Doctoral Dissertation

Deforestation Driven by Agricultural Commodities and an Empirical Analysis of Policy Design

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Abstract

Between 1990 and 2015 Argentina lost 22.1% of its native forests -7,681,000 hectares- ranking 9th regarding forest cover loss on a global scale. The country is an exporter of agricultural commodities and the third largest soybean producer in the world, just below the United States and Brazil. Along with Brazil, Uruguay, and Paraguay, Argentina constitutes what is called the 'Soybean Republics': a term that refers to economies in which soybeans production plays a crucial role in earning foreign exchange income.

There is a consensus that the production of agricultural commodities is a driver of deforestation since it pushes the expansion of the agricultural frontier whereas global demand is risen and expected to rise more. Thus, for countries exporting forest-risk commodities -soy, palm oil, timber, and cattle- further developing of exports can be a strong driver for economic growth as well as deforestation. This forest conversion translates into the loss of the environmental services provided by forest (soil protection, greenhouse gases capture, and water regulation) with environmental, economic, and social consequences.

Although several policy actions have been implemented, deforestation is still a problem in Argentina and other agricultural forest-risk commodities producers. Preservation policies are not producing the expected outputs, except for a few successful cases at some places. Attempting to shed new light on the deforestation problem, this study focus on its main drivers: that is, the export of agricultural commodities.

The hypothesis is that the production of commodities is not taken into account in the design of Public Policies addressing deforestation. As a consequence, preservation policies do not produce the expected outputs. Thus, the main research question of this

study is “to what extent the production of forest-risk agricultural commodities is integrated into the design of forest protection policies?”

The methodology proposed comprise the elaboration of an Analytical Policy Framework and the search for references on the export of commodities, agricultural production, and expansion of the agricultural frontier through Content Analysis’ techniques. The Analytical Policy Framework provides a menu of policy options to address deforestation, organized according to whether they are public or private. In turn, Public Policies are classified into International Policies, Forest Policies in Forested Countries and Forest-Relevant Non-Forest Policies. Given that international markets significantly influence the production of agricultural forest-risk commodities and that private and public policy complement each other, demand-side measures targeting forest-risk commodities implemented through the supply chain are also incorporated into the framework

This research seeks to help in the better formulation of policies aimed at forest conservation and, although it is limited to the case of soy production in Argentina, the lessons of this study could provide insights into other cases of deforestation driven by the production of forest-risk.

This study concludes that Argentina acknowledges the production of agricultural commodities as deforestation drivers in the international policies addressing deforestation that it subscribes to. However, the content analysis conducted on the documents related to the country’s Forest Policy suggests that the Government has poorly integrated the export of commodities in the design of its forest protection policy. Beyond the results of the content analysis, the lack of implementation of the funding of the Forest Policy with the two percent (2%) of the total revenues of export taxes on agricultural products suggests a reluctant attitude of the Government towards integrating the production of agricultural commodities in its Forest Protection Policy.

On the contrary, forest protection policies implemented by International traders' firms involved in soybeans exports not only acknowledge the role played by commodities productions as a driver of deforestation but also integrate it in their sustainability policies. The extent of these efforts varies according to firm size and commercialized byproduct on the one hand, and country of operation on the other.

Finally, International and National Public Policies, targeting producers, and Demand-side measures, implemented throughout the supply chain, are complementary. A stronger acknowledgment of the linkages between the production of agricultural commodities and deforestation might allow for more effective public policies. Additionally, a closer collaboration with the private sector could enhance the enforcement of the Argentinean Forest Policy.

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To my family, who has encouraged me to do what I believe in, supported me in each one of my ventures, accepted the distances that they entailed, and cheered me up to do my best at this stage.

Declaration

I hereby declare that the contents of this work are the results of my own research, conducted under the supervision of Professor Yamazaki Keiichi, and that every source of information utilized in this paper has been properly acknowledged and referenced. Therefore I accept full responsibility for the contents of this work.

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List of Acronyms and Terms

2BSvs	Biomass Biofuels Sustainability voluntary scheme
ACA	Argentine Cooperatives Association
ADG	Aceitera General Deheza
ADM	Archer Daniels Midland Company
AFIP	Federal Administration of Public Revenue
CAIT	Climate Access Indicators Tool
CARBIO	Argentine Chamber of Biofuels
CDP	Carbon Disclosure Project
COFCO	China National Cereals, Oils and Foodstuffs Corporation
COP	Conferences of the Parties
EPI	Environmental Performance Index
FAO	Food and Agriculture Organization
FCPF	Forest Carbon Partnership Facility
FECNF	Fund for the Enrichment and Conservation of Native Forests
FIP	Forest Investment Program
GCF	Governors' Climate and Forests Task Force
GDP	Gross Domestic Product
GFW	Global Forest Watch
GHG	Greenhouse gas
GM	Genetically modified
GNI	Gross National Income
GPPS	Group of Producing Countries from the Southern Cone
HDI	Human Development Index
IADB	Inter-American Development Bank
IBAMA	Brazilian Institute of Environment and Renewable Natural Resources

IDB	Inter-American Development Bank
IFC	International Finance Group
IICA	Inter-American Institute for Cooperation on Agriculture
IFPRI	International Food Policy Research Institute
INDC	Intended Nationally Determined Contributions
INDEC	National Institute of Statistics and Censuses of Argentina
INTA	Argentinean National Institute of Agricultural Technology
IPCC	Intergovernmental Panel on Climate Change
ISCC	International Sustainability and Carbon Certification
KPMG	Klynveld Peat Marwick Goerdeler
LDC	Louis Dreyfus Company
MAGYP	Ministry of Agriculture, Livestock and Fisheries of Argentina
MAyDS	Ministry of Environment and Sustainable Development of Argentina
NDCs	Nationally Determined Contributions
NDPE	No Deforestation, No Peat, No Exploitation
NDVI	Normalized Difference Vegetation Index
NTB	Non-Tariff Barriers
OAS	Organization of American States
OECD	Organization for Economic Co-operation and Development
OTBN	Territorial Organization of Native Forests
PINBN	National Inventory of Native Forest of Argentina
PPP	Purchasing power parity
PSA	Payments for Environmental Services
PSE	Payment for Ecosystem Services
REAP	Reduced Emissions Agricultural Policies
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RTRS	Round Table on Responsible Soy

SAyDS	Secretariat of Environment and Sustainable Development
TRASE	Transparency for Sustainable Economies
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forest
WB	World Bank
WRI	World Resources Institute
WTO	World Trade Organization
WWF	World Wildlife Fund

Chapter 1 Introduction

According to Global Forest Watch, Argentina lost 234 thousand hectares of native forests in 2017, the equivalent of 31 soccer fields per hour. The country is an exporter of agricultural commodities and the third largest soybean producer in the world, just below the United States and Brazil. Along with Brazil, Uruguay, and Paraguay, Argentina constitutes what is call the 'Soybean Republics': a term that refers to economies in which soybeans production plays a crucial role in earning foreign exchange income.

There is a consensus that the production of commodities is a global driver of deforestation since it pushes the expansion of the agricultural frontier whereas global demand is rising and expected to rise more. This expansion translates into the loss of native forests and their environmental services (soil protection, greenhouse gases capture, and water regulation), which have environmental, economic, and social consequences.

Although several policy actions have been implemented, deforestation is still a problem in Argentina and other agricultural forest-risk commodities producers such as Brazil and Paraguay in Latin America; and Indonesia and Malaysia in Asia. Preservation policies are not producing the expected outputs except for a few successful cases at some places. Attempting to shed new light on the deforestation problem, this study focuses on its main drivers: that is, the export of agricultural commodities. In my understanding, very few studies exist that tackle policies addressing the conflict between production of agricultural commodities and environmental protection.

The hypothesis of this study is that the production of agricultural commodities is not taken into account in the design of public policies in Argentina to either reduce or eliminate deforestation. As a consequence, preservation policies do not produce the expected outputs. Thus, the main research question that guides this study is “to what extent the production of forest-risk agricultural commodities is integrated into the design of forest protection policies?” Besides elaborating on this, Chapter 1 also describes the objectives, significance and scope of the research.

1.1 Research Problem

In export countries of agricultural commodities, further developing of their exports can be a strong driver for economic growth. Although these economies rely on their natural resources to grow, environmental sustainability and economic growth quite often appear as seemingly conflicting goals (OECD, 2013; OECD-FAO, 2015). A central challenge for sustainability is how to preserve forest ecosystems and the services that they provide while enhancing agricultural production. This challenge for developing countries confronts the force of economic globalization, which seeks cropland that is shrinking in availability and triggers deforestation (Lambin & Meyfroidt, 2011). One case is in Argentina. In Argentina, the commodity sector has been one of the mainstays of the economy since the very beginning of the country, currently contributing around 63% of total foreign exchange earnings (INTA, 2016, p.20). In a context of growing demand of agricultural commodities, Argentina fuels its economic growth expanding the agricultural frontier at the expense of native forests (Bruinsma, 2009).

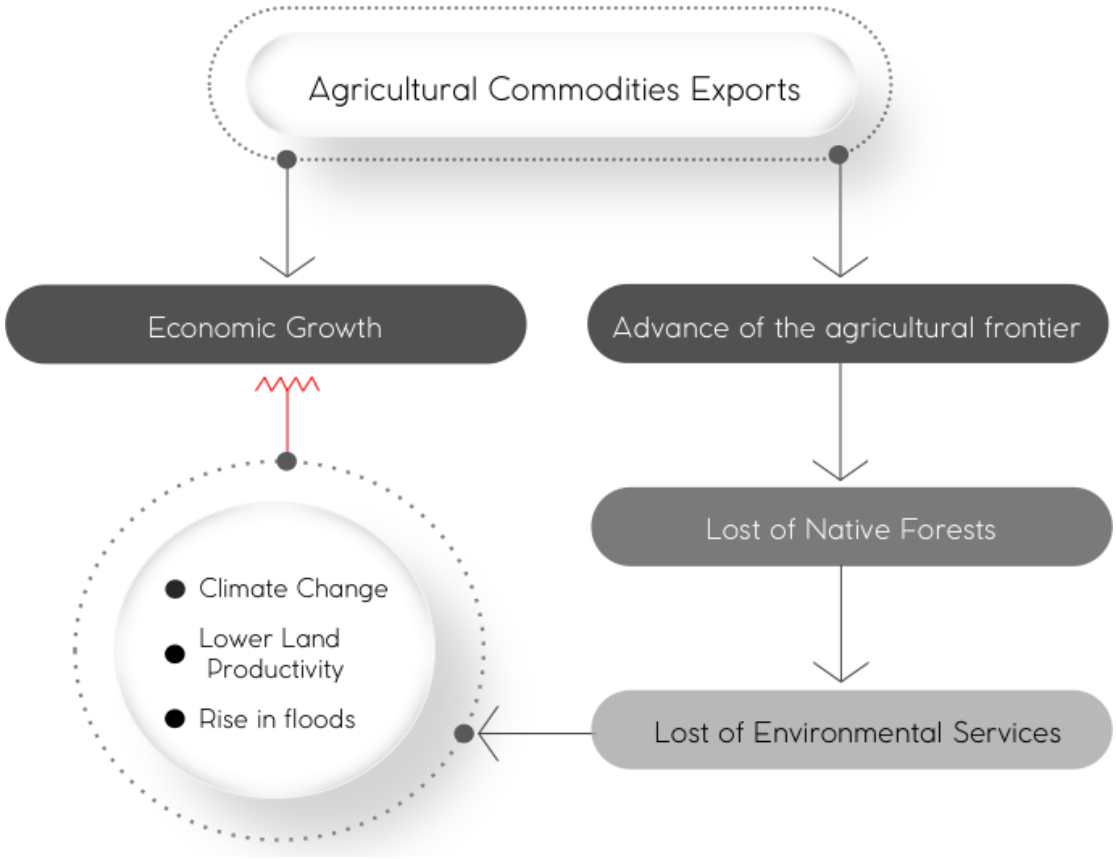
On this zero-sum game between agricultural expansion and forest loss, it is important to take into account what forests bring to this particular exchange. Forests provide environmental services -CO2 capture, water regulation, and soil protection- whose loss carry consequences such as climate change, the rise of floods, and diminished soil

productivity. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change reported that forestry, which includes deforestation, accounted for 17% of total global greenhouse emissions (IPCC, 2007, p.105). Moreover, agriculture explained around 80% of deforestation worldwide and in Latin America commercial agriculture accounted for approximately 2/3 of its entire deforested area (REDD+ Policymakers, 2012, p.5).

As for further proof of the consequences brought by environmental services loss, floods in Argentina are becoming more frequent and heavier in recent years, displacing vulnerable populations and causing the loss of entire harvests. As of 2016, floods were the event that most affected people and assets in Argentina, accounting for around 60% of natural disasters and almost 95% of the economic damage and population affected (WB, 2016, p.30).

Stating that economic growth is not decoupled from environmental degradation is not an outrageous claim. Still, the market fails to internalize the costs of producing commodities and policies set in place fail to deliver the expected outcomes. In my understanding, very few studies exist that tackle the direct conflict between economic growth and environmental protection, between agricultural exports and deforestation. The research problem of this thesis is illustrated by the conceptual map (Figure 1-1).

Figure 1-1: Research Problem - Conceptual Map



Source: Author's creation

1.2 Hypothesis

The hypothesis of this study is that the production of agricultural commodities is not taken into account in the design of Public Policies addressing deforestation in Argentina. As a consequence, preservation policies do not produce the expected outputs.

This hypothesis contrasts with the existing view that many environmental laws in Latin American countries are of global standard quality and that the problem is not with laws themselves, but with the actual implementation process, which suffers from chronic governance limitations. Indeed, we are living in the age of globalization where many regulations and laws are 'synchronizing' internationally thanks to thousands of international conferences held here and there around the globe every year to promote international standardization of laws and regulations. Our hypothesis is that, in contrast

with such a view, laws themselves are not sufficient in Argentina as far as forest conservation is concerned.

1.3 Research Questions

To tackle the hypothesis of this thesis, the main research question that guides this study is ***to what extent the production of commodities is integrated into the design of forest protection policies?*** To answer this, the following sub research questions were formulated.

I. To what extent International Deforestation Policies acknowledge the production of agricultural commodities as a deforestation driver?
II. To what extent the Argentinean Government has integrated the export of agricultural commodities in the design of its Forest Policy?
III. To what extent the top Commodities Exporters firms in Argentina integrate deforestation in their supply chain sustainability policies?

1.4 Research Objectives

Forest preservation policies do not produce the expected outputs; presumably as a consequence of not taking into consideration export commodities in its design. Thus, the research objectives of this study are to clarify to what extent:

I. Relevant International Policies acknowledge the production of agricultural commodities as a deforestation driver.
II. The Argentine Government has integrated the export of agricultural commodities in the design of its forest protection policy.
III. Top Commodities Exporters firms in Argentina integrate deforestation in their supply chain sustainability policies.

1.5 Significance of the Research

In terms of significance of the research, there are very few studies on how to effectively tackle export-commodities-driven deforestation; a challenge particularly acute for forest-risk-commodities producers such as Brazil and Paraguay. Markets do not internalize the environmental costs of producing commodities whereas public policies fail to deliver the expected outcomes. By shedding light on these issues, this research seeks to help in the better formulation of policies aimed at forest conservation. Moreover, the lessons of this study could provide insights into other cases of deforestation driven by the production of forest-risk commodities (soy, palm, timber, cattle, and cocoa).

1.6 Scope and Limitations of the Research

This study is limited to the case of Argentina and the production of soy. The country deforestation rates, combined with the significant participation of soybean in its exports, make it an archetypal case of deforestation driven by the production of forest-risk commodities. Taking into consideration the differences among countries and commodities, it might be possible to extrapolate conclusions on a larger scale.

Chapter 2 Literature Review

2.1 Introduction

This literature review briefly describes the importance of deforestation, the economics of deforestation, and some key policy issues. This chapter also introduces the concept of deforestation drivers, focusing on the production of agricultural commodities, including soybeans in particular.

Forests provide environmental services such as CO_2 capture, water regulation, and soil protection. When deforestation occurs, these services disappear and the environmental consequences of deforestation arise. Subchapter 2.2 elaborates on these consequences: climate change, floods and soil erosion.

In order to gain a deeper understanding of the economics behind deforestation, as well as some of the related key policy issues, deforestation will be analyzed through the Von Thünen model in subchapter 2.3.

For its part, subchapter 2.4 tackles the main driver of deforestation: the advance of the agricultural frontier to produce commodities. The relation between environmental concerns and trade will also be addressed. Additionally, deforestation drivers will be explained and classified. An analysis of the global impact that these drivers represent in term of forest loss and its trends will also be presented.

In subchapter 2.5 the impact of soybean production in terms of deforestation will be further explored. To better understand commodity-driven deforestation through the lens of this particular crop, the various usages of soybean as well as its trade will also be described.

