic Law of Territorial Regulation and the General Policy of Territorial Planning (still in the process) are among the most important of these. To date, the Technical Basis of the law were prepared in 2014 and various technical and participatory exercises have led to its consolidation. The purpose of Law 388 was to harmonize many different mandates from the Constitution to metropolitan regulations. Fundamentally, this law also deals with the competence and autonomy of municipalities over land, as mentioned in subsection 2 and 3 of article 1,

“The establishment of the mechanisms that allow the municipality, in exercise of its autonomy, to promote the organization of its territory, the equitable and rational use of the land, the preservation and defense of the localized ecological and cultural heritage in its territorial scope and the prevention of disasters in high-risk settlements, as well as the execution of efficient urban planning actions.”

This is interpreted as placing the responsibility to guarantee efficient land uses, i.e, using land in accordance with its productive potential and ecological characteristics, at the level of the municipality.

This aspect is further developed in Decree 3600, which introduces the concept that it is necessary to consider what is the primary ecosystem type and other environmental determinants when evaluating the appropriate productive use of the land. It creates conceptual categories for rural land, protected areas, and areas for agricultural production, livestock production and resource extraction. While the decree mandates the need to consider the characteristics mentioned, it does not prohibit any development actions. These standards also propose a boundary between productive areas and conservation areas, which has implications for industrial crops frequently in monocultures such as oil palm in the case that they eventually expand into high conservation value areas. For its part, Law 1454 develops article 288 of the Constitution, and clarifies how the responsibilities for land use zoning are shared among the different levels of public administration: national, departmental and municipal. It establishes that the national government is responsible for creating a general policy of land use planning in order to guide the development of the department's plans for different sectors.

It then falls to the municipality to formulate and implement land use plans, based on the suitability of areas for agriculture. According to this interpretation, it could be assumed that the municipality plays a role in defining where oil palm can be planted through processes like developing land use plans or production management plans, in order to guarantee the balance between agricultural production and land tenure under efficient forms of land use and legal security of the land.

As an intermediate-level territorial instrument, Colombia's departments each formulate a Departmental Zoning Plan (POD by its Spanish acronym) and some also receive technical support from the National Planning Department (DNP, by its Spanish acronym). These have only recently been applied in Colombia. The PODs must consider the enabling conditions in the department in order to generate a balanced and sustainable socioeconomic development (DNP, 2013). These plans harmonize zoning guidelines based on the agreed upon land use models and balance national and regional strategies as well as allow coordinated action across municipalities for basic aspects of land use and development (ibid 2013).

At the national level, the General Policy for Land Use Planning is being formulated based on the Technical Bases document, prepared within the Territorial Planning Commission. This requires at least three components: the models of ownership and use of the territory, the sectoral plans and the environmental zoning contained in the Statute of Zoning and Adequate Use of the Territory (EZUAT, by its Spanish acronym) established by the MADS. These three elements, once they are fully formulated and adopted in the General Policy, will be of great importance for agricultural sector development and therefore for sector planning such as the establishment or expansion of oil palm plantations. In effect, the reference levels that these models will provide on landholding and land use throughout the territory will set the tone for the future expansion of specific productive activities, not only in relation to the biogeophysical conditions of the territory, and the distribution between exploitation and conservation, but also as a benchmark for maximizing the efficiency of different sector's economic development. In the same way, the sectoral plans will guide each sector's development path and its contribution to the national economy. The EZUAT (although still under review and pending adoption) will serve as the technical guidelines to improve the profile of economic decisions and incorporate the environmental dimension of development.

Suitability zoning is defined as a participatory multisectoral planning process that is technical, administrative and political in nature. It seeks to contribute to the sustainable use of resources in the territory in order to improve agricultural productivity, food security and local, regional, national, and international competitiveness under principles of social responsibility and environmental sustainability (MADR - UPRA, 2018). At a national level, the most important strategic action that is being carried out is the land use planning and zoning of rural property based on biophysical and socioeconomic inputs. This activity has seven objectives, three of which directly relate to the sustainable management of crops, such as palm:

- Promote the development of multifunctional and multisectoral agricultural production systems based on criteria of social inclusion, sustainability and competitiveness, in order to contribute to land-based rural development and continuous improvement of the population's quality of life.
- Improve the productive potential of rural territories, promoting sustainability and increasing the competitiveness of agricultural systems through interventions for sustainable intensification.
- Manage the rural land use conflicts through its integrated planning and the reconcile the interests of the different actors to improve competitiveness and guarantee sustainability.

As an output of this process, the country demarcated an agricultural frontier.¹² This frontier is defined as “the limit in the rural landscape that separates the areas where agricultural activities are allowed, from the protected areas, those of special ecological importance, and the other areas in which agricultural activities are excluded by mandate of law or regulation (MADR - UPRA, 2018).” Agricultural activities are understood as including agriculture, livestock, forestry for commercial purposes, aquaculture, and fishing, as well as other stages in the supply chain involving the adaptation and transformation of production, associated support services and marketing of primary products. The objective of the agricultural frontier is to promote the efficient use of rural agricultural land, the land use zoning of rural property, and the strengthening of the productivity and competitiveness of agricultural activities through the formulation of public policies. It is intended to consolidate agricultural development in areas where production already occurs and prevent the continued conversion of natural ecosystems to agricultural uses. The current border of this agricultural frontier corresponds closely with Colombia’s recent arc of deforestation. Focusing management and investments in the agricultural and rural development sector can help reduce the loss of ecosystems of environmental importance. For the palm sector, this limits expansion within these areas, and focuses effort on intensifying within rural agricultural landscapes that are already in use, and recovering and conserving the functionality of agroecosystems.

Another policy designed to address this is the Territory Management Policy for Agricultural Uses (GESTUA, by its Spanish acronym). These policy guidelines were formulated in 2017 through Resolution 128, which adopted the Basis for the Management of the Territory for Agricultural Uses and the Guidelines for Planning in the Agricultural Sector. The Technical Basis document (UPRA, 2015) that gave rise to this resolution develops its proposals around three axes: agricultural sector planning, agricultural land use planning and agricultural intersectoral management, which are developed in macro, meso and micro contexts. In the macro scope, the national development framework derived from the 2014-2018 PND, and impacts territorial zoning and the post-peace accord environment; in the meso scope, it refers to the spatial dimension of development in the rural context; at a micro scale, it impacts the many farming properties that make up the country’s agricultural subsector.

Within the framework of the first two strategies, the policies’ approach will classify property, regularize the land market, promote agricultural suitability zoning, advance in the adaptation of land, and ensure inclusion of socioeconomic factors in the technical process of land suitability assessment. The intersectoral management strategy is reserved for those activities that, according to the Technical Basis document, are not directly related to the sector, or not within the scope of institutional responsibilities, such as risk management and climate change. Lastly, Decree 4145 of 2011 created the Unidad de Planificación Rural Agropecuaria (UPRA) or Rural Agricultural Planning Agency, although certain areas, such as collective territories and those of indigenous communities among others, are outside of the agency’s institutional mandate.

¹² The technical document on the definition of the agricultural frontier clarifies that as part of this definition, it is necessary that the agricultural frontier may include other areas whose management category, derived from environmental zoning, allows agricultural activities, such as exploitation, forestry or reforestation for commercial purposes associated with natural forests, as well as those that must have a special treatment for their use due to environmental considerations or risk management for the development of human activities (MADR - UPRA, 2018).



7b. Climate adaptation and mitigation policies

Optimal land utilization for both conservation and development goals will be essential to avoid the effects of climate change, both from the point of view of adaptation and mitigation. The Agriculture, Forestry and Other Land Use (AFOLU) sector is the largest contributor (60%) to national GHG emissions, with the agricultural sector responsible for 19% of these emissions; although there is no specific information on the contribution of the oil palm sector (Fedepalma-Cenipalma, 2019). While all of the agricultural sector is vulnerable to climate change, the long time horizon and financial investment required to develop an oil palm plantation makes the sector uniquely vulnerable. Any future climate change (whether in 10, 15 or 20 years) will cause damage to the yield potential, especially in palm production zones, such as the Caribbean Region, which has been identified as having greater vulnerability to climate change. For this reason, Fedepalma, the palm sector's trade organization, is developing adaptation models that include palm varieties that are more resistant to water stress, one of the primary impacts that Colombia's oil palm regions are likely to experience in the future (Contexto Ganadero, 2017).

The National Climate Change Policy (PNCC, by its Spanish acronym) is a policy that aims to reduce land based emissions by incorporating climate change management into public and private decisions to advance climate-resilient (adaptation) and low-carbon (mitigation) development (MADS, 2017). This policy is framed and articulated by the Paris Agreement, ratified in Colombia by Law 1844 of 2017. The PNCC identifies five strategic approaches of which two are directly related to the palm sector: low-carbon and climate-resilient rural development, and ecosystem management and conservation strategy and ecosystem services for low-carbon and climate-resilient development. Promoting land management oriented to zero deforestation and sustainable production will be needed to meet the goals set in the Paris Agreement, those from other international commitments, as well as by national policies, like the Policy of Green Growth. This emphasizes the importance of involving the private sector to reduce emissions, and covers agreements such as the ZDAs. Under this objective, there are a number of specific activities (see Appendix 4); these emphasize property-level interventions that promote cultural and productive practices to aid in adaptation to new climatic conditions, while reducing sources of emissions. Related to this, the country formulated the Colombian Strategy for Low Carbon Development, ECDDB by its Spanish acronym, as a short, medium and long-term development planning program to be led by the MADS, with support from the DNP and the different Sectoral Ministries. This seeks to decouple national economic growth from the growth of greenhouse gas (GHG) and move towards the decarbonization of the economy, while contributing to national social and economic development. This initiative is expected to support economic growth, efficient use of resources, innovation, and the development of new technologies through instruments such as Comprehensive Sectoral Climate Change Plans.

The second of the two palm-related strategic objectives is directly related to the reduction of deforestation due to land cover change in the agricultural sector. It is based on a land sharing conservation model that presumes

agricultural development can be made more conservation-friendly. By using language related to the ecosystem-based adaptation approach, the policies signal the importance of maintaining or restoring the capacity of natural systems to provide environmental services that benefit socioeconomic sectors and their adaptation to climate change. So far, this objective has been used to advance the protection of important ecosystems such as the páramos, which provide the ecosystem service of water regulation for much of the country's irrigation, drinking water and hydroelectricity systems (Sarmiento Pinzón, Cadena Vargas, Sarmiento Giraldo, & Zapata Jiménez, 2013). It could also be applied to strategic ecosystems linked to or near palm production zones.

Another important policy is the country's National Strategy for Reducing Emissions from Deforestation and forest Degradation (ENREDD+). Colombia's commitment under the United Nations Framework on Climate Change Convention (UNFCCC) to REDD+ implementation is called "Forests Territories of Life: A Comprehensive Strategy for the Control of Deforestation and Forest Management." This policy instrument has the intention of stopping deforestation and forest degradation and contributing to both mitigation of and adaptation to climate change through sustainable development (MinAmbiente, 2018). It is also aligned with the commitments outlined in the 2016 Peace Accord, which has as one of its most important goals, comprehensive rural development that is resilient to climate and environmental risk. It also makes a long-term commitment to support sustainable rural development based on natural forests, which improve the quality of life of rural communities, guarantee the multiple benefits provided by standing forests and contribute to the reduction of GHG emissions, an objective that is implemented through activities such as the development of the forest economy and the halting the expansion of the agricultural frontier. Multiple sectors of the Colombian State, including agriculture, the environment, the education, the labor sector, among others, are responsible for implementation of this policy instrument.

The REDD+ policy defines five approaches: 1. Sociocultural management of forests and public awareness, 2. Development of the forest economy and closure of the agricultural frontier, 3. Cross-sectoral management of land use planning and environmental determinants. 4. Permanent monitoring and control, and 5. Generation and strengthening of legal, institutional and financial capacities. The second and third of these stand out and those through which land use activities could be modified to reduce sectoral emissions. Actions taken under the strategy to develop a low emissions forest economy and to halt the expansion of the agricultural frontier would not only contribute to national objectives to reduce deforestation, but would also complement other national policy objectives, including addressing territorial issues that are not covered under the mandate of other entities in the agricultural sector, such as UPRA. This includes measures like the following:

- Community forestry programs that develop the value chains of goods and services from forests.
- Sustainable forest management associated with the closure of the agricultural frontier.
- Development of zero deforestation agreements for agricultural (including oil palm) and forest product value chains. This also highlights the importance of commercial forest plantation policy, where there is a need to strengthen climate change adaptation and mitigation measures.
- Develop and implement agroecological pilot projects in rural stabilization edges along the agricultural frontier.

To implement these policies and evaluate progress toward them, the country established systems for monitoring of its forests, as part of forest management and to aid in enforcement of forest governance. IDEAM is in charge of these three systems: the Forest and Carbon Monitoring System (SMByC) (described in Section 4), the Forest Information (SNIF) and the National Forest Inventory (IFN).



7c. Biodiesel policies

As discussed in Section 3, the palm production chain includes various products in each of its links, particularly in the final phase, the oleochemical industry phase, where oils and fats are processed into production of products and raw materials for other processes. Biodiesel is a biofuel that was promoted as an alternative to fossil fuels (coal, oil and gas), the high consumption of which is considered responsible for a good part of the global environmental crisis. In Colombia, biofuel policy revolves around the regulation of production (of raw materials and good practices) and the introduction into the market to stimulate gradual increases in consumption. The first legislative instrument related to biofuels was Law 693, passed in 2001. It referred to the oxygenation of fossil fuels, through the mixture of ethanol. In contrast to biodiesel, it is produced from fermentation of sugars from biomass such as corn, beet, sugar cane among others. Later, Law 939 of 2004 was issued - this law encouraged the production and commercialization of biofuels of plant or animal origin (biodiesel) for use in diesel engines. As established in the UPME Biofuels in Colombia Report (UPME, 2009), this Law created tax provisions and excluded biodiesel from the payment of the sales tax and global tax on diesel fuel. This generated important incentives for the financing of projects, particularly of late-yield crops such as oil palm.

In 2007, Decree 2629 was issued with provisions to promote the use of biofuels in the country, as well as measures applicable to vehicles and motor equipment that use fuels in their operation. As a priority, the gradual use of biofuels was established through the use of mixtures with conventional fuels in such a way that by 2012 the percentage of ethanol or biodiesel was 20%, as well as having a new vehicle fleet whose engines would allow said mixture. It should be noted that, in some cases, it was necessary to adapt the engines that did not allow the mixture of biofuel. This legislative framework promoted the production of biofuels and therefore the sale of palm oil for this purpose, stimulating the agricultural phase and the oleochemical industry. Graph 1 shows the growing trend in crude palm oil sales, whose growth rate in 10 years was close to 1,000%, and Graph 2 shows how biodiesel production grew close to 2,000% in the same period.

There are 12 biodiesel production plants in Colombia, with half located in the Caribbean zone (see Map 3). The majority of the country uses B10 with frontier areas with Venezuela using B2. Many of the plants started operation in 2008 or 2009 and the nation's current capacity is 858,200 metric tonnes per year, with an actual production level of 460,121 (Fedebiocomustibles 2021).

8. Major Companies and Their Market Shares

We estimate as of 2020, that the ZDA covers between 27-35% of oil palm produced in Colombia, depending on the method used for calculating market share. There are many different methods of calculating market share of companies, and data are often incomplete due to lack of transparency and publicly available information. This is further complicated by the challenges of defining what is considered to be part of the sector, and of identifying linkages between companies. Palm supply chains are complex, like most global supply chains (see Section 2), and are made up of growers, mills and processors, traders, processors of consumer goods or biofuels. These actors may be independent of each other, or share ownership structures. We present three methods of calculating market shares for the oil palm sector (Table 4-6 and Figure 4-5) using three different datasets, domestic sales from 2017 (La Nota 2018); palm oil exports from 2017 (Trase 2020), and domestic palm oil production for 2016 (Fedepalma 2017) and where possible identify signatories to the national ZDA.

According to the 2017 oil and edible fats market share data, the growers, processors and traders among the signatories represent 27% of the palm oil market, by revenue (La Nota 2018). Revenue trends from 2014-2017 for these signatories can be found in Figure 4 (La Nota 2018). The largest among the signatories is the business group Aceites Manuelita (owner of Ingenio Manuelita), which occupies the tenth position overall among companies most important in the country in terms of sales. There are several other important actors (i.e. C.I. Acepalma, Daabon, C.I. Biocosta, and Indupalma) that would significantly expand the coverage of the agreement if they were to sign the agreement (Figure 4, Table 4). Among these companies, Daabon also has the highest RSPO certification and their own company-level zero deforestation commitment and therefore should easily be able to comply with the ZDA.

Exports in 2017 were around 550,000 tons crude palm oil equivalent, controlled by a small number of actors, C.I. Acepalma (43%) and C.I. Biocosta (37%), but only one direct signatory of the agreement, TEAM (2%) is directly involved in export markets (Table 5).