2.2 Why deforestation matters

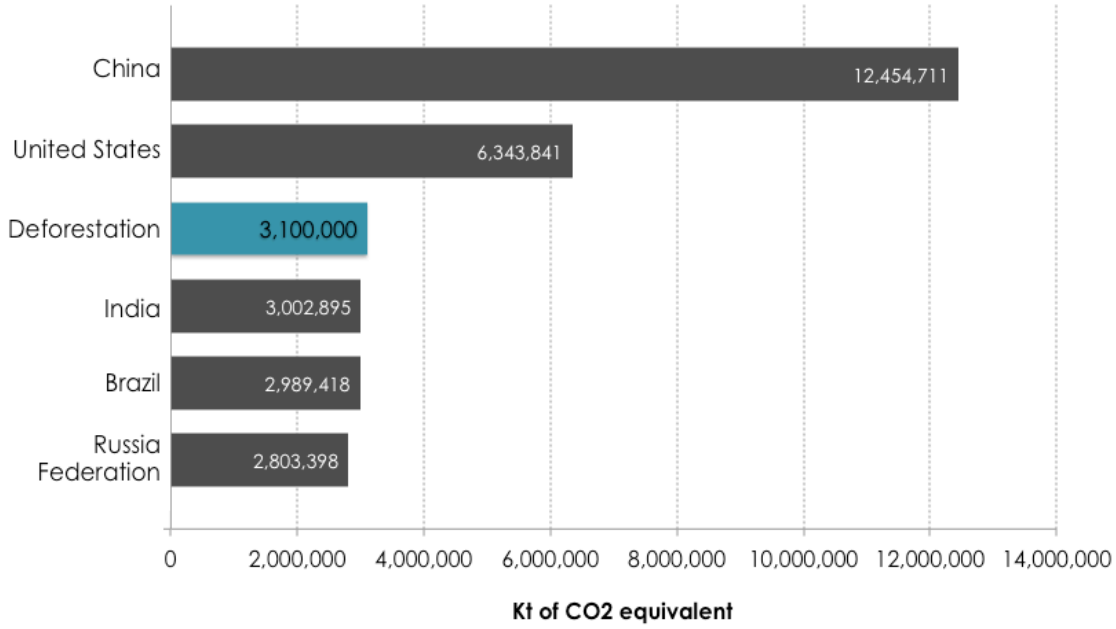
Forests cover around 40 million km2 -31% of the planet's land area– and are distributed unequally throughout the world: 31% in Asia, 21% in South America, 17% in Africa, 17% in North and Central America, 9% in Europe and 5% in Oceania (MAyDS, 2016, p.160; UN, 2015). On a fundamental level, regarding why deforestation matters, a possible argument is that this 31% of world forest-cover shelters around 300 million people and 80% of the world's terrestrial biodiversity (UN, 2015; Jenkins & Schaap, 2018; MAyDS, 2016, p.160). This argument alone provides a solid foundation for forest conservation on sanctuary-basis merit. Moreover, from an economic point of view, approximately 1.6 billion people depend on forests for their livelihoods (MAyDS, 2016, p.160; UN, 2015, p.1; UNFF, 2012, p.1).

Beyond the economic livelihood argument and its cultural and social implications, deforestation matters because forests provide environmental services: CO_2 capture, water regulation, and soil protection. Losing these services translate into climate change, the rise of floods and diminished soil productivity, having a direct impact on the quality of life and livelihood of people.

Forest acts as carbon sinks (MAyDS, 2016). Forest growth sequesters and stores carbon from the atmosphere, contributing to the regulation of the global carbon cycle and climate change mitigation (Jenkins & Schaap, 2018). The UN-REDD (2018) establishes that destroying tropical forest releases more carbon emissions than the entire global transport sector and second only to the energy sector. Moreover, forest loss, deforestation, and forest degradation account for 11% of the world's greenhouse gas (GHG) emissions (UN-REDD, 2016, p.1). Figure 2-1 shows the annual greenhouse gas emissions of the top five emitters countries -China, United States, Brazil, and the Russian Federation- and those that come from deforestation. If deforestation were a country, its emissions would be the third largest in the world

behind only China and the United States.

Figure 2-1: Annual Greenhouse Gas Emissions, 2012



Source: Author's elaboration based on data from Climate Watch (2018) and WB (2018c)

Moreover, as presented by Seymour & Busch (2018), although the participation of global emissions from deforestation has fallen over time, it is not because deforestation has diminished, but because the emissions from burning fossil fuels have risen more quickly.

Water regulation is another environmental service provided by forests. Water regulation stabilizes steam flow and water runoff, reducing the risks of natural disasters such as droughts, floods, and landslides (Jenkins & Schaap, 2018). On this regard, Jenkins & Schaap (2018) establishes that a healthy forest ecosystem provides a "green infrastructure" -opposite to a built infrastructure denominated "gray"- which can filter out water pollution, recharge aquifers, and absorb flooding. Moreover, Seymour & Busch (2016) notes that this "green infrastructure" save tens of millions of dollars by preventing sedimentation, which extends the lives of hydroelectric dams and irrigation

systems.

Finally, the last environmental service provided by forest comes in the form of soil conservation, which helps prevent land degradation and desertification (Jenkins & Schaap, 2018). This conundrum becomes especially significant given that worldwide 2.6 billion people directly depend on agriculture for their livelihoods (Jenkins & Schaap, 2018, p.8). In turn; agriculture is one of the major reasons for forestland conversion (MAyDS, 2016; WWF, 2014). As it is, 52% of the land used for agriculture is moderately or severely affected by soil degradation (Jenkins & Schaap, 2018, p.8). Which in turn diminishes or jeopardizes soil productivity and raises a plethora of problems for the agricultural sector. According to the World Resources Institute (2017), 30% of global forest cover was lost, 20% was degraded, and 35% was fragmented, leaving intact only 15%. To mitigate the damage, the UN Forum on Forests Secretariat estimates that achieving sustainable forest management on a global scale would cost US$70-$160 billion per year (UNFF, 2012, p.77; UN, 2015, p.2).

For these multiple reasons, forest preservation and responsible management are needed for achieving sustainable development. Luckily, there has been an increase of awareness and concern regarding deforestation and its mitigation. Concern that gave rise to the creation of analysis tools to approach the matter in a more comprehensive and encompassing way (WB, 2016). Among them, there is the Global Forest Watch -established by the World Resources Institute-, and the Environmental Performance Index (EPI), which was produced through the joint effort of Yale University, Columbia University and the World Economic Forum (EPI, 2018). The EPI ranks 180 countries on 24 performance indicators across various environmental and ecosystem categories; thus it establishes a scorecard that highlights who are the leaders and who are at the bottom in environmental performance (EPI, 2018). While fairly recent developments, still given the gravity of the matter, these tools and changes in

perspective are needed towards sustainably thwarting deforestation.

2.3 The economics of deforestation and key policy issues

The rapid conversion of forestland -whether it is on tropical-forest, dry-forest or savannas- is often associated with conversion to agriculture. Hence creating a situation regarding land allocation between competing alternative-uses; in this case agriculture and forest conservation. This dual competing usage of land lends itself to be analyzed through the von Thünen model.

In broad strokes, the Von Thünen model regards how land rent -demarcated by the distance from a commercial center (the city)- shapes land uses (Angelsen, 2007). Notwithstanding, as explained by Angelsen (2007), nowadays this approach has gotten a somewhat broader interpretation in the literature, taking it more into the lines of the study of locational aspects of land-uses, as determined by the land rent. The rent of alternative land-uses is determined by a number of factors that depend directly or indirectly on the location of the land: factors such as crop prices, input costs, available technologies, agro-ecological conditions, etc. (Angelsen, 2007).

In any case, the economics of land, as its starting point, that land is allocated to the usage with the highest land rent (surplus or profit). Thus, the key tenet is that land user -farmers, companies, etc.– clear the forest due to non-forest land usage is more profitable than forestland usage (yield higher land rent) (Angelsen, 2010). Much of the criticism that this approach receives is that it only contemplates two possibilities for land usage: agricultural and forest usage. In spite of this, this dual model serves as a starting point for an analytical comparison of land usage, and it's profitability. On first instance, the agricultural rent can be defined as:

$$r^a = p^a y^a - w l^a - q k^a - v^a d$$

Where the agricultural production per hectare (yields) is give (y^a). The produce is sold in a central market at a given price (p^a). The labor (l^a) and capital (k^a) required per hectare are fixed, with input prices being the wage (w) and annual costs of capital (q). Transport costs are the product of costs per kilometer (v^a) and distance from the center (d). In this scenario, the rent declines with distance. The agricultural frontier is delimited where agricultural expansion is not profitable anymore: $r^a = 0$, hence defined as:

$$d = (p^a y^a - w l^a - q k^a) / v^a$$

Before delving into the policies that can be extrapolated from this model, it is important to note that the Von Thünen's model classify agriculture as intensive (lowland) and extensive (upland or frontier); were intensive means "intensive" in productive inputs other than land (Angelsen, 2010). Policies that stimulate intensive agriculture can include credit programs, subsidized fertilizers and seeds, assistance in marketing, and agricultural extension programs (Angelsen, 2010; Rudel, 2009). These types of policies have been dubbed by Rudel (2009) as Reduced Emissions Agricultural Policies (REAP) since they have highly likely scenario for positive forest conservation outcomes. Notwithstanding, as Angelsen (2010) points out, it has some notorious short sights if the dominant crop is traded internationally, then the higher profits can be used to extend the crops to new land for higher production, which in turn favor forest loss.

Finally, if the sole scenario were to stop deforestation, keeping agricultural rents low would be an effective policy (Angelsen, 2010). Wunder (2003) refers to this as "the 'improved Gabonese recipe' for forest conservation," where taxation of export agricultural products would run rampant, investing in rural roads would be nonexistent, and support for smallholders would be scant. While ideal for forest protection,

Angelsen (2010) points out that it is not compatible to reducing poverty and boosting - or having at all- agricultural production.

For its part, forest rent reflects the different nature of the diverse products and services that can be generated by standing forest. Angelsen (2010) distinguishes between three main types: private forest products (extractive forest rent), local public goods, and global public goods (protective forest rent). The first category refers to products such as timber and the diverse range of products that can be extracted from the forest. The second category, encompass water catchment and pollination services. The third category covers biodiversity maintenance and carbon sequestration and storage. Overall, forest rent can be defined as:

$$r^a = (p^t y^t - w l^t - q k^t - v^t d) + p^l y^l + p^g y^g$$

The extractive rent, r^a, increases due to higher timber and non-timber forest products prices (p^t); technological progress (y^t, l^t, k^t); and lower labor (w), capital (q), and transport (v^t) costs. Higher values of local (p^l) and global (p^g) forest public goods increase the overall forest rent further and should lead to put less forest under agricultural use. However, such an outcome depends critically on that rent being captured by the actual land users, as returned to below (Angelsen, 2010).

As for policies regarding the forest, increasing forest rent would be one option. Forest rent can be influenced through tax policies and marketing arrangements that affect prices of timber and other forest products or through the promotion of new technologies (Angelsen, 2007; Angelsen, 2010). In this regard, we see an increased awareness in consumers for eco-friendly products nowadays; this can be used as an advantage by stimulating a higher demand for limited supplies of forest products and gives time for the forest to regrow and stabilize (Angelsen, 2010). Moreover, diversification of forest

products extracted can also be favorable to increase its profitability without having to depend exclusively on motorized agriculture (Angelsen, 2010).

Historically the forest rent was capitalized by extractive activities and its rent was linked with the scarcity of products (Angelsen, 2010). Nowadays, the paradigm has shifted and continues to shift. Adopting policies that seize protective forest rent could be a way of generating a higher profitability without depending solely on forest extraction (Angelsen, 2010; Angelsen, 2007). For this to work, establishing systems for payments of environmental services (PSE) would be required. Because of its public goods nature, an increase in the protective rent has no impact on deforestation, unless land users can capture some share of it (Angelsen, 2010). In this regard, Angelsen (2010) further mentions two ways for internalizing the externalities: i) moving decisions to a higher scale and ii) creating a market for the public goods. Assigning individual property rights would be a step toward establishing comprehensive PSE and, furthermore, it could change the mentality of people regarding forest conservation, seeing it not only as environmental responsibility but also as a profitable investment (Angelsen, 2010).

2.4 Main drivers of deforestation: agriculture and trade of commodities

Forest ecosystems remain under constant danger (MAyDS, 2016) and environmental concerns have also grown exponentially in recent years (IFPRI-IICA, 2017). In an effort to understand and correct the course on this detrimental forest trend, researches and studies have pointed towards the advancement of the agriculture frontier as a major reason for the current rates of deforestation (MAyDS, 2016; WWF, 2014; Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). More importantly, this wave of concern and research has played a significant role in agricultural trade (IFPRI-IICA, 2017; IFPRI, 2017). We can see this in the initiation of processes to create environmental standards

that restrict food imports (for example, the European Union) after the Paris Agreement (COP21), where GHG emissions were deemed as major concerns affecting agricultural production (IFPRI-IICA, 2017). Similarly, recent G20 meetings have incorporated environmental concern as a major agenda item. Nevertheless, as explained in the Agricultural Trade Interests and Challenges at the WTO Ministerial Conference (2017), for these concerns to be included in the WTO trade negotiations, issues such as the difference in carbon footprint for different products and processes are to be addressed first.

Regardless, the fact that they are now part of the agenda is a big step towards reaching favorable solutions; especially since it is estimated that 80% of deforestation worldwide (REDD+ Policymakers, 2012, p.5). From this statistics, commercial agriculture is the largest culprit accounting for 33%-49% of deforestation (Henders, Persson, & Kastner, 2015, p.10). In Latin America the picture becomes grimmer, since commercial agriculture accounts for around 68% of deforestation (Hosonuma, et al., 2012, p.5; REDD+ Policymakers, 2012, p.5). For this matter, addressing forest conservation while ignoring the global supply and demand aspect of the trade would be reductive and futile. Moreover, they are two different sets of drivers whose inputs and outputs act and react in an array of different ways.

Drivers of deforestation and forest degradation may be separated in two tiers: Proximate or Direct and Underlying or Indirect. The first category encompasses the human activities and actions that directly impact forest and result in loss of carbon stocks (Henders, Ostwald, Verendel, & Ibisch, 2018). Land conversion to agriculture can be classified in this tier of drivers. Locally effective measures to address this drivers can be found in land use regulations, logging bans, or incentives for conservation (Henders, Ostwald, Verendel, & Ibisch, 2018; Lambin E. , et al., 2014). Underlying or indirect drivers refer to the intricate interactions of political, social,

economic, cultural, and technological processes that influence and exert pressure on the proximate drivers (REDD+ Policymakers, 2012). As explained further in the report, this second category of drivers -where global demand for commodities makes a niche- act on multiple scales: international (markets, commodity prices), national (population growth, domestic markets, national policies, governance) and local circumstances (subsistence, poverty). Regarding the influence and impact of macro-economic factors on the direct drivers, it is worth mentioning that they can undermine the outcomes of policies addressing direct drivers, or even displace the land conversion to previously unaffected land, creating a leakage effect (Meyfroidt, Lambin, Erb, & Hertel, 2013; Gasparri, Grau, & Gutiérrez Angonese, 2013).

The REDD+ Policymakers report (2012) conveys a keen concern regarding international drivers and its pressure on deforestation. The report paints a bleak scenario where the continued rise of global urbanization, long-term population trends, growth in developing countries regional markets for key commodities, and increasingly meat-based diets are expected to increase and thus take a significant toll on forest loss (REDD+ Policymakers, 2012). Regardless of the detrimental impact on forest coverage, it is undeniable that these international factors present fruitful venues for potential economic growth. In the past, in order to capitalize them, local governments had put in place instruments -provision of cheap credit, easier access to land titles after forest clearing or road investment- supporting economic growth based on the export of primary commodities and agricultural products (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010; REDD+ Policymakers, 2012). These actions further cemented these indirect drivers as major players (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010; REDD+ Policymakers, 2012).

As of the year 2000, the croplands dedicated to the production of agricultural export commodities accounted for at least 20% of global harvested land (MacDonald, et al.,

2015, p.278; Kastner, Erb, & Haberl, 2014, p.4). Among the commodities that have a steadfast dominion on this matter we find soybean, timber, meat and palm oil. Between the years of 2010 and 2011, the production of these commodities alone, account for over 40% of total tropical deforestation (Henders, Persson, & Kastner, 2015, p.8). To better understand how soybeans became such a dominant crop, the following paragraphs will address its specifics.

2.5 Soy, soy production, soy trade, and deforestation

Many factors have to arise for the transformation of a region's landscape: technological innovation, favorable climatic conditions, availability of land and labor, agricultural commodity prices, and demand (Zak, Cabido, & Hodgson, 2004; Lambin, et al., 2013). In this regard, there has been a significant change in the agricultural landscape of the southern cone of Latin America in recent years; this change takes the form of a product that has emerged at a rapid pace: soy.

The global demand for soy weighs heavily, and it has been on the rise for the last 50 years (WWF, 2014), a trend that shows no sign of stopping since it is predicted to continue to rise (OECD-FAO, 2017). In China alone -the largest soy consumer in the world- soy consumption doubled over from 25.7 million tons in 2000 to 55 million tons in 2009 (WWF, 2014, p.30). By 2015 Chinese soy imports represented about 65% of the global soy trade, with imports supplying about 85% of soy consumption in the country (CDP, 2017a, p.3). Likewise, studies and researchers have predicted that this trend will continue.

Production in the last 50 years has expanded in a tenfold, reaching productions from 27 to 269 million tons (WWF, 2014, p.10). For the specific case of South America, between 1996 and 2004 soy production rose around 123% (WWF, 2014, p.20).

Currently, soy production is highly concentrated in certain countries. For example for the year of 2012, approximately 270 million tons of soy were produced; of which 93% came from only six countries. They are Argentina, Brazil, China, India, Paraguay, and the USA (WWF, 2014, p.14).

Based on the data from the WWF report (2014), Table 2-1 shows a rather comprehensive picture of the global trade that goes around the globe regarding soy for the year of 2014. Even though it has unquestionably changed from that period to current years, it has not had significant variations.

Table 2-1: Global soybean trade in 2012

Global

Production	240 Mt.
Consumption	260 Mt.
Comercialized volumes	161 Mt.

***Million metric tons**

United States		UE27		China	
Production	84,2 Mt.	Production	1,3 Mt.	Production	13,8 Mt.
Consumptior	37,0 Mt.	Consumptior	34,7 Mt.	Consumptior	72,1 Mt.
Import	0,8 Mt.	Import	35,1 Mt.	Import	60,8 Mt.
Export	47,9 Mt.	Export	1,7 Mt.	Export	2,7 Mt.

Argentina		Brazil		India	
Production	40,1 Mt.	Production	66,8 Mt.	Production	10,6 Mt.
Consumptior	6,5 Mt.	Consumptior	18,6 Mt.	Consumptior	7,7 Mt.
Import	0,0 Mt.	Import	0,2 Mt.	Import	1,3 Mt.
Export	37,8 Mt.	Export	52,9 Mt.	Export	4,1 Mt.