Using the 2016 domestic production volume data, we find that the ZDA has 35% coverage (Fedepalma 2017) (Table 6). This data also highlights the same set of larger actors (i.e. C.I. Acepalma (13%), Daabon (8%), C.I. Biocosta (7%), and Indupalma (5%)) who would significantly expand the coverage of the agreement if they signed. There are also several actors who could be good candidates for signing the agreement, as they have: 1. international zero deforestation agreements (Colgate Palmolive, Cargill), 2. RSPO certifications (Daabon), or suppliers who have signed the agreement (C.I. BioCosta supplied by Palmaceite S.A.). Consumer facing companies like Mondelez and Nestle would also be good targets as supply chain traceability reports indicate that they source from a number of Colombian mills.

Geographically, the signatories have facilities within all of the production zones although there are still gaps in participation. Signatories are concentrated within Cesar, Meta, Norte de Santander and Santander (Section 4, Map 3). These departments encompass the main areas of forest loss identified in the IDEAM analysis. There is one recent signatory from the Southwestern production zone, where the Amazonian deforestation frontier is located and where IDEAM's baseline analysis found the largest extents of deforestation (IDEAM 2019). There is no representation by stakeholders in the departments of Antioquia, Caquetá or Vichada (Section 4, Map 3).

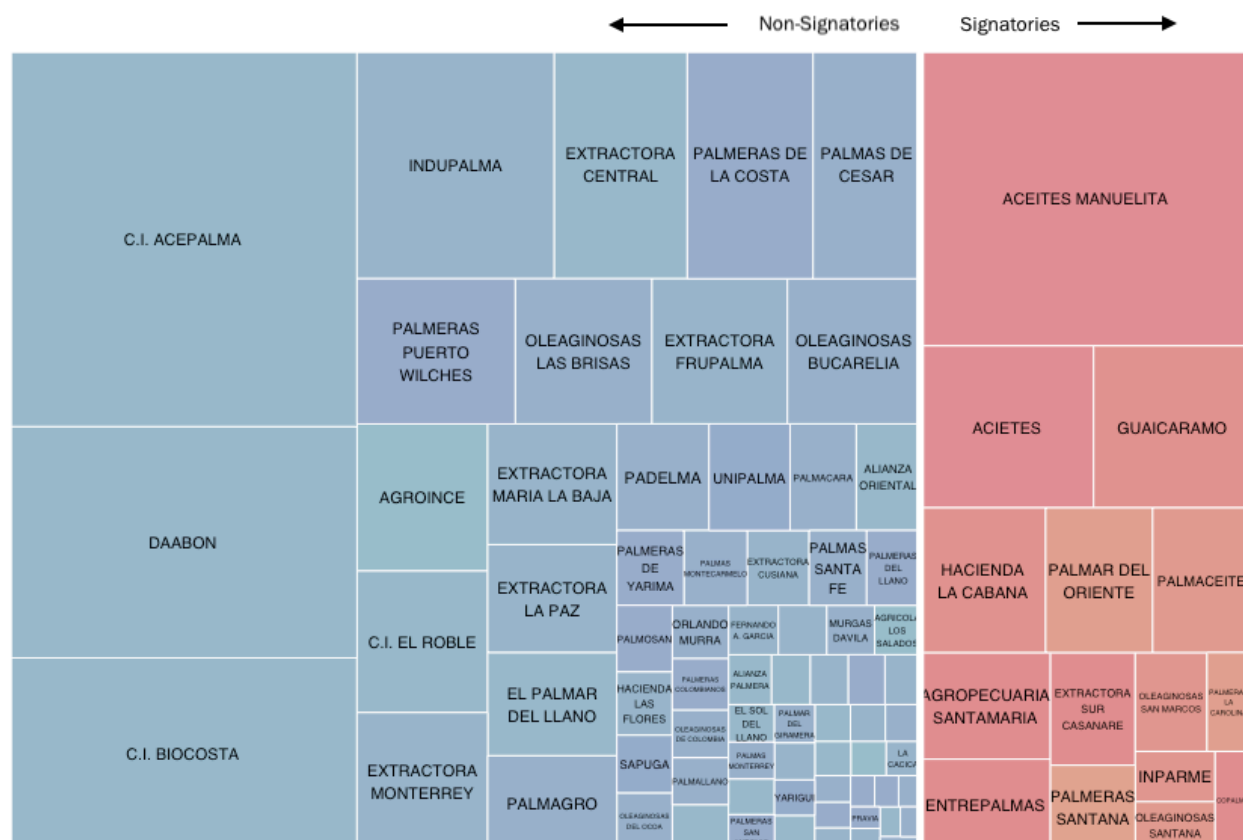


Figure 4. Market shares in the palm sector based on all sales (2014) and Zero Deforestation Agreement coverage, size of boxes in the treemap represent sales volume (Blues=ZDA Signatory and Orange/Red=ZDA Non-signatory)

Source: La Nota 2018

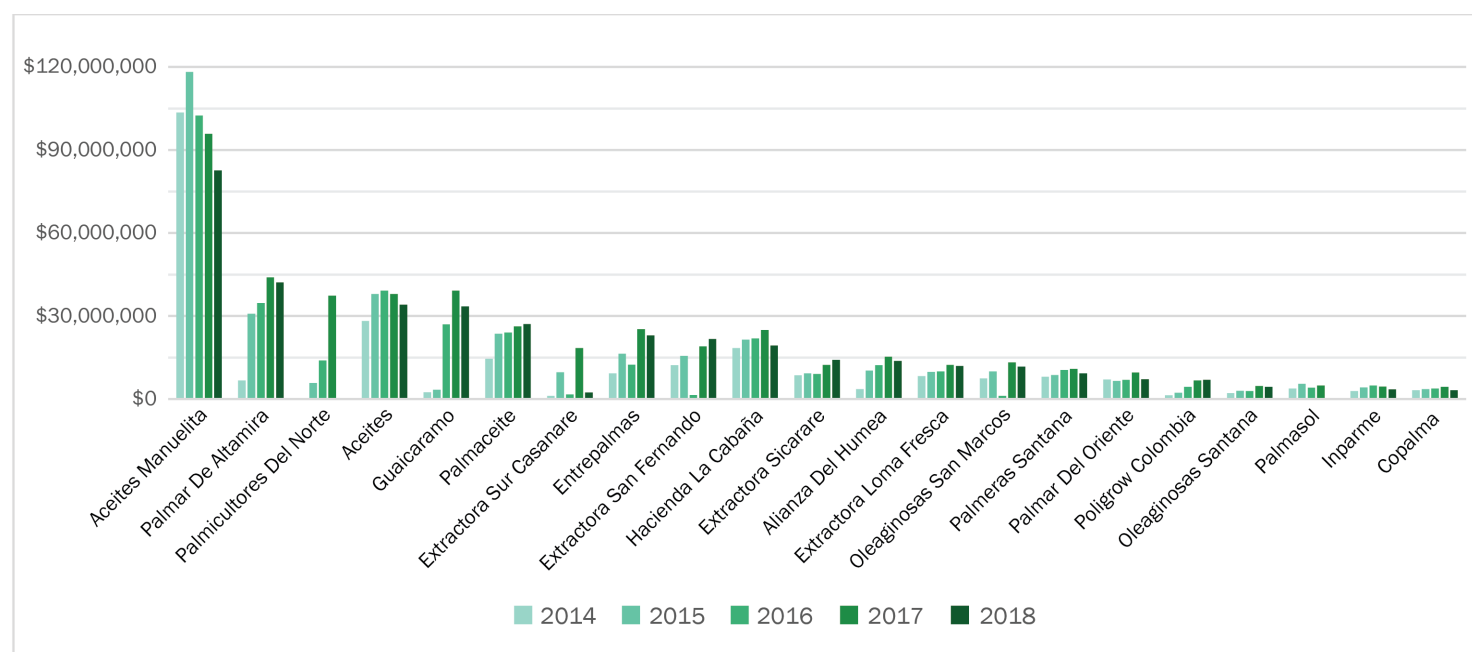


Figure 5. Market share in the palm oil sector of signatories to the Zero Deforestation Agreement (2014-2018)

Source: La Nota 2018

Table 4. Market share (2014) of companies in the palm sector based on all sales and Zero Deforestation Agreement coverage