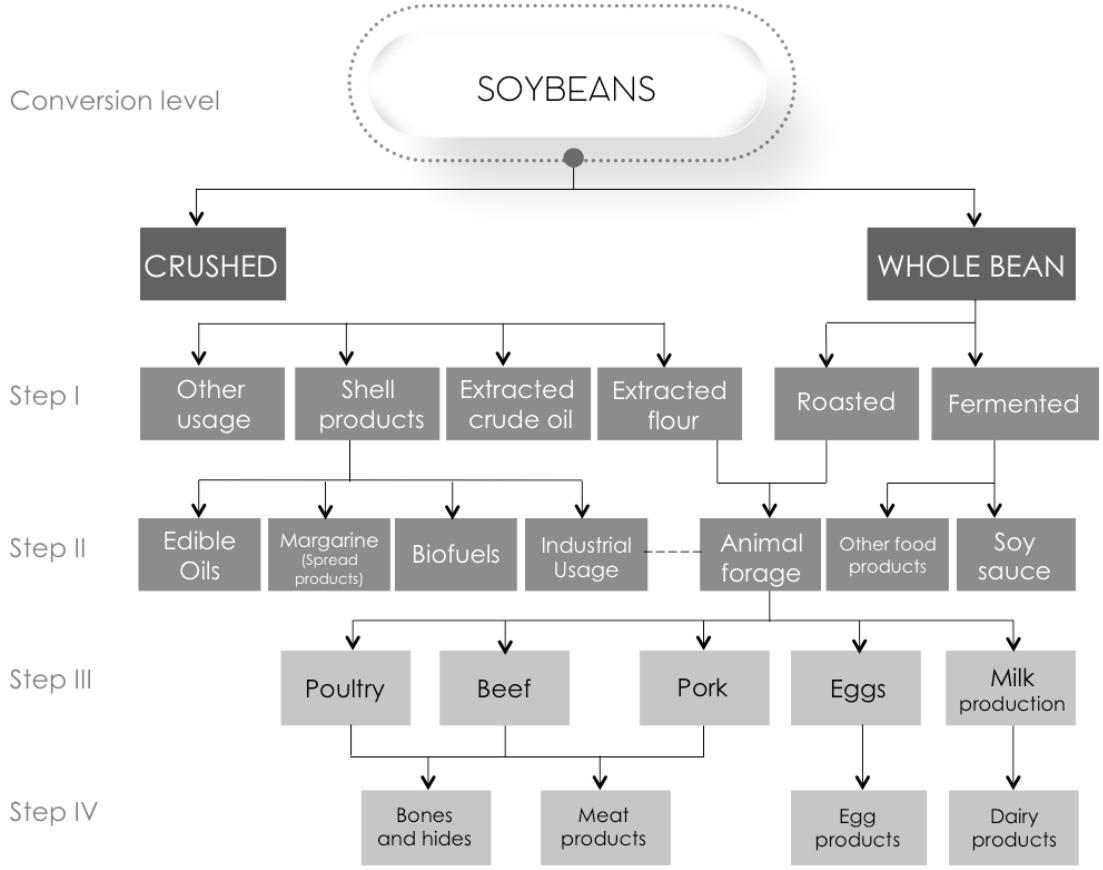
Source: Author's elaboration based on data from WWF (2014, p. 26)

Overall, throughout the last two decades, soybean has had the largest expansion of any other global crop, a trend that stresses the need for land and thus threatening forests and other critical natural ecosystems (WWF, 2014). To put into perspective as of how much land is needed for soybean production, as of 2014, the area destined for

soy production covered more than one million km2, the equivalent of France, Germany, Belgium, and Netherlands combined (WWF, 2014, p.10). As of now, millions of hectares of forests, pastures, and savannahs have been turned into agricultural land, directly or indirectly, as a result of the global boom in soybean production (WWF, 2014).

But how come soy became such a dominant crop? It is not part of the daily diet of most of the world and, in spite of the growth in recent healthy-food fads, it could not be responsible for such global demand. While that reasoning could be somewhat correct, encasing soy to only such usage would be beyond reductive. While soy for direct human consumption surmounts about 6% of soybean production (WWF, 2014, p.15), much of the 'wonder' of this crop comes from its arrange of usages. It is highly likely that upon going to the supermarket, regardless of the food selection, a soy-based product would be in the mix; that is due to the fact that products derived from soy are a highly common ingredient in processed food that range from chocolate bars to meat. The highest usage for soy comes from the animal kingdom. Soy used for animal fodder -especially poultry and swine-, surmounts about three fourths of the world soybean production (WWF, 2014, p.4). In this regard soy is a critical component in the model of industrial agriculture (WWF, 2014). Moreover, one of the most recent usage -still a small proportion on a global scale- is biodiesel. Regardless of the current low level of production, in a rapidly evolving world with increasing concerns for cleaner energy, soy-based biofuel is predicted to increase (Laborde, 2011). Figure 2-2 shows the multiple products and conversions levels soybeans go through.

Figure 2-2: Products derived from soy



Source: Author's elaboration based on data from WWF (2014, p.16)

To further analyze policies regarding deforestation, an Analytical Policy Framework will be presented in the following chapter. Additionally, the research tools employed in this thesis, as well as a brief description of how the methodology will be applied to answer the research questions will be described.

Chapter 3 Methodology

3.1 Introduction

The methodology proposed to answer the research question "*to what extent the production of forest-risk agricultural commodities is integrated into the design of forest protection policies?"* comprise the elaboration of an Analytical Policy Framework and the use of the research tools provided by Content Analysis.

The first challenge when addressing the research question is to identify the policies to be analyzed. Based on a literature review, an Analytical Policy Framework is built to provide a menu of policy options to address deforestation. This framework organizes the policies according to whether they are public or private. In turn, Public Policies are classified into International Policies, Forest Policies in Forested Countries and Forest-Relevant Non-Forest Policies. Given that international markets significantly influence the production of agricultural forest-risk commodities, demand-side measures targeting forest-risk commodities implemented throughout the supply chain are also incorporated into the framework. Subchapter 3.2. contains a brief description of each policy option.

The Analytical Policy Framework is utilized to identify the policies set in place in Argentina whereas the content analysis serves to analyze them. Subchapter 3.3 presents a brief explanation of Content Analysis and a description of the terms employed in this research.

To identify the policies to be analyzed according to the scope of this study, the following criteria are applied to the policy options of the Analytical Policy Framework:

- Policies should have the explicit aim to regulate, reduce or eliminate deforestation.
- Policies should apply to the Argentinean case.
- Policies should be compatible with sustained commodity production.

Subchapter 3.4 details how the methodology is applied for tackling each of the sub research questions. To answer first one -to what extent International Deforestation Policies acknowledge the production of agricultural commodities as a deforestation driver?- an in-depth literature review of the UNFCCC process, as well as its "protocols" or "Agreements" will be conducted. To answer the second sub research -to what extent the Argentinean Government has integrated the export of agricultural commodities in the design of its forest policy?- a search for references on the export of commodities, agricultural production, and expansion of the agricultural frontier will be conducted in the documents that comprise the Argentinean Forest Policy. To address the third sub research questions -to what extent the top Commodities Exporters firms in Argentina integrate deforestation in their supply chain sustainability policies?-, the sustainability policies of the Argentinean lead soy traders of soy will be analyzed. The results of the analysis is detailed in Chapter 4.

3.2 Analytical Policy Framework

Policies are the set of objectives, decisions, and actions carried out by a government (for the case of the public sector) or stakeholder to solve the problems considered to be priorities -by the citizens, government, or the actors involved- at a given moment (Tamayo Sáez, 1997; Oslak & O´Donnell, 1995). Tamayo Sáez (1997), also mentions that the process or cycle of construction of the policies comprises the following phases:

a) Identification and definition of the problem.
b) Formulation of alternative solution.

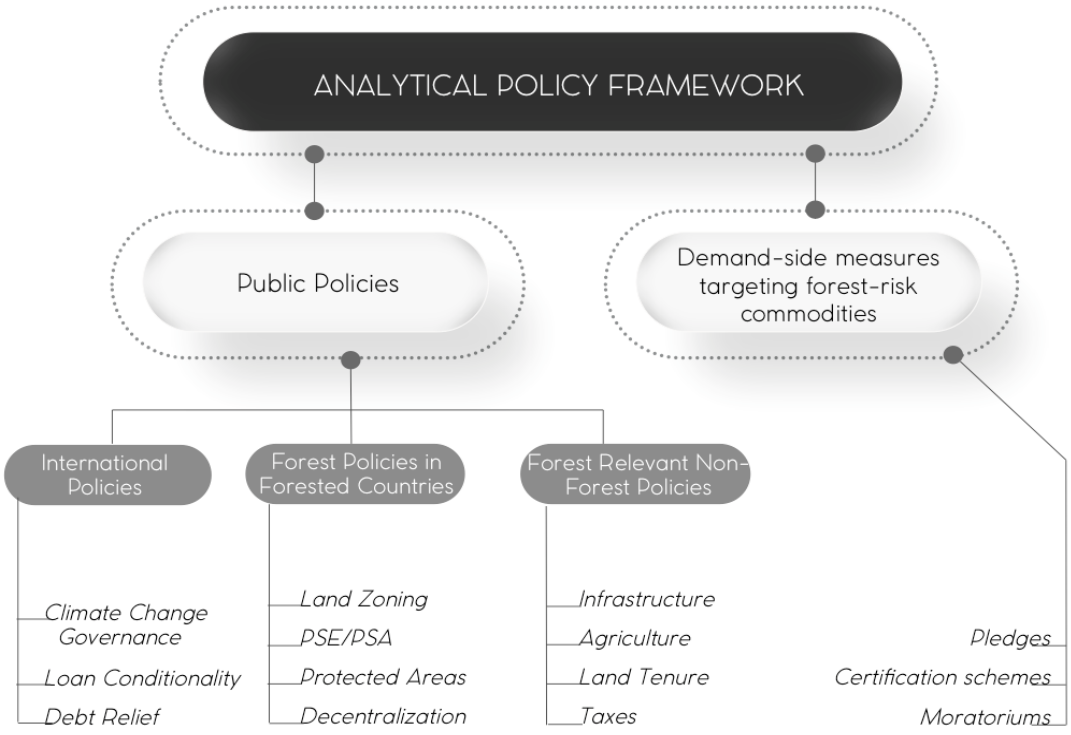
c) Implementation of the selected alternative.

d) Evaluation of the results obtained.

In this way, we can define policy as the aforementioned set of decisions and actions undertaken by a governance body to influence a problem. It is worth mentioning that, the cycle or process of policies is a conceptual framework that helps guide the process, yet often times some policies alter the order of said cycle (Tamayo Sáez, 1997).

Based on this definition and the literature review done for this paper, the following Analytical Policy Framework was created, organizing policy options according to Public policies and Demand-side measures targeting forest-risk commodities. The first ones are also classified into International Policies, Forest Policies in Forested Countries, and Forest-Relevant Non-Forest Policies. Figure 3-1, shows the main categories of the framework that will be further explored in the following paragraphs.

Figure 3-1: Analytical Policy Framework



Source: Author's creation based on Angelsen (2010), Pfaff et al. (2010) and Henders et al. (2018)

The following paragraphs present an analysis and an explanation of each set of policies organized through the Analytical Policy Framework.

3.2.1 Public Policies

Public Policies are classified into International Policies, Forest Policies in Forested Countries and Forest-Relevant Non-Forest Policies. Hereafter a brief description of each one.

3.2.1.1 International Policies

International Policies intended to address deforestation are contained in the climate change governance, loan conditionality, and debt relief.

i. Climate Change Governance

The United Nations Framework Convention on Climate Change (UNFCCC) is the leading space to discuss and coordinate climate change policies. The UNFCCC is an international environmental treaty adopted in 1992. Its primary objective was to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system (UNFCCC, 1992). The framework outlined how specific international treaties -called 'protocols' or 'agreements'- may be negotiated to specify further actions toward the reduction of GHG (UNFCCC, 1992). While a cornerstone of Climate Change policies, it is important to mention that this framework was established more so as a 'gentleman's pact', since it is a nonbinding agreement between countries and contained no enforcement mechanisms (UNFCCC, 2018a).

Since 1994, the parties to the convention have met annually in the Conference of the Parties (COP) to assess progress in dealings with climate change (UNFCCC, 2018a). Moreover, the UNFCCC Secretariat joined efforts with the Intergovernmental Panel on Climate Change (IPCC), an intergovernmental scientific body assessing scientific and technical information produced worldwide relevant to understanding climate change

(IPCC, 2018). The scientific evidence brought up the IPCC's 4th Assessment Report, launched in 2007, brought to light the fact that forest destruction accounted for 17% of the total global GHG emissions (IPCC, 2018; IPCC, 2007, p.105); it paved the road for the 2007 Bali Roadmap.

In 2007, in an attempt to escalate Climate Change efforts, Governments adopted the 'Bali Roadmap', which consisted of a number of forward-looking decisions essential to reach a secure climate future (UNFCCC, 2018b). This Road Map included the Bali Action Plan, which charted the course for a new negotiating process under the UNFCCC (UNFCCC, 2018b). This Action Plan was divided into five main categories: shared vision, mitigation, adaptation, technology, and financing (UNFCCC, 2018b). Arguably, this action plan laid the groundwork for the REDD+ programme. In this action plan, parties agreed to further address the reduction of emissions from deforestation and forest degradation in developing countries (REDD) (UNFCCC-REDD+, 2018). Nevertheless, it is also worth mentioning that, in spite all this, the Bali Action Plan does not define or list developing countries.

While gaining notoriety in the Bali Roadmap, the REDD proposal was first considered by the COP in 2005 (UNFCCC, 2018c). With the growing concern of UNFCCC to identify the drivers of deforestation, the REDD initiative started gaining support (UNFCCC, 2018c). The UNFCCC began to address the scientific, technical, and methodological issues relating to estimating and monitoring emissions from deforestation as well as the costs and technical barriers for the implementation of activities to reduce deforestation (UNFCCC, 2018c). In this context, the COP started encouraging developing country parties to contribute to the mitigation actions in the forest sector by undertaking the following activities: i) reducing emissions from deforestation, ii) reducing emissions from forest degradation, iii) conservation of forest carbon stocks, iv) sustainable management of forest, and v) enhancement of forest

carbon stocks (UNFCCC-REDD+, 2018). All these ended up becoming the REDD+ Programme: a climate change mitigation program that incentivizes developing countries to keep their forests standing by offering results-based payments for actions to reduce or remove forest carbon emissions (UN-REDD, 2018).

As for the technicalities of the programme, we can split them in two fronts: the actions of the developing countries and the actions of the developed countries. For the developing country parties who wish to subscribe to the REDD+, there are certain documents required to elaborate (see Table 3-1) (UN-REDD, 2018). The implementation process varies from nation to nation, based on each country's circumstances, capabilities and the level of support received (UNFCCC-REDD+, 2018). For such matters, the programme can be implemented in three phases: 1. Development of national strategies or action plans, policies and measures, and capacity building; 2. Implementation of national policies and measures and national strategies or action plans and; 3. Results-based actions that should be fully measured reported and verified (UNFCCC-REDD+, 2018). As for the parties in the position to assist, they are encourage to provide technical assistance, facilitate technology transfer, help on the estimation of emissions from deforestation and forest degradation, or provide other supporting tasks depending on each country's case (UNFCCC-REDD+, 2018). Another essential aspect that REDD+ Programme brings to the table is the inclusion of relevant actors, such as international organizations and stakeholders to contribute to the implementation of REDD+ activities (UN-REDD, 2018).

As of now, REDD is generally regarded as the leading vehicle for forest conservation. For its part, international organizations such as UNDP, UNEP, FAO, the World Bank, the Inter-American Development Bank (IDB), the Forest Carbon Partnership Facility (FCPF)[1], the Forest Investment Program (FIP) and the Governors' Climate and Forests

[1] The Forest Carbon Partnership Facility is a global partnership of governments, businesses, civil society, and Indigenous Peoples focused on reducing emissions from deforestation and forest degradation, forest carbon stock

Task Force (GCF)[2] support the UN-REDD initiative (UN-REDD Programme, 2012). There is also involvement of other actors in forms of bilateral cooperation such as the Governments of Norway, Germany and the United States (UN-REDD Programme, 2012).

Table 3-1: REDD+ Developing Country Parties requested elements

No.	Documents
1	National Strategy or Action Plan
2	National forest reference emission level and/or forest reference level or, if appropriate, as an interim measure, subnational forest reference emission levels and/or forest reference levels.
3	A robust and transparent national forest monitoring system for the monitoring and reporting of REDD+
4	A system for providing information on how REDD+ safeguards are being addressed and respected throughout the implementation of REDD+ while respecting sovereignty.

Source: Author's elaboration based on data from UNFCCC-REDD+ (2018)

In 2015, the members of the UNFCCC signed the Paris Agreement, a milestone in terms of global efforts to respond to climate change (UNFCCC, 2018d). The most significant aspect of this agreement is that it requires the parties to submit their Intended Nationally Determined Contributions (INDCs). The INDCs of a country comprises the actions to be taken to reduce its greenhouse gas emissions and establish their target level (UNFCCC, 2018d). The INDCs serves to align local policies with international policies on the matter and to report on the progress within a common

conservation, the sustainable management of forests, and the enhancement of forest carbon stocks in developing countries (activities commonly referred to as REDD+) (FCPF, 2017). It assists countries in their REDD+ efforts by providing them with financial and technical assistance in building their capacity to benefit from possible future systems of positive incentives for REDD+ (FCPF, 2017).