Company	2014 Sales (USD)	Market Share (%)	National ZDA Status
C.I. Acepalma	228,951,711	13%	Non-Signatory
Aceites Manuelita	170,517,656	10%	Signatory
Daabon	136,228,768	8%	Non-Signatory*
C.I. Biocosta	116,129,282	7%	Non-Signatory
Indupalma	78,635,915	5%	Non-Signatory
Extractora Central	53,181,008	3%	Non-Signatory
Palmeras De La Costa	50,146,070	3%	Non-Signatory
Acietes	48,871,538	3%	Signatory
Guaicaramo	44,212,695	3%	Signatory
Palmas De Cesar	42,764,288	2%	Non-Signatory
Palmeras Puerto Wilches	39,954,682	2%	Non-Signatory
Oleaginosas Las Brisas	34,477,929	2%	Non-Signatory
Extractora Frupalma	34,258,013	2%	Non-Signatory
Oleaginosas Bucarelia	33,517,560	2%	Non-Signatory
Agroince	33,452,561	2%	Non-Signatory
C.I. El Roble	32,174,778	2%	Non-Signatory
Hacienda La Cabana	31,626,073	2%	Signatory
Extractora Monterrey	31,106,077	2%	Non-Signatory
Extractora Maria La Baja	27,139,479	2%	Non-Signatory
Palmar Del Oriente	26,889,773	2%	Signatory
Other Type1	321,177,408	19%	Non-Signatory
Other Type2	113,725,382	7%	Signatory

Source: LaNota 2014

*International company ZDA that includes palm oil

Table 5. Market share (2017) of companies in the palm sector exporting palm oil and Zero Deforestation Agreement coverage

Company	2017 Sales (USD)	Market Share (%)	National ZDA Status
C.I. Acepalma	238,086	43%	Non-Signatory
C.I. Biocosta S.A.	204,751	37%	Non-Signatory
Soc. De Comercializacion Internacional Mira Ltda	26,088	5%	Non-Signatory
C.I. Tequendama S.A.S. (Daabon)*	24,890	4%	Non-Signatory**
Indutrade Sociedad De Comercializacion Internacional S.A.S. (Indupalma)	24,184	4%	Non-Signatory
Team Foods Colombia S.A.	10,253	2%	Signatory
Cargill De Colombia L.T.D.A.	10,235	2%	Non-Signatory**
Grasas Y Aceites Vegetales L.T.D.A.	4,610	1%	Non-Signatory
Indutrade Colombia S.A.S. (Indupalma)	4,258	1%	Non-Signatory
C.I. Macroexport Gutierrez Y Ramirez S.A.S.	3,356	1%	Non-Signatory
Oleoflores S.A.S.	1,730	0%	Non-Signatory
Grasas Y Derivados S.A.	941	0%	Non-Signatory
Extractora Maria La Baja S.A.S.	301	0%	Non-Signatory
Geg Mercantil S.A.S.	128	0%	Non-Signatory
Nvi Caribe Trading Corporation S.A.S.	104	0%	Non-Signatory
Comercializadora Asopalmar S.A.S.	102	0%	Non-Signatory
C.I. Inversiones Group Kairos S.A.S.	101	0%	Non-Signatory
Del Llano S.A.	89	0%	Non-Signatory
Fabrica De Grasas Y Productos Quimicos L.T.D.A	86	0%	Non-Signatory
C.I. Carbonesy Frutas Del Caribe S.A.S.	72	0%	Non-Signatory
C.I. Prodmercar L.T.D.A.	69	0%	Non-Signatory
Rivercol S.A.	61	0%	Non-Signatory
Colgate Palmolive C.I.A.	32	0%	Non-Signatory**
Fleischmann Foods S.A.	30	0%	Non-Signatory
Del Llano Alto Oleico S.A.S.	3	0%	Non-Signatory
C.I. Sociedad Industrial De Grasas Vegetales Sigra S.A.	1	0%	Non-Signatory
Quimerco S.A.	>1	0%	Non-Signatory
Hada S.A.	>1	0%	Non-Signatory
Total	554,561	100%	Signatory=1; Non-Signatory=27

Source: TRASE 2019

*RSPO Next certification

**International company ZDA that includes palm oil

Table 6. Market share (2016) based on domestic sales compiled by Fedepalma

Company	Tons	Market Share (%)	National ZDA Status	Type
Bio D. S.A.	107,013	9%	Signatory	Biofuel
Ecodiesel Colombia S.A.	98,953	9%	Non-Signatory	Biofuel
Aceites Manuelita S.A.	96,401	8%	Signatory	Biofuel
Alianza Team S.A.	62,041	5%	Signatory	Oil and fat processing
Oleoflores S.A.	61,316	5%	Non-Signatory	Biofuel
Grupo Grasco	42,888	4%	Non-Signatory	Oil and fat processing
Inversora La Paz S.A.S.	37,142	3%	Non-Signatory	Biofuel
Biocombustibles Sostenibles Del Caribe S.A.-Bsc S.A.	35,006	3%	Non-Signatory	Biofuel
C.I. Sociedad Industrial De Grasas Vegetales Sgra S.A.	25,416	2%	Non-Signatory	Oil and fat processing
Odin Energy S.A.	22,925	2%	Non-Signatory	Biofuel
Duquesa S.A.	19,544	2%	Non-Signatory	Oil and fat processing
C.I. Santandereana De Aceites S.A.	18,149	2%	Non-Signatory	Oil and fat processing
Del Llano S.A.	14,616	1%	Non-Signatory	Oil and fat processing
Grasas Y Derivados S.A. - Gradesa	13,766	1%	Non-Signatory	Oil and fat processing
Aak Colombia S.A.S. (Antes Fanagra S.A.)	10,530	0.9%	Non-Signatory	Oil and fat processing
Oleoflores S.A.	6,563	0.6%	Non-Signatory	Oil and fat processing
Agropecuaria La Rivera Gaitán S.A.S.	6,382	0.6%	Non-Signatory	Oil and fat processing
C.I. Tequendama (Daabon)	5,485	0.5%	Non-Signatory*	Oil and fat processing
Italcol	5,557	0.5%	Non-Signatory	Food processing
Avícola El Madroño S.A.	5,123	0.4%	Non-Signatory	Food processing
Others	48,594	7.0%	Non-Signatory	Mixed types

Source: FEDEPALMA 2017

*International company with a ZDA that includes palm oil

9. Conclusions

Oil palm is a rapidly growing part of Colombia's economy and a vital component of economic development for its rural areas. Production volume has more than doubled and export volume has more than quadrupled over the past decade.¹³ Colombian palm oil is promoted as "unique and differentiated" in the global marketplace because much of the country's production area replaced land cleared many years ago for other commodity crops or cattle pastures. In this report, we review current production and expansion, and the impacts of the sector on Colombia's forests and biodiversity. We also map oil palm supply chains and evaluate suitable land pools by different land cover types and locate at-risk forests. Lastly, we estimate the market share of major companies and the coverage of the ZDA. The report focuses on environment impacts. However, the social impacts are equally important in evaluating the sustainable expansion of the crop in the Colombian context, where land use and ownership are uniquely complex due to highly unequal landholding and the country's long history of conflict. While the sector's current contribution to national deforestation is low, effective planning and governance of land use will be required for expansion to continue without placing forests and other important ecosystems at risk. There are several public policies designed to ensure that the sector can continue to grow and maintaining its positive environmental reputation. These include Colombia's global climate commitments, public policies at different administrative scales like territorial planning and land use zoning, and supply chain agreements with both public and private support, like a voluntary ZDA designed to be sector-wide. As demand for palm oil and other agriculture commodities continues to grow globally, if these risks can be avoided, Colombian palm production has an opportunity to produce deforestation-free palm that benefits rural producers.

10. References

Acepalma (2020). Products and Services. Retrieved, January 19, 2020: <https://www.acepalma.com/productos-y-servicios/aceites-y-derivados-y-glicerina>

BACI (2010). BACI: International Trade Database at the Product-Level. The 1994-2017, Version CEPII Working Paper, N° 2010-23, Octobre 2010 Guillaume Gaulier, Soledad Zignago. Retrieved, January 19, 2020: <https://oec.world/en/resources/data/>

Cámara de Comercio de Cartagena. (2010). La organización industrial del mercado internacional de aceite de palma africana 1986-2005. Serie Avances de Investigación No. 4.