[2] The Governors' Climate and Forests Task Force was founded in 2008 and since its first meeting in 2009 the GCF Task Force has expanded its reach to include jurisdictions from ten countries Brazil, Colombia, Ecuador, Indonesia, Ivory Coast, Mexico, Nigeria, Peru, Spain, and the United States (GFC, 2018). It provides a platform to advance subnational policy innovation and leadership, ongoing engagement and collaboration with public and private sector stakeholders at multiple levels, and pathways to effective national and international approaches to REDD+ and low emissions development (GCF, 2018).

framework. These INDCs became Nationally Determined Contributions (NDCs) once a country ratifies the agreement (UNFCCC, 2018d). Argentina ratified the Paris Agreement in 2016.

ii. Loan Conditionality

Conditionality loans attach specific reforms to lending from governments and multilateral financial institutions and have become increasingly popular within forestry in recent years (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). Likewise, for the specific case of environmental issues, when the interest of lenders and local stakeholders were aligned this strategy can be successful (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010).

iii. Debt Relief

An important factor to take into consideration is foreign debt. The restrictive nature of foreign debt may lead governments to exert pressure on economically profitable investments such as agriculture commodities -through taxes on agricultural exports-, thus encouraging deforestation (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). In this regard, Deacon (1997) deemed the transactions between parties to enable conservation or the provision of environmental services as “debt-for-nature swaps.” In this case, establishing a conservation trust fund (with the debtor nation) with “debt-for-nature swaps” could be an effective attempt to diminish the international debt in consistency with forest protection (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). Nevertheless, the nature of debt and debt relief is complicated; it involves a possible never-ending circle of trade at the expenses of deforestation. Moreover, Pfaff et al. (2010) reference Sheikh CRS Report for Congress in 2006, which propose that clear causal links are difficult to establish between debt reduction and lower resource extraction since many factors drive forest loss.

3.2.1.2 Forest Policies in Forested Countries

As expressed by Pfaff et al. (2010), various initiatives on a national and subnational level have been established to protect forested areas; yet typically the objective has been only partially achieved. Policies to address deforestation encompass land zoning, payment for environmental services, protected areas and decentralization.

i. Land Zoning

Land use zoning refers to the delimitation of areas for different land uses. Generally speaking, they are implemented by the enactment of regulatory laws that divide the territory into delimited protected areas and limited forest conversion areas for sustainable uses (Lambin E. , et al., 2014; Cambas Sans, Aguiar, Vallejos, & Paruelo, 2017). To meet their goals, mechanism including subsidies, tax credits and sanctions are employed for their enforcement (Cambas Sans, Aguiar, Vallejos, & Paruelo, 2017).

ii. PSE/PSA

Payment for Ecosystem Services (PSE), also known as Payment for Environmental Services (PSA), rewards landowners for protecting ecosystem services such as water quality, species habitat or carbon storage (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010; WWF, 2014). It can help the restoration of natural vegetation and to balance the conversion of forest into agricultural production (WWF, 2014). Likewise, for landowners who grow crops for their consumption, REDD policies can improve their status since these benefits can be on the order of several months of agricultural returns (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010; Köhlin & Amacher, 2005; Köhlin & Parks, 2001). In this regard, PSE schemes can bring forest conservation and adaptation benefits for their users.

iii. Protected Areas

As for forest conservation policies, protected areas are the most common and explicit form, yet there is a question regarding how effective they are. As Pfaff et al. (2010) notes, protected forest areas tend to be on land with low threat of deforestation to begin with, thus having little impact on the expected outcomes from the conservation policy. Joppa & Pfaff (2009) further points out that, generally speaking, national protected areas are often unrepresentative of national lands. Which further drives the point that, in general terms, protected forest land differ from the type of land that would be used for conversion purposes (Joppa & Pfaff, 2009).

iv. Decentralization

As Pfaff et al. (2010) states, in most tropical countries the forests are owned by the state, which leaves the millions of people living in these forests with no legal right to the forests. This situation leaves as sole authority regarding forest usage a State entity that dictates the usage of the forest -zoned as timber, agricultural concession, public parks, conservation areas, etc.- (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). This situation is referred to as the 'tragedy of the commons'. The tragedy of the commons alludes to transferring property rights from traditional user groups to others, eliminating the incentives to partake in restrained use or monitoring, and become more of poachers rather than protectors. In this regard, decentralization could be a good option for reducing forest degradation. Nevertheless, for it to work, certain key aspects should be addressed: financial incentives for forest protection, transparency and accountability of local institutions, secure ownership rights, and support of central state authorities for managing their lands (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010).

3.2.1.3 Forest Relevant Non-Forest Policies

Infrastructure policies, agricultural policies, land tenure regimes, and taxes might shape deforestation in a given country.

i. Infrastructure Policies

Recent studies have proved that change in transport infrastructure affect deforestation (Sills & Caviglia-Harris, 2009; Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). In general terms, construction of new roads provides market access, lowers transport cost, opens new areas, and often leads to both more economic output and increased deforestation (Angelsen, 2010; Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). Moreover, according to Angelsen (2010), no forest conservation policy can be considered comprehensive, unless it provides clear guidelines on investments in transportation infrastructure.

Agricultural usage is the main reason for forest conversion. Feasibility of transport and its cost increase net revenues from outputs and lower costs of inputs from labor to fertilizers (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). In comparison with forest usage, most often than not, agricultural land usage is more profitable (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010).

ii. Agricultural Policies

In a general term, tropical deforestation is driven by agricultural land demand (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010; Angelsen, 2010; UN-REDD, 2016), hence the need to revise agricultural policies and its intricacies (Agrimonitor-IADB, 2014; Agrimonitor-IADB, 2016; Agrimonitor-IADB, 2013).

If we applied the Von Thunen model to evaluate the value of the land in terms of its returns, investment decisions towards agricultural profitability will be regarded together with policies that affect factors such as technology and infrastructure -including the

policies for credit, titling rules, tenure security, etc. (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010; Angelsen, 2010). In general terms, agricultural profit rises with prices of outputs and falls with prices of inputs (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010).

On a first instance, there are the policies for outputs. Reducing output prices via economic recession, overvaluation of exchange rates, and conflict is the clearest route to reducing deforestation (Fearnside, 2005; López & Galinato, 2005); yet for obvious reasons, it is not a very feasible option.

On the other hand, there are policies that affect inputs. Policies that promote more accessible credit will lower the costs of agricultural production, increase its profitability and the derived demand for agricultural land (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). Policies such as tariffs and subsidies affect the influx and usage of inputs such as fertilizer and chemicals also determine profitability (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). Finally, the two primary inputs in agricultural production are land and labor; it means that the usage of agricultural land is heavily influenced by tenure and taxation policies (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010).

iii. Land Tenure

"Squatters rights" are tenure regimes in which those who clear forest acquire title of the land (Fearnside, 2003). Some could see this type of land tenure as a 'win-win' situation. Regardless of the likelihood of the clearing being productive or not, this type of land tenure provides the possibility of acquisition of title, facilitating credit and/ or future resale and thus encouraging deforestation practices (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). However, research has shown that investment in development of forest capital tends to shy away from areas with insecure property rights and lack of government enforcement (Wibowo & Byron, 1999; Barbier &

Burgess, 2001; Bohn & Deacon, 2000). Incentive for long-term sustainable management diminishes as well since there is good reason to fear the risk of losing forestland through expropriation (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010).

iv. Taxes

Pigouvian taxes seek to correct a negative or positive externality. The effect of the tax is to ensure that the private marginal cost (which costs the producer to produce) plus the tax is equal to the marginal social cost (what it costs society, including the producer, to produce) (Rosen, 2004) This tax internalizes the costs of the externality to the producers or consumers. Commonly cited examples of negative externalities refer to environmental challenges such as pollution including greenhouse gas emission. Internalizing the externalities leads to a more desirable market output. Many countries have adopted these taxes as a way to solve so-called market failures such as pollution, and sales of harmful products such as tobacco (Rosen, 2004)

3.2.2 Demand-Side Measures Targeting Forest-Risk Commodities

Demand-side measures targeting forest-risk commodities aim to shape the supply by promoting demand for sustainably sourced commodities and encouraging deforestation-free production along supply chains; therefore, they indirectly influence land use decisions (Henders, Ostwald, Verendel, & Ibisch, 2018). The world can mitigate deforestation by lessening the demand for destructive outputs. Moreover, this type of measures goes beyond traditional policy approaches and can help tackle this issue from different angles (Henders, Ostwald, Verendel, & Ibisch, 2018).

It is important to take into consideration the way international trade weights on the situation. Although a part of what developing countries produce is consume within their nations, a significant portion of that production is exported. Trade linkages suggest a

role for global demand-side interventions to reduce economic incentives for production of commodities on the forest frontier (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). Moreover, if the influential actors -international buyers- adopt measures, they can help shape the industry practices and standards within supplier countries (Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010).

Several private sector and civil-society initiatives have been developed to address the effect of agricultural commodity consumption on deforestation. Such demand-side measures can take the form of certification schemes, roundtables for sustainable production, moratoria to restrict market access for products incurring deforestation, industry-developed standards or voluntary disclosure initiatives among others (Walker, Patel, Davies, Milledge, & Hulse, 2013).

i. Forest Certification Schemes

Certification is a popular and widespread measure to facilitate consumer demands for sustainable commodities and is also commonly used to show companies' adherence to zero-deforestation pledges (Walker, Patel, Davies, Milledge, & Hulse, 2013). They aim to boost profitability through reduced marketing cost, trading with less risky assets associated with forest-friendly goods and having preferential access to buyers (Walker, Patel, Davies, Milledge, & Hulse, 2013). These type of policies have struggle to obtain a substantial global market share and the cost for participating in certification schemes can be quite significant, making it difficult to adopt for smallholders (KPMG, 2013; Walker, Patel, Davies, Milledge, & Hulse, 2013).

ii. Commodity roundtables

Commodity roundtables are voluntary governance mechanisms that are jointly developed by producers, members of the industry, and civil society, which focus on developing environmental standards and provide formal third-party certification programmes (Walker, Patel, Davies, Milledge, & Hulse, 2013; Pfaff, Sills, Amacher,

Coren, Lawlor, & Streck, 2010). Nevertheless, given the nature of these policies -were several actors have to convey in a general consensus-, they might be lengthy to form and have a small market share (Walker, Patel, Davies, Milledge, & Hulse, 2013).

iii. Industry-developed standards, policies, and codes of conduct

On this particular set of policies, companies regulate themselves and create environmental standards and internal policies towards more sustainable practices. Nevertheless, since these policies might as well go in their own interests and are self-imposed, they can be relatively lax and lack an impartial, independent monitoring, that assesses their impact (Walker, Patel, Davies, Milledge, & Hulse, 2013).

iv. Voluntary moratoria

Moratoria are agreements where a significant portion of an industry, or a single company, submits itself to stop activities from a particularly designated forested area (Walker, Patel, Davies, Milledge, & Hulse, 2013). This, by its nature, poses its own limits: it only reaches a specific limited spatial demarked land and it is valid for a certain duration of time (Walker, Patel, Davies, Milledge, & Hulse, 2013).

v. Voluntary disclosure initiatives

As with the industry-developed standards, in these sets of actions companies might take it upon themselves to have a deforestation-free supply chain through disclosure initiatives, which can sometimes influence government policies (Walker, Patel, Davies, Milledge, & Hulse, 2013). The full transparency makes the companies liable to civil society tracing or inspecting if they are purchasing certified goods, avoiding forest protected areas or adopting policies pertinent to forest protection. Nevertheless, as Walker et al. (2013) notes, these actions have more of a reactive nature, acting after an specific civil society campaign.

3.3 Content Analysis

Content analysis is a research tool used to determine the presence of certain words of concepts within a text or sets of texts (Busch, et al., 2012). The first step to conduct a content analysis is to break down the text into manageable categories -words, word sense, phrases, sentence or theme-, which will be further analyzed through a conceptual or rational analysis (Busch, et al., 2012). A conceptual analysis focuses on tallying the occurrences of selected terms within a text, analyzing and quantifying their presence (Busch, et al., 2012). A Rational analysis goes beyond the tallying and seeks the study of the relationships and meanings among concepts in a text (Busch, et al., 2012). Additionally, this approach might follow the conversion of text into a map of concepts and relations. The map is then analyzed on the level of concepts and statements, where a statement consists of two concepts and their relationship (Busch, et al., 2012).

In order to answer the research questions presented in this study, a content analysis searching for references to the export of commodities, agricultural production, and expansion of the agricultural frontier will be conducted on the text of the Native Forests Law and other 48 laws and decrees established by subnational governments to regulate its implementation. This analysis will be carried out to identify links between deforestation and commodity consumption in Argentinean Forest Policy.

3.4 Application of the methodology to answer the research questions

The Analytical Policy Framework described in this chapter works as a map to identify the policy options affecting deforestation. To select the policies to be analyzed according to the scope of this study, the following selection criteria are applied to the set in place policy options:

- The policy options to be selected should have the explicit aim to regulate, reduce or eliminate deforestation. Thus, forest-relevant non-forest policies are excluded from the analysis.
- The policy options to be selected should be applicable to the Argentinean case. Thus, loan conditionality and debt relief are excluded from the analysis.
- The policy options to be selected should be compatible with sustained commodity production. Thus the policy of protected areas is excluded from the analysis.

Based on these criteria, in order to answer the first research sub question -*to what extent International Deforestation Policies acknowledge the production of agricultural commodities as a deforestation driver?*- an in-depth literature review will be conducted on the UNFCCC process, as well as the Argentinean INDCs and REDD+ strategy.

To answer the second sub research *to what extent the Argentinean Government has integrated the export of agricultural commodities in the design of its forest policy?*, a content analysis searching for references on exports of commodities, agricultural production, and expansion of the agricultural frontier will be conducted on the Argentinean Native Forests Law (described in the next chapter) and in the 48 laws and decrees established by subnational governments, which regulate the implementation of the national law.

To address the third sub research questions *to what extent the top Commodities Exporters firms in Argentina integrate deforestation in their supply chain sustainability policies?*, the sustainability policies of the lead traders of soy in Argentina will be analyzed.

The results of the analysis are detailed in Chapter 4.

Chapter 4 Argentinean Case

4.1 Introduction

In order to provide some context to this study, a brief description of the territory, population, economy, and socio-economic indicators of Argentina is provided in section 4.2.

Section 4.3 examines the role played by agriculture in Argentina to provide a better comprehension and grasp of the relevance of this sector in the country. The section describes the impacts of agriculture on economic growth, fiscal revenues and foreign exchange earnings.

In this same vein, section 4.4 focuses on 'soybeanization', the dominance of agriculture by soybean production, examining its economic and social impact. A brief description of how soybeanization came about will also be presented. For its part, section 4.5 will address the environmental degradation derived from the production of soybean in Argentina. To this end, other issues such as floodings, soil degradation and contamination and climate change will be covered.

Section 4.6 addresses the sub research questions 'to what extent international deforestation policies acknowledge the production of agricultural commodities as a deforestation driver?' and 'to what extent the Argentinean Government has integrated the export of agricultural commodities in the design of its forest policy?'. In order to do so, and as described in Chapter 3, the Analytical Policy Framework, content analysis, and an in-depth literature review will be combined to address the sub research questions. An assessment of the effectiveness of forest laws will be presented.

Section 4.7 addresses the sub research question “To what extent the top Commodities Exporters firms in Argentina integrate deforestation in their supply chain sustainability policies?” will be addressed. To that end, the Argentinean supply chain for soybeans will be clarified. Subsequently, the top trader companies will be examined in search of demand-side measures targeting forest-risk commodities such as pledges, forest policies, measurable time-bound targets, and certification schemes.

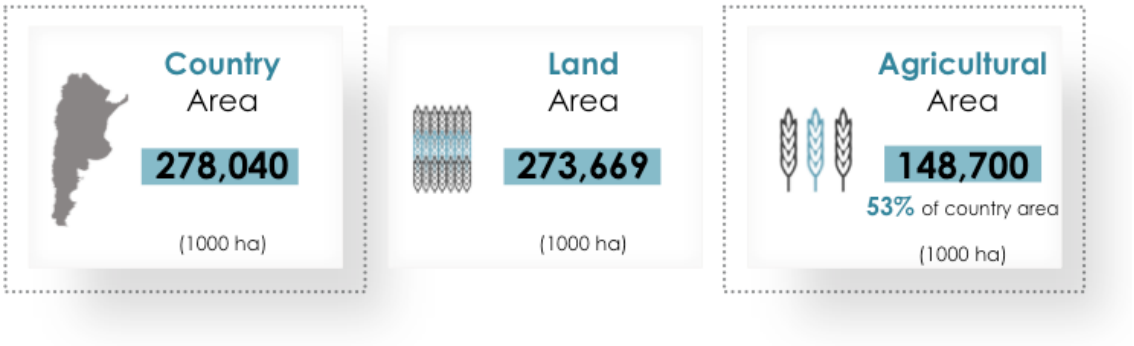
4.2 Argentina at a glance

Territory-wise, Argentina is one of the largest countries in the world. The country expands to 2,780,400 km^2, making it the 9^{th} largest country in the world (CIA, 2018; FAO, 2014). With such a behemoth extend of land; it is no wonder that it has a wide range of extreme landscapes. When traveling through Argentina, one can encounter very different landscapes from sub-tropical forests in the north to glaciers in the south. The country is characterized by an imbalance in the geographical distribution of its population, with 32% of it concentrated in the Metropolitan Area of Buenos Aires (MAyDS, 2016, p.18).

According to the National Institute of Statistics and Censuses of Argentina, the estimated population of the country for the year 2018 is 44.494.502, 49% male and 51% female (INDEC, 2018). The life expectancy at birth for the year 2017 was of 76.7, increasing by 5.1 years from 1990 (UNDP, 2018, p.2). As per the data collected, the median age of the Argentineans is 31.7 years (INDEC, 2018). It is also worth mentioning that the expected years of schooling rounds around 17.4, which is above average in comparison to other countries in the region (UNDP, 2018, p. 2). Also noteworthy is that 63.4% of the labor force is classified as skilled, marking the Argentine population as a relatively young, educated and highly skilled.

Argentinean economy is characterized by extreme swings. The economic and financial crisis has plagued the Argentinean economic scene in recent and current history. Despite the economic growth of 2.9% in 2017, economic activity in 2018 has receded; it is expected to end with a recession (WB, 2018a). Argentina is one of the largest economies in Latin America and has a Gross Domestic Product (GDP) of more than US$ 628 billion (WB, 2018a). Taking advantage of vast fertile lands, the country has positioned itself as a leading food producer with large-scale agricultural and livestock industries (WB, 2018a). Figure 4-1 illustrates Agricultural predominance in the country, surmounting to 53% of the country area (FAO, 2014).

Figure 4-1: Argentinean Land Allocation



Source: Author's elaboration based on data from FAO (2014)

As for the economic conditions of the population, Argentinean Gross National Income (GNI) per capita, expressed in constant prices of 2011 international dollars converted using purchasing power parity (PPP), increased by about 77.9% between 1990 and 2017, going from US$ 10,376 to US$ 18,461 (UNDP, 2018, p.2). During the period between 2004 and 2011, the country made substantial gains in poverty reduction (WB, 2018a; WB, 2018b). According to the data available, for the first semester of 2003, 54% of Argentineans lived in poverty; by 2006 it had reduced to 26.9% (MAyDS, 2016, p.26). As the Poverty & Equity Brief of World Bank (2018b) notes, poverty rates have

remained somewhat constant since 2012. As of the first half of 2018, 27.3% of Argentineans lived in poverty; 4.9% were in extreme poverty (WB, 2018a).

For the year of 2017 the Human Development Index (HDI) of the country was of 0.825, just below the average of 0.894 for countries in the group of very high human development, yet well above the average of 0.758 for countries in Latin America and the Caribbean (UNDP, 2018, p.22).

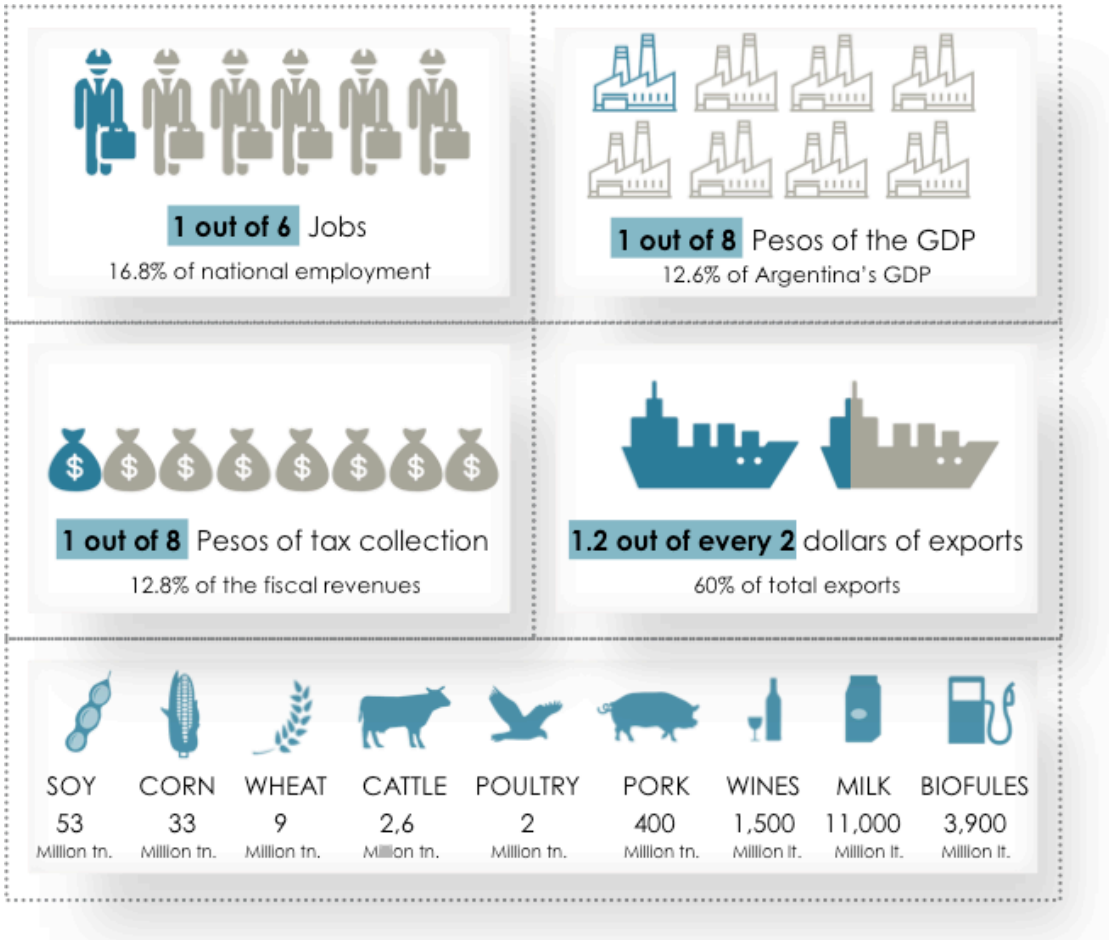
4.3 Agricultural sector and its relevance for the Argentinean Economy.

The intrinsic characteristics of the country -adequate climate, vast expanses of fertile soils, and access to maritime transport- give the recipe for ideal agricultural production (WB, 2006). The country has historically capitalized on these elements, thus emerging as a major food exporter with a current capacity to produce food for more than 400 million people, roughly ten times its population (INTA, 2017, p.13). The agri-food chains in Argentina contributed 12.6% of total GDP for 2014 (measured at constant prices in 2004), which would surmount to about 1 out of 8 pesos of the GDP (MAyDS, 2016, p.330). In comparison, for the year of 2015 the sector had approximate participation of 7% over the total GDP, which would became 18-22% if the indirect net contribution of the agro-processing chain were added (INTA, 2017, p.14). For the year of 2014, the agro-industrial exports contributed 1.2 for every 2 USD in terms of foreign exchange income per export (MAyDS, 2016, p.330). For that same year, the share of agriculture represented 12.8% of what was collected by the Federal Administration of Public Revenue (AFIP) (WB, 2016; MAyDS, 2016, p.330).

It is important to mention the socioeconomic impact of agriculture, both by the production volumes generated as well as the direct and indirect jobs it generates (MAyDS, 2016). In 2015 the sector directly employed around 7% of the registered labor force (INTA, 2017, p.14). What is more, if the agro-industrial activities and the indirect

labor force are added, that number rise to 17% (Nogués, 2015, p.102). Therefore, taking into consideration that 1 out of 6 jobs in Argentina comes from this sector, it is irrefutable to argue that the footprint it has on its society is significant (MAyDS, 2016, p.330). Figure 4-2 shows this economic imprint in the country for the year of 2014.

Figure 4-2: Relevance of the agricultural sector in the Argentinean economy



Source: Author's elaboration based on data from MAyDS (2016, p.330)

Even though the agricultural expansion of Argentina can be traced to the 1930s, it is in the last three decades that the agricultural boom took hold of the country (Urcola, Arnauld de Sarte, Veiga, Elverdin, & Albaladejo, 2013; MAyDS, 2016). The advance in development and adoption of new crop techniques improved the sector productivity.

It helped solidify Argentina as a worldwide extensive agriculture producer of crops with high technical levels and at reasonable costs (MAyDS, 2016).

The following subsection delves into the growth of the leading crop of the country and elaborate on the term 'soybeanization.'

4.4 Soybeanization

Soybeanization can be defined as the continuing and growing use of land for large-scale cultivation -in this case of soybean crops-, in the detriment of the other production alternatives (Urcola, Arnauld de Sarte, Veiga, Elverdin, & Albaladejo, 2013). This concept made its appearance in the Argentinean agricultural sector in the 90's (Urcola, Arnauld de Sarte, Veiga, Elverdin, & Albaladejo, 2013; MAyDS, 2016; INTA, 2017).

Several factors significantly contributed to the Soybeanization. First, in the early 1990's the government made modifications in its economic policy pertaining to agriculture, eliminating agricultural export taxes and reducing import duties on inputs and capital goods (IFPRI, 2009). On a second front, in 1996 new soybean varieties -genetically modified to be resistant to the herbicide glyphosate- were introduced (IFPRI, 2009; Goldfarb & Zoomers, 2013). Third, roughly at the same time of the introduction of the GM soy, there was a significant decline in the global price of glyphosate (IFPRI, 2009). Moreover, the deregulations and the introduction of the GM soy came at a time when neighboring countries didn't allow the production of said particular crop, making Argentina the country to turn to (Goldfarb & Zoomers, 2013). These factors, combined with the high international demand, laid the groundwork for the rapid expansion of soy production in Argentina, and subsequently to the 'United Republics of soy' (Brazil, Paraguay, Uruguay, Bolivia) (Goldfarb & Zoomers, 2013; IFPRI, 2009).

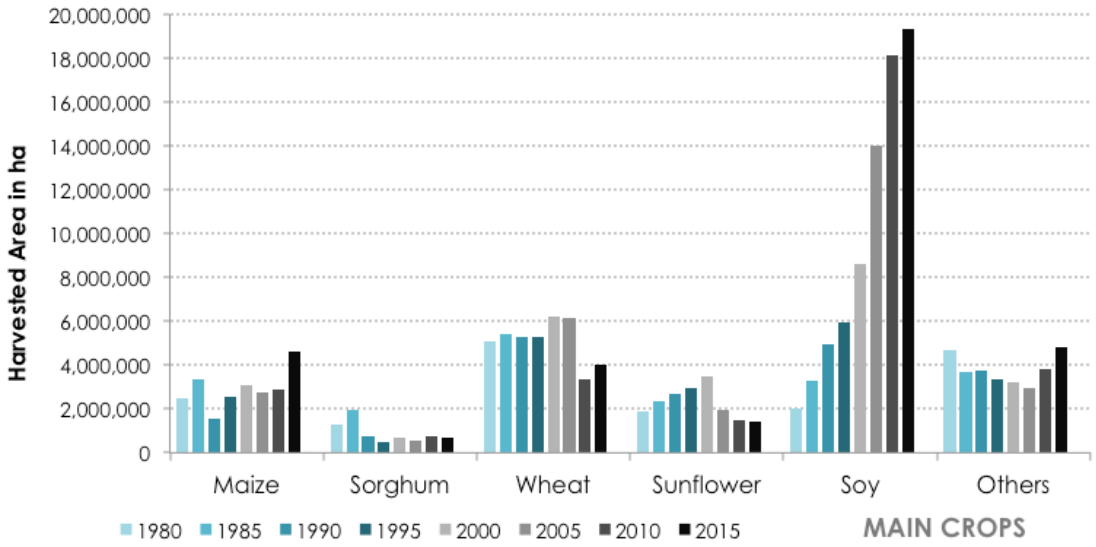
These conditions lead to the procurement and introduction of a **"production package.**" The package typically included no-till seeding, glyphosate-resistant transgenic seeds, and glyphosate as the main herbicide (Tomei & Upham, 2009; Urcola, Arnauld de Sarte, Veiga, Elverdin, & Albaladejo, 2013). In general terms, the "Production package" consisted of technological innovations that save costs, time, and labor during the production process and increase the productivity of the land.

Additionally, the high commodity prices and inexpensive financing of the 1990's shifted the land-use actors in Argentina, concentrating them in the hands of few producers by means of '**sowing pools'** (Baumann, Piquer-Rodríguez, Fehlenberg, Gavier Pizarro, & Kuemmerle, 2016; Urcola, Arnauld de Sarte, Veiga, Elverdin, & Albaladejo, 2013). Sowing pools are large-scale firms that organize together and work like investment funds, contracting land and farm labor to third parties in different regions. Their geographical diversification, combined with their size and "assets light" business model, reduce risks and enable inputs acquisition at a wholesale level. (Carrasco, Sánchez, & Tamagno, 2012). By 2013, independent estimations indicated that soybean sowing pools accounted for approximately 20% of the land planted with soy (Urcola, Arnauld de Sarte, Veiga, Elverdin, & Albaladejo, 2013, p.6).

Emerging from these conditions, the *soybeanization* of Argentina consolidated itself as a heavily inclined export-focused model of agriculture that further relied on mechanized and large-scale production (Monti, 2008; Tomei & Upham, 2009; Urcola, Arnauld de Sarte, Veiga, Elverdin, & Albaladejo, 2013; FAO, 2004). From the period between 1990 and 2014, soybean production increased by more than 400%, closing the production campaign of 2013/2014 with 53.4 million tons (Piquer-Rodríguez, et al., 2015; Bolsa de Cereales, 2014, p.110). Between 1990 and 2015, the area destined to the cultivation of soy almost fourfold, so much so that by 2015 soy represented 55% of the cultivated area in Argentina (FAOSTAT, 2018). The evolution of the harvested area

shows the growing importance of oilseeds when comparing to the main cereals, that did not register a growing trend during the same period (IFPRI, 2017). This scenario is attributable to the increased profitability of soybean, its lower cost of planting and cultivation and its growing global demand (IFPRI, 2017). Figure 4-3 shows a significant increase in the participation of soy in the use of agricultural land compared with other crops.

Figure 4-3: Participation of the main crops in the use of agricultural land (1980-2015)



Source: Author's elaboration based on data from FAOSTAT (2018)

4.5 Environmental degradation as consequence of Soybeanization

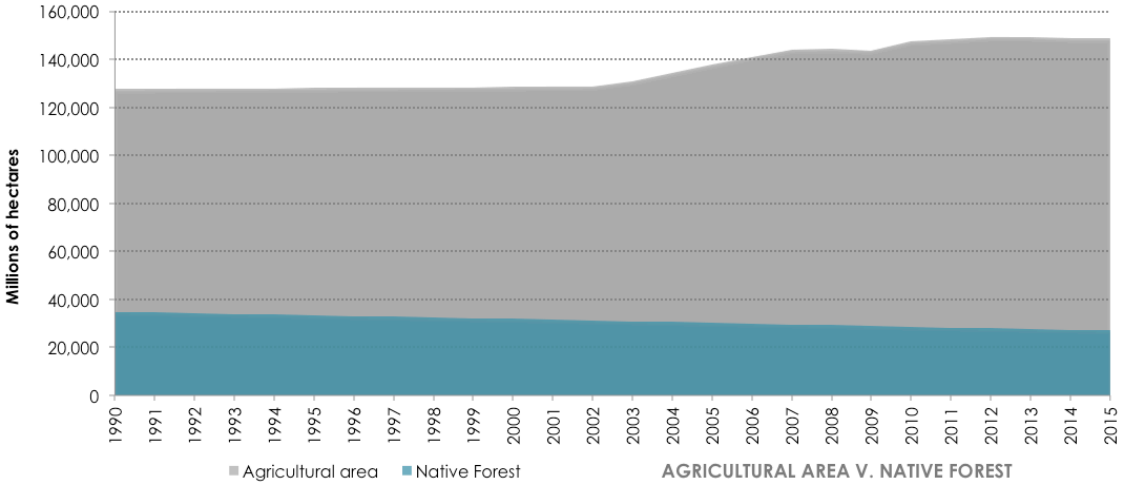
The 1990's soybeanization process was one of the most aggravating factors for the Argentine environment (Zarrilli & Salomón, 2015; WB, 2016; Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010). As expressed by Zarrilli & Salomón (2015), in the last thirty years, Argentina has faced one of the most aggravating processes of native forest transformation, mostly carried out by the monoculture of soybean. This process of deforestation has had an estimated cost to society of 0.74% of the Argentinean GDP per year (WB, 2016, p.57)..

The expansion of soy production was characterized by a structural shift from traditional grazing agriculture to high-intensity soy cultivation, greater intensification in the use of inputs -especially herbicides and insecticides-, and a substantial increase in the agricultural cycle (Zarrilli & Salomón, 2015). This shift translated to significant environmental externalities (WB, 2016), among the most pressing ones, were deforestation, land degradation, climate change, floodings, and water contamination (WB, 2016; WWF, 2014; Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010; Zarrilli & Salomón, 2015).

4.5.1 Soybean expansion, agricultural frontier, and deforestation

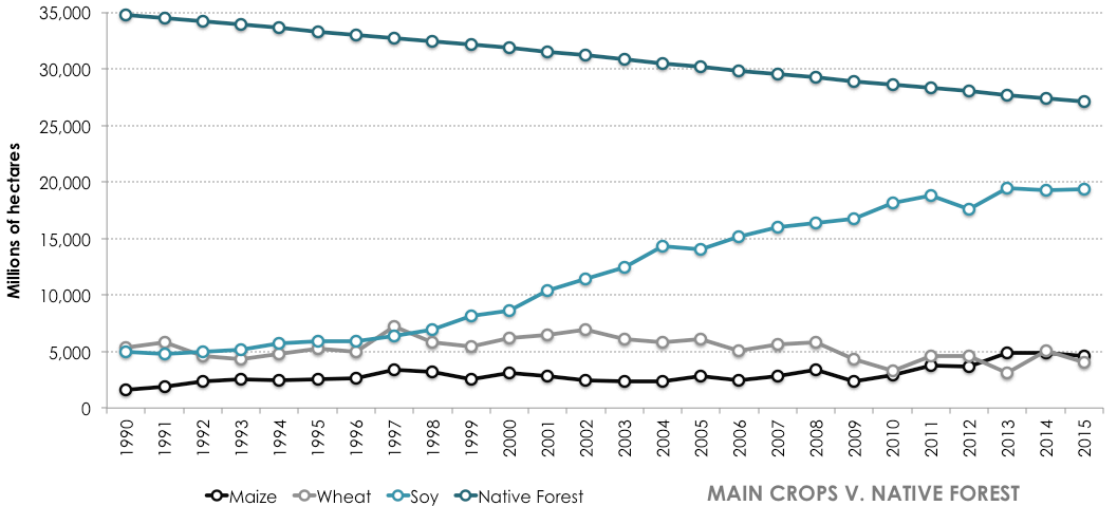
Due to high international prices and growing demand, the expansion of soybean cultivation is the main driver of the advance of the agricultural frontier in Argentina (MAyDS, 2016; WB, 2006). Moreover, the World Bank Country Environmental Analysis for Argentina (2016) noticed that, despite the decline of prices for soybeans in 2011, the continuous increase of prices for soybean until 2009 drove a strong impetus for deforestation. Figure 4-4 shows the decline in native forests area *vis-à-vis* an increase in the agricultural area from 1990 to 2015. Figure 4-5 shows that this increase in the agricultural area is explained by the expansion of area destined to soy cultivation, that almost fourfold since 1990 and 2014, so much so that by 2015 soy represented 55% of the cultivated area in Argentina.