Carrasco, José Carlos León. (2018) Producción mundial de aceite de palma alcanzó las 64.8 millones de toneladas en 2017. Retrieved, January 19, 2020: <https://agraria.pe/noticias/produccion-mundial-de-aceite-de-palma-alcanzo-las-648-millon-16021>

¹³ Exports - 416% increase from 2010 (135,000) to 2018 (697,000) (MT). Production - 116% increase from 2010 (752,089) to 2018 (1,630,000) (MT) (Fedepalma)

- Castiblanco, C., Etter, A., and Aide, T. M. (2013). Oil palm plantations in Colombia: a model of future expansion. *Environmental Science & Policy* 27:172–183.
- Castiblanco, C., Etter, A., & Ramirez, A. (2015). Impacts of oil palm expansion in Colombia: What do socioeconomic indicators show?. *Land Use Policy*, 44, 31-43.
- Cenipalma. 2020. App Catastro Nacional. Retrieved, January 19, 2020: <https://geoservicios.cenipalma.org/>
- Centro Nacional de Memoria Histórica (2018), Y a la vida por fin daremos todo... Memorias de las y los trabajadores y extrabajadores de la agroindustria de la palma de aceite en el Cesar. 1950-2018, Bogotá, CNMH.
- Departamento Nacional de Planeación. (2013). *Balance en el diseño e implementación de lineamientos de ordenamiento territorial departamental*. Bogotá. Pg76. Retrieved, January 19, 2020: <https://colaboracion.dnp.gov.co/CDT/Desarrollo%20Territorial/Balance%20procesos%20de%20Ordenamiento%20Territorial%20Departamental.pdf>
- Dermawan, A., O. Hospes. Sustainability pathways of oil palm production: a comparison of Indonesia, Colombia and Cameroon. In. Alain Rival (ed.), *Achieving sustainable cultivation of oil palm Volume 1: Introduction, breeding and cultivation techniques*. Cambridge: Burleigh Dodds. (http://www.cifor.org/publications/pdf_files/Books/CDermawan1801.pdf)
- Fedebiocombustibles (2020). Información Estadística Sector Biocombustibles. Retrieved, January 19, 2020: https://www.fedebiocombustibles.com/estadistica-mostrar_info-titulo-Biodiesel.htm
- Fedepalma-Cenipalma (2019). *XLVII Congreso Nacional de Cultivadores de Palma de Aceite 2019*. Bogotá.
- Fedepalma (2017) Anuario Estadístico 2017: La agroindustria de la palma de aceite en Colombia y en el mundo 2013-2017. Fedepalma
- Fedepalma (2018) Anuario Estadístico 2018: La agroindustria de la palma de aceite en Colombia y en el mundo 2013-2017. Fedepalma
- Fedepalma (2019) Anuario Estadístico 2019: La agroindustria de la palma de aceite en Colombia y en el mundo 2014-2018. Fedepalma
- Fedepalma (2020) La Palma de Aceite en Colombia. Retrieved August 19, 2020: <http://web.fedepalma.org/sites/default/files/files/infografia-palmadeaceite-colombia-2020.pdf>
- Food and Agriculture Organization (FAO) (2020). FAOSTAT: Production data. Retrieved January 19, 2020: <http://www.fao.org/faostat/en/?#data/TP>
- Furumo, P. R., & Aide, T. M. (2017). Characterizing commercial oil palm expansion in Latin America: land use change and trade. *Environmental Research Letters*, 12(2), 024008
- Furumo, P. R., & Aide, T. M. (2019). Using soundscapes to assess biodiversity in Neotropical oil palm landscapes. *Landscape Ecology*, 34(4), 911-923
- Furumo, P. R., Rueda, X., Rodríguez, J.S., & Ramos, I.K.P. (2020). Field evidence for positive certification outcomes on oil palm smallholder management practices in Colombia. *Journal of Cleaner Production*, 245, 118891.
- Gilroy, J., Prescott, G., Cárdenas, J., González del Pliego, P.. 2014. Minimizing the biodiversity impact of Neotropical oil palm development. *Global Change Biology* 1–10.
- Instituto de Hidrología , Meteorología, y Estudios Ambientales (IDEAM) (2018). Sistema de monitoreo de bosque y carbono. Retrieved November 19, 2018: <http://www.ideam.gov.co/web/ecosistemas/deforestacion-colombia>
- IDEAM (2019). Línea base de deforestación 2011-2017 en áreas de cultivo de Palma de aceite Africana (*Elaeis guineensis*) y la Palma de aceite híbrida (*E. oleifera* x *E. guineensis*). IDEAm. pg28.

- López-Ricaurte, L., Edwards, D. P., Romero-Rodríguez, N., & Gilroy, J. J. (2017). Impacts of oil palm expansion on avian biodiversity in a Neotropical natural savanna. *Biological Conservation*, 213, 225-233
- La Nota (2012). Colombia: African palm plantations and crude oil sector: 2007-2011.
- La Nota (2014). Colombia: African palm plantations and crude oil sector: 2011-2014.
- La Nota (2018). Colombia: African palm plantations and crude oil sector: 2014-2017.
- Michail, Niamh (2018). How is Colombia's palm oil 'unique and differentiated'? Food navigator Retrieved, January 19, 2020: foodnavigator.com/Article/2018/04/05/How-is-Colombia-s-palm-oil-unique-and-differentiated
- Ministerio de Agricultura y Desarrollo Rural - Unidad de Planificación Rural Agropecuaria (UPRA) (2018). *Identificación general de la frontera agrícola en Colombia*. Bogotá. Pg.61. Accessed: https://www.minagricultura.gov.co/Normatividad/Projects_Documents/IDENTIFICACION%20GENERAL%20DE%20LA%20FRONTERA%20.pdf
- Ministerio del Ambiente y Desarrollo Sostenible (MADS) (2008). Evaluación ambiental estratégica de políticas, planes y programas de biocombustibles en Colombia con énfasis en biodiversidad. Ministerio de Ambiente, Vivienda y Desarrollo territorial, Bogotá, Colombia.
- Ministerio del Ambiente y Desarrollo Sostenible (MADS) (2017). *Política Nacional de Cambio Climático*. Bogotá: Puntoaparte, Pg. 148. Retrieved, January 19, 2020: https://www.minambiente.gov.co/images/cambioclimatico/pdf/Politica_Nacional_de_Cambio_Climatico_-_PNCC_/PNCC_PoliticasyPublicas_LIBRO_Final_Web_01.pdf
- Ministerio del Ambiente y Desarrollo Sostenible (MADS) (2017). Acuerdo de voluntades para la deforestación cero en la cadena de aceite de palma en Colombia. Retrieved, January 19, 2020: https://www.minambiente.gov.co/images/ACUERDO_DEFORESTACION_CEROCADENA_ACEITE_DE_PALMA_COLOMBIA_Version_para_Suscripcion_28112017.pdf
- Ocampo-Peñuela, N., Garcia-Ulloa, J., Ghazoul, J., & Etter, A. (2018). Quantifying impacts of oil palm expansion on Colombia's threatened biodiversity. *Biological conservation*, 224, 117-121.
- Pardo L.E., Campbell M.J., Edwards W., Clements G.R., Laurance W.F. (2018) Terrestrial mammal responses to oil palm dominated landscapes in Colombia. *PLoS ONE* 13(5): e0197539. <https://doi.org/10.1371/journal.pone.0197539>
- Potter, L. (2020). Colombia's oil palm development in times of war and 'peace': Myths, enablers and the disparate realities of land control. *Journal of Rural Studies* 78, 491-502.
- Quezada, J. C., Etter, A., Ghazoul, J., Buttler, A., & Guillaume, T. (2019). Carbon neutral expansion of oil palm plantations in the Neotropics. *Science Advances*, 5(11), eaaw4418.
- Romero-Ruiz, M. H., Flantua, S. G. A., Tansey, K., & Berrio, J. C. (2012). Landscape transformations in savannas of northern South America: Land use/cover changes since 1987 in the Llanos Orientales of Colombia. *Applied Geography*, 32(2), 766-776.
- Sarmiento, C. E. (Ed.). (2013). *Aportes a la conservación estratégica de los Páramos de Colombia: Actualización de la cartografía de los complejos de páramos a escala 1:100.000*. Bogotá, Colombia: Legis S.A.
- Serrano, A. (2020). Can small scale farming save oil palm? Edge Effects. Retrieved, August 19, 2020: <https://edgeeffects.net/small-scale-oil-palm/>
- Statista (2019). Agriculture and Livestock. Retrieved, January 19, 2020: <https://es.statista.com/estadisticas/564745/produccion-mundial-de-los-principales-aceites-vegetales>
- TRASE (2020). Trase-Earth Data: Colombia Oil Palm. Retrieved March, 20, 2020: <https://trase.earth/data>

- Unidad de Planificación Rural Agropecuaria (UPRA) (2015). *Gestión del Territorio para Usos Agropecuarios. Bases para la formulación de política pública*. (F. Fonseca Fino, D. Rey Martínez, & D. Aguilar Corrales, Edits.) Bogotá. Pg.215. Retrieved March, 20, 2020: <http://hdl.handle.net/20.500.12324/34838>
- Unidad de Planificación Rural Agropecuaria (UPRA) (2016). Zonificación para cultivo comercial de la palma. Retrieved March, 20, 2020: <https://upra.gov.co/uso-y-adequacion-de-tierras/evaluacion-de-tierras/zonificacion>
- UPME. (2009). *Biocombustibles en Colombia*. Bogotá.
- United States Department of Agriculture Foreign Agricultural Service (USDA FAS) (2018). GAIN Report No. CO1811. Colombia Biofuels Annual 2018. Retrieved March, 20, 2020: https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Biofuels%20Annual_Bogota_Colombia_7-6-2018.pdf
- Van Ausdal, S. (2009). Pasture, profit, and power: An environmental history of cattle ranching in Colombia, 1850–1950. *Geoforum*, 40(5), 707-719.
- Vargas, L.E.P., Laurance, W. F., Clements, G. R., & Edwards, W. (2015). The impacts of oil palm agriculture on Colombia's biodiversity: what we know and still need to know. *Tropical Conservation Science*, 8(3), 828-845.
- Zavala Gómez, R. (2016). Una visión general a las características del sector de la palma de aceite. *Palmas* 37(Especial Tomo II), pp. 287-291.