Figure 4-4: Evolution of agricultural area and native forest



Source: Author's elaboration based on data from FAOSTAT (2018)

Figure 4-5: Evolution of area occupied with soy, wheat, maize, and native forests

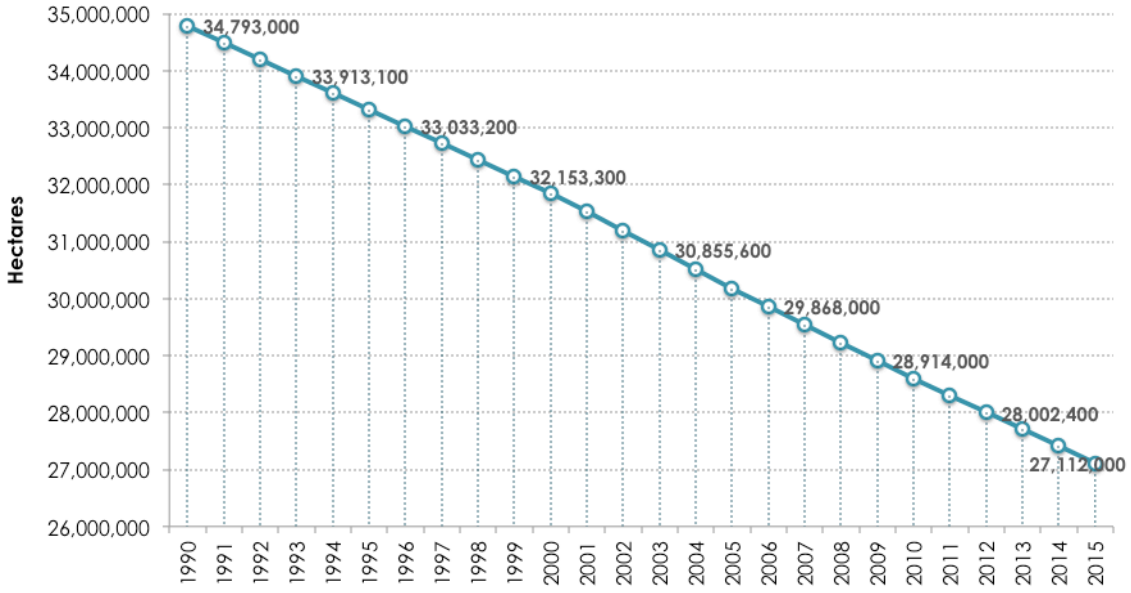


Source: Author's elaboration based on data from FAOSTAT (2018)

The rate of forest loss that Argentina has gone through is alarming (Dirección de Bosques, 2008). As shown in Figure 4-6, between 1990 and 2015, Argentina lost 7,681,000 hectares of native forest, ranking 9th regarding forest cover loss on a global scale. In the same period, Brazil, the leading country regarding forest cover loss, lost 53,167,000 hectares (FAOSTAT, 2018). Although Argentinean forest cover loss might

appear as not significant in comparison with the neighbor country, it is worth noting that Brazil lost 9.7% of its forest cover whereas Argentina lost 22.1% of it.

Figure 4-6: Native Forest Area of Argentina (1990-2015)



Source: Author's elaboration based on data from FAOSTAT (2018)

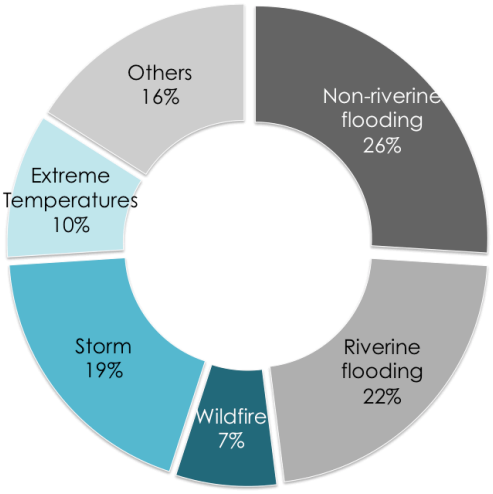
This expansion of the agricultural frontier, the adoption of the aforementioned technological package, and the expansion of the sowing pools while exponentially increased the production capacity, came with the cost of native forest loss. The provinces with the largest deforested area are those that have suffered a cumbersome expansive process of soybean cultivation (Zarrilli & Salomón, 2015). What is more, the forest loss attributable to the advance of soy in the 2007/2008 campaign, estimated a US $ 763,200,000 loss concerning environmental services not received (Zarrilli & Salomón, 2015, p.13). Nevertheless, as the advancement of concern for the environmental impact grew in Argentina, the first National Inventory of Native Forest of Argentina (PINBN) was carried out between 1998 and 2005 (MAyDS, 2016). The PINBN was the first comprehensive study of the distribution, area and composition of the forest (MAyDS, 2016). The report came to several conclusions as to the severe degradation processes the native forest in Argentina suffered. Among them: the loss

of biodiversity, loss of productivity and economic value of the forest, soil erosion, increase of greenhouse gases, alterations to the hydrological regime, migration, and uprooting of the rural population (MAyDS, 2016).

4.5.2 Forests loss and floodings in Argentina

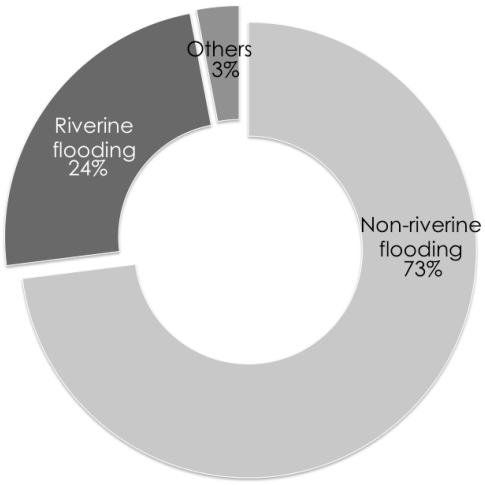
As described in the literature review, deforestation reduces the capacity of native forests to provide ecosystem services such as water regulation. Flooding in Argentina are becoming more frequent every year. The riverine flooding combined with poor rural drainage infrastructure and increased rainfalls cause approximately 60% of all natural disasters in Argentina and account for 95% of the economic damages done by natural disasters (WB, 2016, p.30). Figures 4-7 and 4-8 illustrate the participation of floodings in the occurrence of natural disasters and their economic damage for the period 1950-2015

Figure 4-7: Occurence of natural disasters between 1950 and 2015



Source: Author's elaboration based on data from WB (2016, p. 30)

Figure 4-8: Economic damage of natural disasters between 1950 and 2015

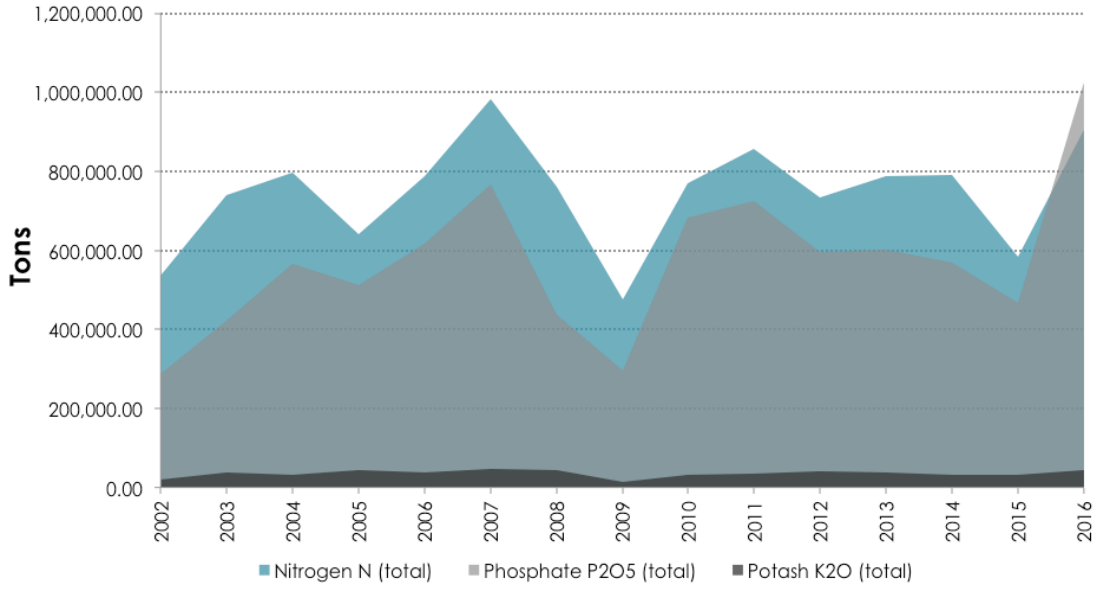


Source: Author's elaboration based on data from WB (2016, p. 30)

4.5.3 Forest loss, soil degradation and contamination in Argentina

The Argentinean National Institute of Agricultural Technology (2017) points out the advancement of agriculture with soybean being a leading proponent as the main determent on organic matter and the balance of nutrients in the soil. The changes brought by the soybeanization process generated a marked increase in the process of hydric and wind erosion, affecting the soil negatively (Taboada, Martínez De Marco, & Tracanna, 2016). Figure 4-9 shows that the use of fertilizers doubled in the period between 2002 and 2016. The extensive usage of the 'technological package' introduced in the 1990s has cost Argentinean society an equivalent to 3.56% of GDP on land degradation (WB, 2016, p.57).

Figure 4-9: Evolution of use of fertilizers in Argentina by nutrient (2002-2016)



Source: Author's elaboration based on data from FAOSTAT (2018)

Moreover, this technological package brought with it an exponential usage of agrochemicals, in particular, glyphosate. Between 1996 and 2007 the use of glyphosate increased from 13.9 million liters to more than 180 million liters (SAyDS, 2008, p.5; INTA, 2013, p.8). Besides the possible negative ramifications that these agents bring towards human health, there is the impact on contamination of the soil

and bodies of water (INTA, 2017). In this regard, a World Bank report (2016) points out high levels of arsenic contamination in groundwater in many regions. The report further estimates that groundwater contamination has annual costs to society of 0.4% of the GDP (WB, 2016, p.57).

In the same line, studies using the Normalized Difference Vegetation Index[3] (NDVI), more commonly known as the "Green Index", were carried out to value the soil degradation on various regions of Argentina between 2000 and 2014 culminating in mixed results (MAyDS, 2016). Not surprisingly, one of the steepest falls of NDVI was located in the area of the dry Chaco, the region most severely affected by the replacement of land use to agriculture (MAyDS, 2016).

Finally, another result that the soil degradation brings, particularly present in the Gran Chaco, was the reduced capacity of the soil to produce economic goods, which in turn generates an increase in migration of young population to better opportunities in other localities. The turnout of young population marked another social phenomenon occurring in those regions: the aging population of the rural areas (MAyDS, 2016). In this way, soil degradation produces a deterioration of the social fabric, a decrease in quality of life and a change of demographics in all regions of Argentina (MAyDS, 2016).

4.5.4 Forest Loss and Climate Change

According to the CAIT report of 2016, the emissions reported by Argentina reached a total of 443.26 MtCO2eq, placing the country in the 24th position in the world (WRI-CAIT, 2014). What is more, between 1990-2014, it was reported that land-use change and forestry combined with agriculture, contributed to 52% of the total of the country

[3] Normalized Difference Vegetation Index (NDVI) is an algorithm often called "Green Index" or "Vegetation Index" to monitor major fluctuations in vegetation using remote sensors, usually satellites, of the quantity, quality, and development of vegetation in a certain area (Weier & Herring, 2000). In general terms, the Green index allows making a good approximation of the trend of land degradation, with the assumption that the activity of the vegetation is a reflection of how the ecosystem is functioning (MAyDS, 2016).

over this period (GFW, 2018).

The damage done by the expansion of the agricultural frontier to forested areas is undeniable. Moreover, the footprint that the production of soybean has had in the Argentinean forests is a cause of concern. Despite this, the growing interest to address the loss of environmental services has pushed for reforms both in the international level and the national level. As Nolte et al. (2017a) point out, the challenge now is locating which strategies are more effective in reducing deforestation. The next section discusses Public Policies and Demand-side measures addressing deforestation.

4.6 Public Policies addressing deforestation in Argentina

In 2007 the IPCC released its 4th Assessment Report, which stated that the destruction of forests accounted for 17% of total global greenhouse gas (IPCC, 2007, p.105). Since then, deforestation became a policy issue discussed within the UNFCCC. The same year, in a context of organized civil society involvement, the Congress of Argentina enacted the law 26,331, the Native Forest Law, a comprehensive forest policy.

The next section explores whether climate change policies subscribed by Argentina and the Argentinean Forest Policy contemplate commodities production as a deforestation driver in their design.

4.6.1 International Policies

This subsection address the research question "*to what extent international deforestation policies acknowledge the production of agricultural commodities as a deforestation driver?*". To this end, the United Nations Framework Convention on Climate Change (UNFCCC), signed in 1992 by Argentina, together with its INDCs and REDD+ strategy will be analyzed.

4.6.1.1 Production of commodities as deforestation driver in the UNFCCC and INDCs

Henders et al., (2018) conducted a detailed content analysis of the UN Conventions on Climate Change (UNFCCC), Intended Nationally Determined Contributions (INDCs), and REDD+ documents from eight countries -Argentina, Bolivia, Brazil, Indonesia, Malaysia, Papua New Guinea, Paraguay, and Cameroon- all of whom in recent years have had extensive tree cover loss and are major producers of forest-risk commodities.

The conducted content analysis searched for terminology around international trade, consumption, and exports, to identify links between deforestation and commodity consumption. This was done to show the likeness of acknowledgment regarding export of commodities as a driver of deforestation. The results were discouraging. Since whereas it was UNFCCC policy or INDCs documents, there was nearly a complete lack of explicit references to the links between forest loss and agricultural commodities (Henders, Ostwald, Verendel, & Ibisch, 2018). Interestingly enough, reports of the UN-REDD+ Programme with the Forest Carbon Partnership Facility (FCPF) of the World Bank, showed a more positive picture. Even if the results were very scattered for each country, at least they acknowledged commodity consumption as a deforestation driver (Henders, Ostwald, Verendel, & Ibisch, 2018).

According to the Henders et al. (2018) study, Brazil, the leading country of the Global Forest Watch deforestation ranking, mentioned deforestation three times in its INDCs. These mentions are related to Brazilian successful reduction of its deforestation rates, and the ambitious targets of the country on the matter. These targets, include reducing illegal deforestation to zero by 2030, and improving native forests management to control practices that are either illegal or unsustainable (Henders, Ostwald, Verendel, & Ibisch, 2018). The INDCs foresees restoration activities. The terms export, trade,

and commodities do not appear in the document. Brazil is not part of any REDD+ initiative. Although Brazil might seem reluctant to acknowledge the production of commodities as a deforestation driver, it has recently decreased deforestation in the Amazon, a hotspot for forest loss thanks to a set of public and private actions, including legislation revision, improved law enforcement, and soy and cattle moratoria from Amazonian cleared areas.

4.6.1.2 Acknowledgment of agricultural commodities as deforestation drivers made by Argentina under the UNFCCC

For the particular case of Argentina, the study showed that deforestation was not mentioned in its INDCs; instead, it emphasizes roles of the country as food producer for the world market (Henders, Ostwald, Verendel, & Ibisch, 2018). While the INDCs contains the promotion of sustainable forest management and an unconditional emission reduction goal, the study stresses the position of the country on these policies as not wanting them to restrict international trade (Henders, Ostwald, Verendel, & Ibisch, 2018).

In spite of this lackluster result on its INDCs, the REDD strategy for Argentina shows a more promising picture. In it, the importance of export of agricultural commodities as national deforestation driver is acknowledged, and what is more, it developed a pilot programme to reduce commodity-based deforestation in two provinces (Henders, Ostwald, Verendel, & Ibisch, 2018).

Argentina is also member of the FCPF programme (Forest Carbon Partnership Facility), and the content analysis conducted on Argentinean documents found numerous references to exports and the production of commodities as deforestation drivers. In particular, these references relate to soybean and livestock production.

To sum up, the results of the mentioned study suggests that Argentina acknowledge the role of commodities production as deforestation driver within the frame of international policies intending to address deforestation.

4.6.2 Forest policies in forested countries

In this section, the research question "to what extent the Argentinean Government has integrated the export of agricultural commodities in the design of its forest policy?" will be addressed. To that end, the Law Nº 26,331 of Native Forest, the forest policy of Argentina, will be described and analyzed.

A content analysis to search for references on exports, agricultural production, and expansion of the agricultural frontier will be conducted on the text of the Native Forests Law and other 48 laws and decrees enacted by subnational governments to regulate the implementation. Additionally, this section contains an assessment of the effectiveness of the Forests Law in the Province of Santiago del Estero.