Appendix 1. Signatories to the Oil Palm Zero Deforestation Agreements

- 1. Private Sector:** Aceites S.A., Agropecuaria de Santamaria, Alianza Humea, BioD S.A., Copalma, Entrepalmas, Extractora del Sur de Casanare S.A.S., Extractora Loma Fresca Sur De Bolívar S. A. S., Extractora San Fernando S. A., Extractora San Sebastiano S. A. S., Extractora Sicarare S. A. S., Grupo Éxito, Guaicaramo S.A, Hacienda la Cabaña, Inparme, Manuelita Aceites y Energía, OILSUM GROUP, Oleaginosas San Marcos, Oleaginosas Santana, Palmaceite S.A., Palmar de Altamira, Palmar del Oriente S.A.S., Palmas Oleaginosas de Casacará Ltda., Palmas de Tumaco S.A.S., Palmasol, Palmeras la Carolina, Palmeras Santana, Palmicultores del Norte S. A. S., Poligrow Colombia S.A.S, Prestige Colombia S.A.S, Extractora Cimarrón S.A.S, RioPaila Castilla, TEAM, Unilever
- 2. Government Agencies:** IDEAM, MADR, MADS, MINCIT
- 3. Trade Unions:** FEDEBIOCOMBUSTIBLES, FEDEPALMA
- 4. Non-Governmental Organizations:** Climate Focus, Fundación Natura, National Wildlife Federation, Proforest, Proyección EcoSocial, Solidaridad, World Wildlife Federation
- 5. Observer/Collaborator:** Global Green Growth Institute

Appendix 2. Oil Palm Supply shed Deforestation

Table S1. Forest area in 2016 by oil palm suitability class, nationally and within oil palm mill supply sheds (60 km radius)

Suitability class	Forest (ha)	Mill Supply Sheds Forest (ha)	Mill Supply Sheds Forest (%)
High suitability	122,113	96,704	79.19%
Medium suitability	448,327	208,404	46.48%
Low suitability	502,328	87,045	17.33%
Legal exclusion	12,343,478	991,497	8.03%
Not suitable	48,027,983	4,580,297	9.54%
Total forest	61,444,229	5,963,947	9.71%

Source: UPR 2020; IDEAM 2016

Table S2. Forest clearing (1990-2016) nationally and for land classed as highly suitable for oil palm within oil palm mill supply sheds (60km radius)

Conversion Year	All Forest Conversion			Forest Conversion on Land Classed as Highly Suitable for Oil Palm		
	National	Mill Supply Sheds		National	Mill Supply Sheds	
	ha	ha	%	ha	ha	%
1990 - 2000	2,782,103	708,628	25.47%	80,159	61,601	76.85%
2000 - 2005	1,565,565	434,564	27.76%	58,528	44,836	76.61%
2005 - 2010	1,148,446	287,548	25.04%	44,735	33,703	75.34%
2010 - 2012	288,180	69,949	24.27%	4,234	2,993	70.68%
2012 - 2013	112,713	21,829	19.37%	1,089	796	73.07%
2013 - 2014	126,443	30,158	23.85%	1,254	900	71.77%
2014 - 2015	115,689	30,181	26.09%	1,126	925	82.11%
2015 - 2016	168,040	44,272	26.35%	1,530	1,252	81.79%
Total (1990-2016)	6,307,171	1,627,130	25.80%	192,655	147,005	76.30%

Table S3. Forests, forest clearing, and non-forest land within individual oil palm mill supply sheds (60km radius)

Mill ID	Company name	Forest (ha)	Deforestation 2010 - 2016 (ha)	Non-forest (ha)
54	Aceites Del Vichada	126,011	1,045	993,124
56	Sapuga S.A.	135,734	1,272	975,726
57	Extractora San Sebastiano	149,143	1,390	961,101
55	Braganza	134,207	1,480	973,097
16	Palmas Oleaginosas De Casacará Ltda. - Palmacara	78,560	1,553	800,212
15	Extractora Sicarare S.A.S.	78,070	1,665	821,292
12	Extractora Palmariguani S.A.	49,513	1,692	1,046,210
58	Oleocoa	321,653	1,778	773,524
13	Palmagro S.A.	65,856	1,843	992,390
70	Aceites Morichal	154,390	1,877	932,358
44	Alianza del Humea S.A.S	157,620	1,898	907,146
14	Oleoflores S.A.	88,985	1,900	849,913
43	Oleocol	181,736	1,950	881,200
45	Compañía Palmicultora del Llano S.A. Palmallano S.A.	173,971	1,962	886,704
42	Plantaciones Unipalma de Los Llanos S.A. - Unipalma	236,212	2,039	834,587
69	Aceites Manuelita P&C - Palmar de altamira	166,844	2,144	919,709
68	Aceites Manuelita Manavire	196,205	2,150	889,483
41	Hacienda La Cabaña S.A.	269,708	2,151	797,229
60	Oleaginosas Santana S.A.S.	308,405	2,161	781,278
59	Inversiones La Mejorana Ltda.	304,294	2,165	785,120
61	Agropecuaria La Loma Ltda	302,991	2,213	785,739
62	Alianza Oriental S.A.	301,559	2,215	787,302
11	Palmeras De La Costa S.A.	97,067	2,253	990,129
48	Extractora del Sur de Casanare S.A.S. Surpia S.A.S.	171,194	2,256	885,241
65	Palmeras del Llano S.A., antes El Palmar del Llano S.A.	278,098	2,271	809,503
66	Inversiones La Mejorana S.A.S.	277,549	2,273	810,060
63	Palmeras La Margarita Díaz Martínez & Cía. Ltda.	274,046	2,401	813,056
51	Extractora Cusiana-Maní	126,124	2,479	977,466
49	Ext. Cusiana	194,091	2,480	854,484
46	Guaicaramo S.A.	199,953	2,488	852,922
67	Aceites Morichal S.A.S.	222,507	2,488	863,378
73	Inversiones El Borrego	149,928	2,506	937,968
53	Altamira	131,841	2,523	986,497
71	Servicios de Maquila Agrícola de Los Llanos S.a.s	146,612	2,613	937,923
50	Extractora Cusiana-Tauramena	213,233	2,622	854,719
47	Palmeras Santana Ltda.	207,681	2,632	839,951
74	Baquero Ramírez Víctor Ramón	151,026	2,655	935,592
64	Complejo Bioenergético de Castilla La Nueva - Biocastilla S.A.	250,573	2,682	834,430
72	Extractora La Paz S.A.	149,599	2,721	935,104
40	Morro Colorado	258,124	3,281	809,574
17	Extractora Grupalma S.A.S.	146,599	4,039	946,753
24	Agroindustrias del Sur del Cesar Ltda. Y Cía. S.C.A. - Agroince	145,376	4,228	930,522
25	Agroince	156,595	4,342	921,177

75	Extractora La Paz S.A.	282,473	4,758	781,316
79	Palmeras San Pedro Ltda.	174,260	4,843	894,262
52	Industrial Aceitera De Casanare S.A. Sucursal Colombia S.A.	109,346	5,080	989,525
39	Promotora Palmera S.A.S.	308,863	5,151	755,124
9	Aceites S.A.	207,233	5,180	813,033
10	C. I. Tequendama S. A. S.	211,090	5,295	822,270
77	Entrepalmas S.A.S.	222,304	5,437	835,126
82	Palmas de Tumaco S.A.S.	296,068	5,537	68,726
7	Extractora El Roble S.A.S. Extrarsa S.A.S.,El Roble Agricola	240,485	5,599	734,112
26	Palmas del Cesar S. A.	217,483	5,613	852,729
8	Palmaceite S. A.	243,549	5,618	771,554
84	Salamanca Oleaginosas S.A.	320,129	5,689	70,059
85	Palmeiras Colombia S.A.	330,556	5,737	71,370
2	Extractora María La Baja S.A.	85,390	5,835	758,364
3	Grasas Y Derivados S.A. - Gradesa	257,642	5,920	440,698
86	Extractora Santa Fe S.A.S., antes Palmas Santa Fe S.A.	361,865	5,924	73,682
6	Extractora Frupalma S. A.	261,557	6,012	703,451
5	Palmas Oleaginosas del Magdalena Ltda. - Padelma	281,654	6,269	682,747
78	Agropecuaria Santamaria S.A.	210,116	6,313	840,113
4	Extractora La Bella S. A. S.	300,927	6,512	640,536
83	Astorga S.A.	425,777	7,032	77,689
27	Industrial Agraria La Palma Ltda. - Indupalma Ltda.	262,468	7,826	797,528
18	Extractora La Gloria S.A.S.	181,648	8,624	900,505
76	Agropecuaria La Rivera Gaitán SAS, antes Gaitan Tangarife Reinel	363,339	10,134	655,278
28	Extractora Vizcaya S.A.S.	358,600	15,361	659,507
23	Cooperativa Palmas Risaralda Ltda. - Coopar	247,378	15,862	304,771
30	Procesadora de Aceite Oro Rojo Ltda	281,679	16,198	742,636
29	Extractora Loma Fresca Sur de Bolivar S.A.S	353,269	16,613	659,838
87	Confederación Empresarial del Campo de Colombia - Confecampo	409,956	17,244	555,120
80	Aceites Cimarrones S.A.S. Zona Franca	404,993	17,329	614,307
37	Nutrimezclas Y Aceites S.A.S	291,218	18,070	726,591
38	Extractora San Fernando S.A.	298,507	18,299	720,243
81	Poligrow Colombia	507,981	18,747	507,672
36	Extractora Central S. A.	284,052	19,372	726,235
31	Palmeras De Puerto Wilches S A	339,133	21,859	654,041
1	Bioplanta Palmera Para el Desarrollo S.A.	600,076	22,184	406,948
32	Extractora Monterrey S.A.	366,650	23,517	618,427
35	Palma y Trabajo S.A.S.	330,759	24,552	649,618
34	Oleaginosas Las Brisas S.A.	330,770	24,563	649,488
33	Palmas Oleaginosas Bucarelia S.A.	357,376	25,243	619,680
22	Aceites Y Grasas del Catatumbo S.A.S.	288,207	25,732	283,204
21	Oleoflores Tibu	289,212	25,773	284,149
20	Palmicultores del Norte S.A.S.	285,840	25,980	271,206
19	PalNorte	286,746	26,046	271,413

Appendix 3. Approaches for promoting rural development that is climate resilient and low carbon

Línea de acción	Acciones
1. Promover sistemas de producción agropecuaria y pesquera más adaptados a altas temperaturas, sequías o inundaciones, para mejorar la competitividad, los ingresos y la seguridad alimentaria de poblaciones vulnerables.	1.1. Evaluar la vulnerabilidad de sistemas productivos agropecuarios a la variabilidad y al cambio climático.
	1.2. Identificar y evaluar medidas de adaptación para disminuir vulnerabilidad de sistemas productivos agropecuarios prioritarios.
	1.3. Dar lineamientos para incorporar medidas de adaptación en instrumentos sectoriales de la política agropecuaria.
	1.4. Implementar medidas de adaptación para sistemas de producción agropecuaria vulnerables
	1.5. Recomendar líneas de investigación para la adaptación de sistemas productivos agropecuarios
2. Generar y divulgar información agroclimática estratégica tanto para el desarrollo de la agricultura resiliente al clima, como para el desarrollo de seguros climáticos, y de sistemas de predicción y alerta temprana para la adecuación de calendarios de siembra y la prevención de pérdida de cosechas	2.1. Definir el tipo de información, responsables, protocolos de recolección, procesamiento y divulgación de información agroclimática para la adaptación.
	2.2. Recolección, procesamiento y divulgación de información agroclimática para la adaptación
	2.3. Identificar y evaluar medidas basadas en información, para la adaptación al cambio climático de sistemas agropecuarios
	2.4. Recomendar la implementación de medidas basadas en información en instrumentos sectoriales de la política agropecuaria.
	2.5. Implementar medidas de adaptación basadas en información agroclimática
3. Promover acciones integrales en fincas, en las chagras o comunidades que ayuden al uso eficiente del suelo, y en donde se privilegien la conservación de las coberturas naturales existentes en las fincas, la restauración de sus áreas degradadas, la intensificación ganadera baja en carbono, la implementación de sistemas agroforestales, la agricultura familiar, la reducción de la deforestación y la restauración de áreas degradadas, y la asistencia técnica o transferencia tecnológica agropecuaria que aumente la competitividad y disminuya la vulnerabilidad ante el cambio climático.	3.1. Evaluar la vulnerabilidad al cambio climático de las fincas y chagras
	3.2. Evaluar las emisiones de GEI de fincas, chagras o comunidades, incluyendo fuentes pecuarias y cambios de uso del suelo
	3.3. Identificar y evaluar medidas de adaptación para disminuir vulnerabilidad de la actividad ganadera
	3.4. Identificar y evaluar medidas de mitigación para disminuir emisiones por la ganadería, la deforestación y el aumento de sumideros de carbono en fincas, en las chagras o comunidades
	3.5. Evaluar las opciones de implementación conjunta de medidas de adaptación y mitigación
	3.6. Recomendar la implementación de medidas conjuntas en instrumentos sectoriales ambientales y agropecuarios que entre otros temas revisen los estímulos asociados al cambio en el uso del suelo que vienen favoreciendo el desarrollo de proyectos pecuarios.
	3.7. Implementar medidas de adaptación y mitigación en fincas, en las chagras o comunidades
	3.8. Implementar instrumentos económicos para la mitigación de GEI en fincas, en las chagras o comunidades

4.1. Evaluar las zonas de ocupación de baldíos y reservas forestales en frentes significativos de deforestación

4.2. Identificar motores de deforestación en las zonas prioritarias

4.3. Identificar y evaluar medidas de mitigación para disminuir emisiones por deforestación o conservación de sumideros de carbono en zonas de colonización de baldíos, reservas forestales, minería ilegal y cultivos ilícitos, que brinden alternativas económicas a los colonos

4.4. Complementar medidas de mitigación incorporando criterios de resiliencia al clima

4.5. Recomendar la implementación de medidas en instrumentos sectoriales de desarrollo agropecuario, desarrollo rural y acceso a la tierra

4.6. Recomendar la implementación de medidas en instrumentos sectoriales ambientales forestales, incluyendo el manejo de reservas forestales

4.7. Implementar medidas de adaptación y mitigación en frentes significativos de deforestación

4.8. Gestionar la implementación instrumentos económicos para reducir deforestación

5.1. Identificar opciones y paquetes tecnológicos viables para la adaptación de sistemas productivos vulnerables

5.2. Identificar, evaluar medidas para la difusión de opciones y paquetes tecnológicos para la adaptación de sistemas productivos

5.3. Recomendar la incorporación de opciones y paquetes tecnológicos de adaptación en programas sectoriales agropecuarios de asistencia técnica

5.4. Implementar medidas y acciones de asistencia técnica para la adaptación de sistemas agropecuarios

4. Dentro del escenario de post-conflicto brindar alternativas productivas y de acceso a la tierra en áreas con procesos de ocupación de baldíos, minería ilegal, cultivos ilícitos y/o de ocupación de reservas forestales, que promuevan el mantenimiento o el aumento de las reservas de carbono forestal, el cierre de la frontera agrícola, y el uso de sistemas productivos agropecuarios y forestales resilientes al clima y consistentes con la vocación y las condiciones agroecológicas de dichas zonas.

5. Incorporar en los sistemas de asistencia técnica agropecuaria la evaluación y promoción de tecnologías y opciones de adaptación y mitigación en los principales subsectores agrícolas, ganaderos, agroindustriales y de biocombustibles

6. Promover un desarrollo y ordenamiento resiliente al clima y bajo en carbono de los sectores no agropecuarios, en el contexto rural como en los sectores de energía mediante estufas eléctricas y energías alternativas, en el sector de transporte con la implementación de orientaciones de mitigación y adaptación al cambio climático para la creación de nuevas vías o el mejoramiento de las existentes y en materia de turismo para la creación de usos adecuados a las capacidades de carga de los ecosistemas y según las posibilidades definidas.