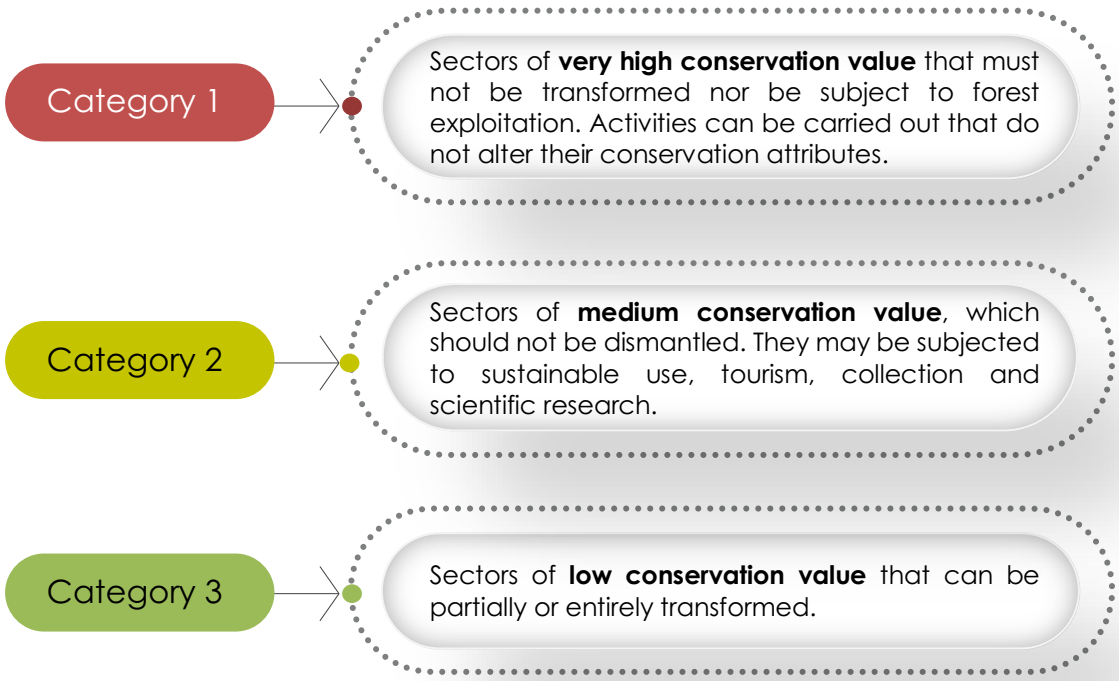
4.6.2.1 National Forest Law Nº 26.331

As previously shown in this chapter, Argentina has experienced an intensive process of deforestation during the last decades. In a context of increased awareness and pressure exerted by the civil society[4], the National Congress sanctioned the Native Forests Law in 2007 (Volante & Seghezzo, 2018; WWF, 2014). This law comprises a land use zoning, a delimitation of areas for different land uses, implemented by the enactment of regulatory laws called "Territorial Organization of Native Forests" (OTBN by its Spanish acronym)." Each jurisdiction has to carry out its OTBN within one year after the enactment of the Native Forest Law and should follow specific Environmental Sustainability Criteria (MAyDS, 2016b; Cambas Sans, Aguiar, Vallejos, & Paruelo, 2017; Ley Nacional No.26.331, 2007). Figure 4-10 shows the conservation categories

[4] Social actors can be grouped into three broad categories: large agricultural and forestry producers, indigenous communities and environmental organizations.

whereas Figure 4-11 shows the geographic distribution of native forests and conservation categories.

Figure 4-10: Forest Conservation Categories



Source: Source: Author's elaboration based on data from MAyDS (2016b, p.2)

To promote compliance, this law also established 'The National Fund for the Enrichment and Conservation of Native Forests'. This fund provides landowners with monetary compensation for the environmental services provided by forest areas located in categories I and II -PSE/PSA-, and establishes fines for those who have caused deforestation in these categories (Ley Nacional No.26.331, 2007). The Forest Law establishes that the Fund for the Enrichment and Conservation of Native Forests (FECNF), will be composed of no less of 0.3% of the National Budget (article 31, item a) and two percent (2%) of the total revenues of export taxes on agricultural products (article 31, item b) (Ley Nacional No.26.331, 2007). However, as Table 4-1 shows, for

the years 2010 to 2017, the Fund received the average of only 5.5% of its share of the National Budget (the figure excludes the year 2011 due to lack of data) (Ministerio de Hacienda, 2018). The item b of article 31 was never implemented. In fewer words, the Forest Policy of Argentina has been severely underfunded since it came to existence.

Table 4-1: Budget Allocation to the Fund for the Enrichment and Conservation of Native Forests 2010-2017

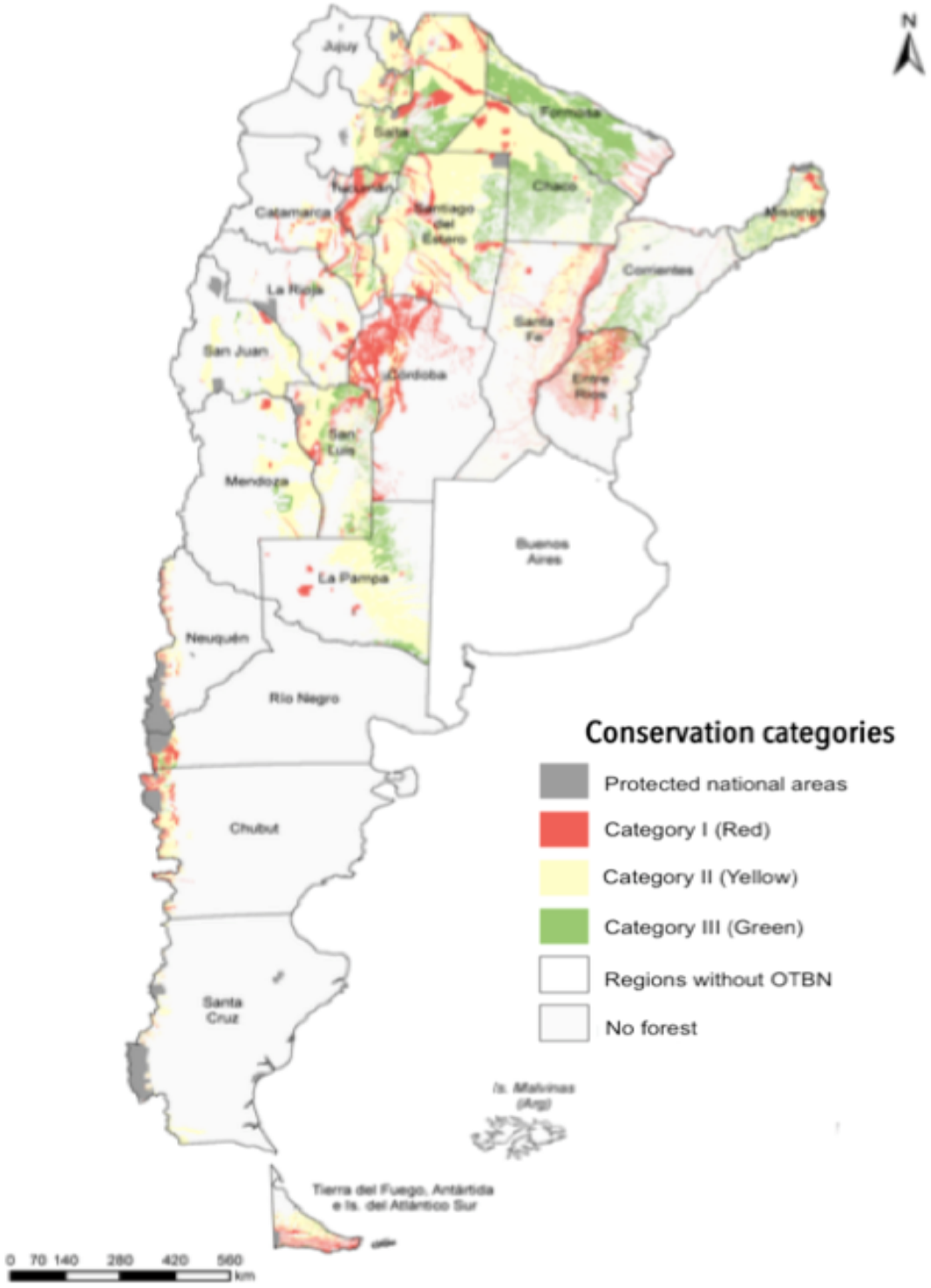
Year	Expected National Budget Allocation to the NFECNF	Actual National Budget Allocation	Actual National Budget Allocation as Percentage of Expected Budget Allocation
2010	$819,388,272	$156,000,000	19.04%
2011*	ND	ND	ND
2012	$1,515,389,860	$32,618,000	2.15%
2013	$1,885,887,654	$23,000,000	1.22%
2014	$2,578,628,068	$17,043,707	0.66%
2015	$3,754,890,745	$232,450,000	6.19%
2016	$4,708,236,276	$246,578,893	5.24%
2017	$7,090,859,612	$270,000,000	3.81%

*In the year of 2011 there was no National Budget approved.

Source: Author's elaboration based on data from Ministerio de Hacienda (2018)

To reach these funds, the provinces had to provide an OTBN accredited by the Secretariat of Environment and Sustainable Development, meaning that it complied with the Environmental Sustainability Criteria. Nevertheless, given the lack of results, the Secretariat opted for a 'compromised solution', accrediting OTBNs not meeting the required standard (Cambas Sans, Aguiar, Vallejos, & Paruelo, 2017).

Figure 4-11: Geographic distribution of forest by conservation category

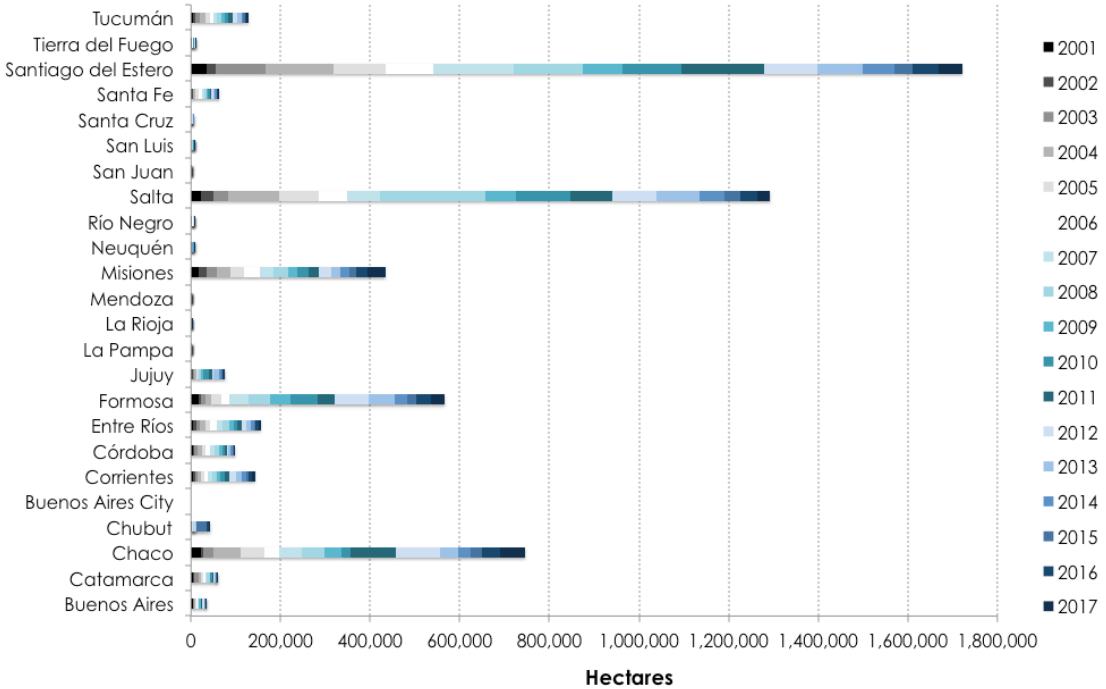


Source: MAyDS (2016b, p.3)

4.6.2.2 Assessing the effectiveness of the National Forest Law No. 26.331 in the Province of Santiago del Estero of the Gran Chaco.

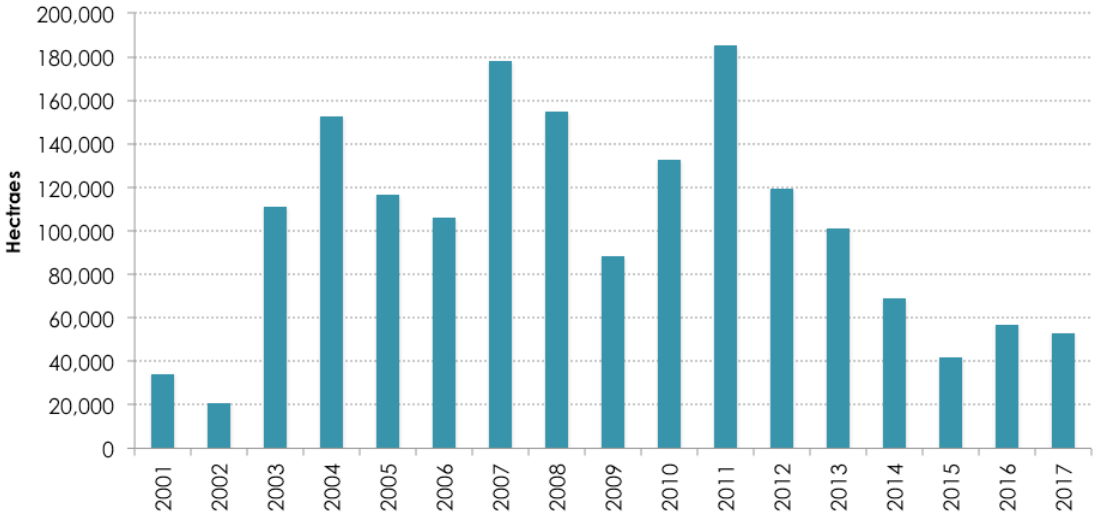
Deforestation is particularly present in the ecological region of the Gran Chaco region. From the 2000 to 2012, this region generated the highest annual rates of deforestation with rates between 1.5 and 2.5% (INTA, 2017, p.40); the PINBN study showed that 93% of the native forest of Gran Chaco showed signals of degradation (MAyDS, 2016, p.167). When further dissecting the deforestation statistics for the provinces, as shown in Figure 4-12, the picture becomes more grievous. For the period of 2001 and 2017 three provinces accounted for 67.1% of deforestation on the country (GFW, 2018). From those provinces, Santiago del Estero had the most relative tree cover loss with 30.7%, Salta 23.1%, and Chaco 13.3% (GFW, 2018). Figure 4-13 shows that from 2001 to 2017 Santiago del Estero lost 1.72Mha of tree cover.

Figure 4-12: Tree cover loss in the provinces of Argentina



Source: Author's elaboration based on data from-GFW (2018)

Figure 4-13: Tree cover loss in Santiago del Estero



Source: Author's elaboration based on data from-GFW (2018)

These three provinces are located in the Gran Chaco region, the largest remaining continuous stretch of tropical dry forest in South America (Portillo-Quintero & Sanchez-Azofeifa, 2010). Figure 4-14 shows the geographic distribution of the Gran Chaco, that covers an area of approximately 1,080,000 km2, and runs through Argentina (60%), Bolivia and Paraguay (WB, 2016, p.21). In Argentina, the Gran Chaco extends over the following provinces: almost all of Santiago del Estero, eastern Salta, the western half of Chaco and Formosa, north of Santa Fe and Córdoba, and sectors of Catamarca, La Rioja and San Luis. As with the introduction of extensive agriculture, the landscape of Chaco gradually changed and has consistently been prone to major losses of ecosystem services (Grau, Gasparri, & Aide, 2005; Gasparri & Grau, 2009). These changes have been particularly present in the narrow strip of sub-humid Chaco where more than 80% of the original cover ecosystems where replaced for agricultural purposes (OAS, 2009, p.147). What is more, the subtropical dry forests of the Great Chaco region in Argentina are still experiencing rapid clearing, mainly for the production of soybean (Kuemmerle, et al., 2017).

Figure 4-14: Location of Gran Chaco

Source: Goldfarb & Zoomers (2013, p.75)

On paper, the Argentinean Forest Law is a comprehensive instrument to tackle the rampant deforestation and steer to a more sustainable land-usage. Nevertheless, there is a growing concern among researchers on its effectiveness. Especially since the dry forests of Argentina -specifically Gran Chaco- are a global hotspot of deforestation (Cambas Sans, Aguiar, Vallejos, & Paruelo, 2017; WWF, 2014; Nolte, Gobbi, le Polain de Waroux, Piquer-Rodríguez, Butsic, & Lambin, 2017b).

Cambas Sans et al. (2017), carried out a study on Santiago del Estero between 2009 and 2014 to analyze the effectiveness of the zoning policies imposed by the Forest Law Nº 26.331. For the basis of the study, Cambas Sans et al. (2018) established that, to be considered an effective policy, the forest law should accomplish the following: i) a decline in the rates of deforestation in categories I and IIa[5] (deforestation not allowed) and ii) deforestation should occur only in categories IIb[6] and III (deforestation allowed).

The research made several conclusions for each category. For the case of category I (deforestation not allowed), it was noted that deforestation rates were similar to the previous periods (Cambas Sans, Aguiar, Vallejos, & Paruelo, 2017). Additionally, the study showed that the conservation category II (medium conservation value) continued to be the bracket with the highest forest loss and the total deforested area increased for areas categorized as IIb (Cambas Sans, Aguiar, Vallejos, & Paruelo, 2017). As for category III (deforestation allowed), the study concluded that deforestation showed a slight tendency to occur (Cambas Sans, Aguiar, Vallejos, & Paruelo, 2017). These results are also consistent with another research done by Nolte et al. (2017b), where the authors noted that for the province of Santiago del Estero, categories I and IIa (deforestation not allowed), experienced higher deforestation rates than similar properties located within Category III (deforestation allowed).

Even though Cambas Sans et al. (2017) reach a similar conclusion with Nolte et al. (2017) in regards to the case of Santiago del Estero, there were points of divergence as well. The study carried out by Nolte et al. (2017b) was done a broader area, encompassing other two zones of the Dry Chaco where the conclusion of the authors differ. Since a widespread decline in forest cover loss was observed in the area studied

[5] Category IIa. Forests with intermediate conservation value that are degraded but can be restored to reach a higher conservation value. They can be exploited for sustainable activities (Cambas Sans, Aguiar, Vallejos, & Paruelo, 2017).
[6] Category IIb Like Category IIa but deforestation partially allowed (Cambas Sans, Aguiar, Vallejos, & Paruelo, 2017).

by Nolte et al. (2017b), the conclusion of the study was on a positive note regarding the effectiveness of land use zoning process. On the other side, Cambas Sans et al. (2017) concludes that the Law didn't deter deforestation in categories of high conservation value. Moreover, the author signals that other factors beyond conservation policies could very much have influenced the generalized decline of deforestation during the period of 2009 and 2014.