7. Promover dentro de las fincas el manejo forestal sostenible, el aprovechamiento sostenible de los recursos naturales, la conservación de los bosques y de las márgenes hídricas, así como la restauración de las áreas degradadas.

7.1. Incorporar en la planificación predial y comunitaria, acciones de manejo y conservación de los ecosistemas y sus servicios, teniendo en cuenta el rol de los mismos en la reducción de emisiones y aumento de la adaptación territorial.

7.2. Implementar el manejo forestal sostenible y la conservación de los bosques a nivel predial y comunitario.

8. Someter a revisión las subvenciones (incentivos) que contribuyen al deterioro o disminución en la provisión de servicios ecosistémicos que aportan a la adaptación y mitigación al cambio climático en zonas costeras, y promover diseños y técnicas de construcción de viviendas en municipios costeros que permitan amortiguar los efectos de eventos extremos y cambio climático.

9. Incorporar en la planificación, mejoramiento y rehabilitación de infraestructura de adecuación de tierras, la evaluación de los efectos del cambio climático en la disponibilidad hídrica, así como la implementación de opciones para enfrentar los riesgos climáticos como inundaciones o sequías, incluyendo aquellas dirigidas a incentivar el uso eficiente del agua por parte de los usuarios.

9.1. Generar lineamientos para la incorporación del análisis del cambio climático en la planificación, mejoramiento o rehabilitación de proyectos de adecuación de tierras, distritos de riego, sistemas de drenaje

9.2. Definir estándares y buenas prácticas de ahorro y uso eficiente de agua en sistemas de riego agropecuario

9.3. Identificar y evaluar medidas de adaptación para enfrentar riesgos climáticos de sequías o inundaciones en proyectos de adecuación de tierras

9.4. Implementar medidas de adaptación en proyectos de adecuación de tierras, nacionales, regionales y locales

Appendix 4. Policies related to the oil palm sector

The following table lists important policies and norms developed in Colombia to regulate and support the palm industry.

Instrumento	Descripción/contenido
Leyes	<ul style="list-style-type: none">Las leyes marco del sector agropecuario cuyas disposiciones incluyen el cultivo de Palma de Aceite son las siguiente:Ley 1876 de 2017- Por medio de la cual se crea el Sistema Nacional de Innovación Agropecuaria y se dictan otras disposiciones. Fuente: http://201.217.193.253/labpalma/docs/ley_1876_2017.htmLey 1776 de 2016- Por la cual se crean y se desarrollan las zonas de Interés de desarrollos rural, económico y social, Zidres. Fuente: http://201.217.193.253/labpalma/docs/ley_1776_2016.htmLey 1731 de 2014- Por medio de la cual se adoptan medidas en materia de Financiamiento para la reactivación del sector agropecuario, pesquero, acuícola, forestal y agroindustrial, y se dictan otras disposiciones relacionadas con el fortalecimiento de la Corporación Colombiana de Investigación Agropecuaria (Corpoica). Fuente: http://201.217.193.253/labpalma/docs/ley_1731_2014.htmLey 1607 de 2012- Por la cual se expiden normas en materia tributaria y se dictan otras disposiciones. Fuente: http://201.217.193.253/labpalma/docs/ley_1607_2012.htmLey 1587 de 2012- Por la cual se efectuan unas modificaciones al Presupuesto General de La Nación para la vigencia fiscal de 2012. Fuente: http://201.217.193.253/labpalma/docs/ley_1587_2012.htmLey 1450 de 2011- Por la cual se expide el Plan Nacional de Desarrollo, 2010- 2014: Arts. 100, 101, 116. Fuente: http://201.217.193.253/labpalma/docs/ley_1450_2011.htm#100Ley 1380 de 2010- Por la cual se establece el Régimen de Insolvencia para la Persona Natural no Comerciante.

Fuente: http://201.217.193.253/labpalma/docs/ley_1380_2010.htm

- Específicamente para La Agroindustria de la Palma de Aceite está la Ley 138 de 1994)- Por la cual se establece la cuota para el fomento de la Agroindustria de la Palma de Aceite y se crea el Fondo del Fomento Palmero.

Fuente: <http://201.217.193.253/labpalma/docs/arbol/35295.htm>

Decretos

- Decreto 691 de 2018- Por el cual se modifica el artículo 2.1.2.2.8 del Decreto número 1071 de 2015, Decreto Único Reglamentario del Sector Administrativo Agropecuario, Pesquero y de Desarrollo Rural, en lo relacionado con la definición y calificación de pequeño productor para los fines de la Ley 16 de 1990, y se deroga el artículo 2.1.2.2.9 del mismo.

Fuente: http://201.217.193.253/labpalma/docs/decreto_0691_2018.htm

- Decreto 2153 de 2016- Por el cual se adopta el arancel de aduanas y otras disposiciones.

Fuente: http://201.217.193.253/labpalma/docs/decreto_2153_2016.htm

- Decreto 440 de 2016- Por el cual se modifica el Decreto 1071 de 2015, Decreto Único Reglamentario del Sector Administrativo, Agropecuario, Pesquero y de Desarrollo Rural, en lo relacionado con la parte 15, Unidad Administrativa Especial de Gestión de Restitución de Tierras Despojadas.

Fuente: http://201.217.193.253/labpalma/docs/decreto_0440_2016.htm

- Decreto 13 de 2016- Por el cual se adiciona y modifica el Decreto Único Reglamentario del Sector Administrativo, Agropecuario, Pesquero y de Desarrollo Rural, reglamentando el parágrafo 3° del artículo 106 de la Ley 1753 de 2015.

Fuente: http://201.217.193.253/labpalma/docs/decreto_0013_2016.htm

- Decreto 1071 de 2015- Por medio del cual se expide el Decreto Único Reglamentario del Sector Administrativo, Agropecuario, Pesquero y de Desarrollo Rural.

Fuente: http://201.217.193.253/labpalma/docs/decreto_1071_2015.htm

- Decreto 2656 de 2014- Por el cual se aprueba la modificación de la estructura del Banco Agrario de Colombia S.A. y se determinan las funciones de sus dependencias.

Fuente: http://201.217.193.253/labpalma/docs/decreto_2656_2014.htm

- Decreto 1473 de 2014- Por medio del cual se señalan las actividades económicas para los trabajadores por cuenta propia.

Fuente: http://201.217.193.253/labpalma/docs/decreto_1473_2014.htm

- Decreto 355 de 2014- Por el cual se reglamenta el artículo 3° de la Ley 1694 de 2013.

Fuente: http://201.217.193.253/labpalma/docs/decreto_0355_2014.htm

- Decreto 2018 de 2012- Por el cual se aprueba una reforma de los Estatutos del Fondo para el Financiamiento del Sector Agropecuario- Finagro.

Fuente: http://201.217.193.253/labpalma/docs/decreto_2018_2012.htm

- Decreto 1860 de 2012- Por el cual se da aplicación provisional al “Acuerdo de Alcance Parcial entre la República de Colombia y la República Bolivariana de Venezuela” firmado en la Ciudad de Caracas, República Bolivariana de Venezuela, el 29 de Noviembre de 2011, y sus anexos, suscritos en la Ciudad de Cartagena, República de Colombia, el 15 de Abril de 2012.

Fuente: http://201.217.193.253/labpalma/docs/decreto_1860_2012.htm

- Decreto 727 de 2012- Por el cual se modifica el artículo 5° del Decreto número 502 de 2003.

Fuente: http://201.217.193.253/labpalma/docs/decreto_0727_2012.htm

- Decreto 2424 de 2011- Por el cual se modifica el artículo 6° del Decreto número 2354 de 1996, modificado por el artículo 2° del Decreto 130 de 1998.

Fuente: http://201.217.193.253/labpalma/docs/decreto_2424_2011.htm

Circulares

DIAN

- CIRCULAR 3396 de 2018 DIAN - Gravámenes Ad-Valórem aplicables a productos agropecuarios de referencia, sus sustitutos, productos agroindustriales o subproductos.

Fuente: http://201.217.193.253/labpalma/docs/circular_dian_3396_2018.htm

- CIRCULAR 3389 de 2018 DIAN - Gravámenes ad valorem aplicables a productos agropecuarios de referencia, sus sustitutos, productos agroindustriales o subproductos.

Fuente: http://201.217.193.253/labpalma/docs/circular_dian_3389_2018.htm