Grasser et al. (2015) noted that the decline in the global economy could have been a factor to the reduction in cropland expansion in the Chaco region after 2007. In the same vein, Fehlenberg et al., (2017) points out that global surging demand for soybean heavily drives deforestation in the Chaco region. Thus, it is essential to consider the effect of global demand in the variation of deforestation rates. Additionally, the results of continued deforestation on categories I and II pointed to the problem of the assignment of the conservation categories. As Nolte et al., (2017b) noted, stricter conservation categories were allocated to areas with little deforestation pressure due to their marginal value for agriculture. These conclusions are aligned and consistent with the hypothesis of this thesis.

4.6.2.3 Export of agricultural commodities in the Argentinean Forest Policy

To address the research question “to what extent the Argentinean Government has integrated the export of agricultural commodities in the design of its forest protection policy?” a content analysis will be conducted, searching for references to the export of commodities, agricultural production, and expansion of the agricultural frontier on the Native Forest Law of Argentina and the 48 subnational laws and decrees that regulate its implementation in all the 23 provinces of Argentina.

From the analysis of the documents, the first thing that came to attention is that no province has approved its Territorial Organization of its Native Forests (OTBN) within one year from the sanction of the National Forest law in 2007, even though this

timeframe was one of its requirements. None of the 23 provinces complied with carrying out their OTBN in the established timeframe: three took two years to elaborate and approve their OTBN, 11 took three years, and the rest of the provinces elaborated and passed their OTBN from 2011 to 2017. In other words, it took several years for the Forest Policy to be implemented. Nevertheless, on a positive note, Santiago del Estero and Salta -the provinces most affected by deforestation- were among the first provinces to implement the policy.

Regarding the acknowledgment of the relation of export of commodities and deforestation, there is only one reference. The National Forest Law, in the article related to the Fund for the Enrichment and Conservation of Native Forest, stipulates that in order to comply with this law, the Fund for the Enrichment and Conservation of Native Forest will be composed of two percent (2%) of the total withholdings on exports of primary and secondary products from agriculture, livestock, and forestry, besides the budgetary items annually assigned to it. Is worth to mention that the regulation of this article is still pending. In other words, it is not more than a mere claim. Moreover, consistently there are not references to exports in the 48 subnational laws and decrees responsible for the implementation of the policy at the subnational level.

Regarding the relation of expansion of the agricultural frontier, agricultural production, and deforestation, contrary to the previous findings, the Forest Law contents explicit references, establishing that one of its objectives is to *"…regulate the expansion of the agricultural, mining, oil, and urban frontier and any other change in land use that could affect the areas with the presence of native forest."* (Ley Nacional No.26.331, 2007, p.2). The Forest Law also defines land clearing as *"…any anthropogenic action that makes the 'native forest' lose its character as such, determining its conversion to other land uses such as, among others: agriculture, livestock, afforestation, the construction of dams or the development of urbanized areas"* (Ley Nacional No.26.331, 2007, p.2).

Nevertheless, on a subnational level, only ten provinces include this definition in the text of their norms while only seven provinces mention the regulation of the expansion of the agricultural frontier in the text of their norms. Interestingly enough, the province of La Pampa -one of the least currently affected by deforestation- goes a little further in the wording and expresses the following:

> *"Our country has lacked a territorial delimitation in the matter of its native forests oriented to the conservation, restoration, use and sustainable management of them. This combined, among others, with the dispersion of competencies between different levels and government agencies, the weaknesses of the inter-institutional coordination systems and the pressure generated by driving forces of the expansion of agricultural livestock activities constitute a risk scenario for the forest ecosystems and consolidation of exclusion for the population living in them"* (Ley No. 2601, 2010, p.3).

Although the province of La Pampa is at the bottom of the current national ranking of deforestation, it is only because it has been a pioneer. The literature review suggest that until the end of the 19th century, approximately a quarter of its area was covered by "El Calden" forest and that by the beginning of the XX century, the expansion of the agriculture frontier had significantly reduced this forest area (SAyDS, 2008; Zarrilli & Salomón, 2015, p.5).

Finally, it is worth noting that three provinces -San Juan, Catamarca, and Misiones- establish that they will allocate the fees produced by the movement of timber and non-timber forest products of the native forest to their Funds for the Enrichment and Conservation of Native Forests.

To sum up, the result of the content analysis conducted on the Native Forest Law of Argentina and the 48 subnational laws and decrees regulating its implementation is that the Argentine Government has poorly integrated export of commodities in the design of its Forest Policy. None of the 23 provinces have included references to agricultural exports in their norms; ten provinces have included references of agricultural production in their definitions of a land clearing, acknowledging its relation with agricultural (and forestry) activities. Finally, the documents of only seven provinces contain references to the expansion of agricultural frontier.

The Table 4-2 summarizes the results of the content analysis mentioned above. Provinces are ranked according to the cover lost experienced in the period 2001-2017.

Table 4-2: Content Analysis of the norms regulating the implementation of the Argentinean Forest Policy

No.	Hectares of cover lost	% of provincial cover lost	Province	# of reglamentations	Provincial Law establishing the OTBN	Date of passed of the OTBN	References to exports	References to agricultural production	References to expansion of the agricultural frontier	Founding according to deforestation drivers
1	1.72 Mha	24%	**Santiago del Estero**	2	Law N° 6,942	2009/04/24	X	X	X	X
2	1.29 Mha	17%	**Salta**	5	Law N° 7,543	2009/01/26	X	O	X	X
3	746 kha	13%	**Chaco**	5	Law N° 6,409	2010/04/12	X	X	X	X
4	566 kha	11%	**Formosa**	1	Law N° 1,552	2010/06/22	X	X	X	X
5	433 kha	17%	**Misiones**	2	Law N° XVI-105	2010/12/27	X	X	X	O
6	156 kha	11%	**Entre Rios**	1	Law N° 10,284	2014/03/28	X	X	X	X
7	143 kha	11%	**Corrientes**	1	Law N° 5,974	2010/06/18	X	O	X	X
8	128 kha	13%	**Tucumán**	1	Law N° 8,304	2010/06/24	X	O	O	X
9	96.5 kha	13%	**Cordoba**	1	Law N° 9,814	2010/08/10	X	O	O	X
10	76.5 kha	7.30%	**Jujuy**	1	Law N° 5,676	2011/01/14	X	X	X	X
11	61.9 kha	5.20%	**Santa Fe**	2	Law N° 13,372	2013/12/11	X	X	O	X
12	61 kha	9.00%	**Catamarca**	1	Law N° 5,311	2010/09/21	X	O	X	O
13	41.4 kha	5.20%	**Chubut**	4	Law N° 92	2010/07/07	X	X	X	X
14	35.1 kha	8.30%	**Buenos Aires**	2	Law N° 14,888	2017/01/18	X	O	O	X
15	10.2 kha	1.40%	**Tierra del Fuego**	2	Law N° 869	2012/04/25	X	X	X	X
16	8.27 kha	1.10%	**Neuquén**	1	Law N° 2,780	2011/11/09	X	O	O	X
17	7.64 kha	22%	**San Luis**	1	Law N° IX-0697	2009/12/08	X	X	X	X
18	7.41 kha	1.80%	**Río Negro**	1	Law N° 4,552	2010/07/08	X	O	X	X
19	4.93 kha	2.10%	**Santa Cruz**	2	Law N° 3,142	2010/08/17	X	X	X	X
20	872 ha	2.10%	**La Rioja**	2	Law N° 9,188	2012/06/26	X	X	X	X
21	630 ha	0.74%	**La Pampa**	4	Law N° 2,624	2011/07/02	X	X	O	X
22	399 ha	2.80%	**Mendoza**	1	Law N° 8,195	2010/07/23	X	O	O	X
23	131 ha	1.20%	**San Juan**	5	Law N° 8,174	2011/01/03	X	O	X	O
			TOTAL:	48						

ha: hectares
kha: thousand of hectares
mha: million of hectares

Source: Author's elaboration

4.7 Demand Side measures targeting forest-risk commodities

Global demand for agricultural commodities such as soy, beef, palm oil, and timber has increasingly driven forest conversion both in the tropical forest and dry forest and savannas (WWF, 2014; Pfaff, Sills, Amacher, Coren, Lawlor, & Streck, 2010; Henders, Ostwald, Verendel, & Ibisch, 2018). To address forest conversion, public policies should consider that global demand of commodities is key in this problem. Moreover, public policies and demand-side measures could be complementary, thus increasing the effectiveness of forest conservation efforts (Lambin E. , et al., 2014; Nepstad, et al., 2014).

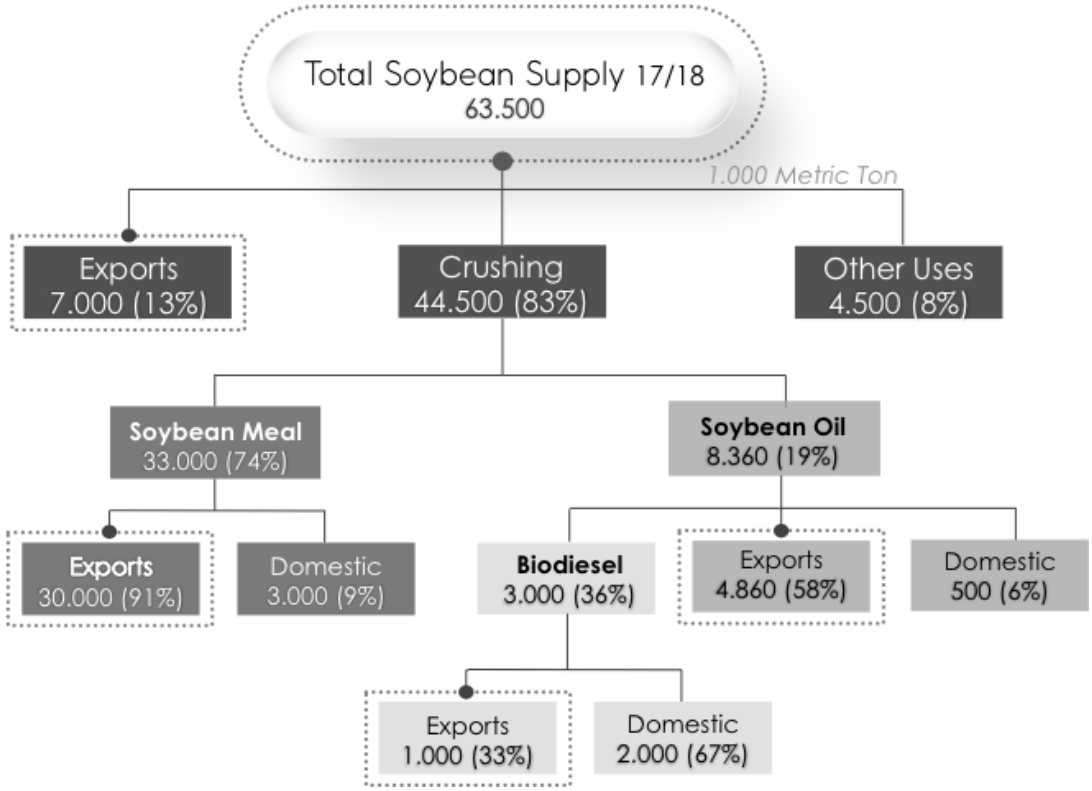
The Sustainable Development Goals of UN made a bold pledge to halt deforestation by 2020. To do so, participation from the high-level organizations is critical. On this last matter, there seems to be a positive turn of events, since concern and commitment from the private sector to comply with this goal has been increasing. As noted by Donofrio et al. (2017), a growing number of companies are voluntarily committing to eliminate deforestation from their supply chains, both in their individual sustainability policies and through participation in larger initiatives -such as The New York Declaration on Forest-. As of March of 2017, 447 companies had made 760 commitments to curb forest destruction in supply chains linked to palm oil, soy, timber and pulp, and cattle (Donofrio, Rothrock, & Leonard, 2017, p.17).

To answer the research question “To what extent the top Commodities Exporters firms in Argentina integrate deforestation in their supply chain sustainability policies?” The following paragraphs of this section will clarify the Argentinean supply chain for soybeans. Subsequently, the top trader companies will be examined in search of demand-side measures targeting forest-risk commodities such as pledges, forest policies, measurable time-bound targets, and certification schemes.

4.7.1 Argentine Soybeans Exports

Between the year of 2017 and 2018, 68% of the soy produced in Argentina was exported; which means that of the 63.500 metric tons of soybean produced -either as beans, meals, oil, or biodiesel- 42.860 were destined for export (MAGyP, 2018). This exchange can be better seen in Figure 4-15, were the soybean supply chain for the period of 2017-2018 is shown in more detail.

Figure 4-15: Soybean Supply Chain for the period of 2017-2018 in Argentina



Source: Author's elaboration based on data from MAGyP (2018)

More interesting than the exports figure, is their concentration in few traders firms, since 94.80% of the soybeans exported were concentrated on 15 firms (MAGyP, 2018). Moreover, further dissection of that information reveals that from those 15 companies, five of them amass about 56.9% of the exports and the top 10 surmounted to 88.2% of the total (MAGyP, 2018). In Table 4-3 the top ten traders firms from the year 2017 are shown.

Table 4-3: Main traders firms that shipped grains, flours, and oils from Argentina in 2017

		STOCK MARKET		COMMODITIES			TOTAL	
	Firms	Origin	Stock market	Grains	Flours	Oils	Tons.	%
1	**Cargill** *Family company	USA	X	7,307,003	3,606,009	670,286	**11,583,299**	**16.0%**
2	**COFCO** (Includes Nidera) *State owned company	China	O	8,209,158	2,538,423	258,982	**11,006,563**	**15.2%**
3	**Bunge**	Netherlands	O	4,626,331	3,661,432	459,041	**8,746,804**	**12.1%**
4	**Dreyfus**	Switzerland	O	4,547,498	3,063,472	332,405	**7,943,375**	**11.0%**
5	**A.G.D.** *Family company	Argentina	X	1,717,388	4,929,001	684,407	**7,330,796**	**10.1%**
6	**Vicentin**	Argentina	O	1,534,239	4,585,758	852,952	**6,972,949**	**9.7%**
7	**A.D.M.** (Includes Toepfer)	USA	O	5,354,489	7,240	12,250	**5,373,979**	**7.4%**
8	**Oleaginosa Moreno**	Argentina	X	1,452,634	3,192,357	688,598	**5,333,589**	**7.4%**
9	**A.C.A.** *Association of 150 cooperatives	Argentina	X	4,032,144	236,000	57,400	**4,325,544**	**6.0%**
10	**Molinos Agro**	Argentina	O	470,318	2,748,318	455,371	**3,674,007**	**5.1%**
	Total			39,251,202	28,568,010	4,471,692	72,290,905	100%
					Top 5 Export Firms		**46,610,837**	**56.90%**
					Top 10 Export Firms		**72,290,905**	**88.20%**
					Top 15 Export Firms		**77,698,807**	**94.80%**

Source: Author's elaboration based on data from MAGyP (2018)

4.7.2 Measures targeting forest-risk commodities conducted by main traders

Given the massive weight these firms have on the export of soybeans in Argentina, this subsection will examine the demand-side measures targeting forest-risk commodities utilized by the seven top soybean exporters of Argentina. This analysis excludes the firms Nº 8 Oleaginosa Moreno, Nº 9 'Asociación de Cooperativas

Argentinas' or ACA (by its Spanish acronym), and Nº 10 Molino Agro, since no information related to efforts to address deforestation were found for these firms.

i. Cargill

Cargill is a privately held global food conglomerate founded in 1865 and based in Minnesota, USA. As it stands, Cargill is one of the largest buyers of agricultural commodities in the world; it imports more products from Argentina than any other company (Cargill, 2018a)

On paper, the company seems to have a significantly strong position against deforestation and production practices. As stated in their Report on Forest (2017), the company acknowledges that forests are critical to managing the impact of agriculture on climate. Moreover, it indicates that they are committed to using their position in the supply chain to take practical measures to help protect forests and mitigate agriculture as a driver of deforestation (Cargill, 2017). In 2014 the company endorsed the New York Declaration on Forest, pledging to reduce deforestation across their agricultural supply chain by half in 2020 and ending it by 2030 (Cargill, 2015a; Cargill, 2015b; Cargill, 2017). As per their 2018 Annual Report, the company stated that 65% of their direct suppliers had a "No Deforestation, No Peat, No Exploitation" (NDPE) sourcing policy (Cargill, 2018b, p.20).

By 2015, they established a Global Policy on Forest and a series of Forest Protection Actions Plans for priority supply chains. Among their goals they stated: i) Measuring progress toward no-deforestation targets, ii) Requirement of compliance with existing local land and forest use laws and iii) The elaboration of an annual report on their implementation of this policy and the actions taken to mitigate risks associated with deforestation (Cargill, 2017; Cargill, 2015a). For the first measure, they partnered with the Global Forest Watch of World Resources Institute to map 1,918 Cargill sourcing areas across 14 countries (Cargill, 2017, p.8). This association was done to establish

a baseline for tree cover loss, which would be used to help measure and track Cargill´s progress against its implementation plans (Cargill, 2017). Likewise, to comply with local forest laws -their second goal-, it was prohibited the production on illegally deforested land (Cargill, 2015b). Also, as part of this strategy, the company requires the compliance of their suppliers to respect and enforce existing forest policies and laws (Cargill, 2015b).

On a ground level, there are several cases where actions have been already implemented on the part of the company towards reaching their 2020 plan. In Brazil, their 2020 Plan for the country focused on the implementation of their 'Forest Code'. The aim is to help the sector move to legal compliance and to help farmers enhance production while conserving and restoring forests (Cargill, 2017; Cargill, 2015b). Moreover, in 2006 Cargill partnered with industry and environmental organizations in Brazil to create the Brazilian Soy Moratorium. The moratorium stipulated that the firm was not to purchase soy from lands in the Amazon biome that were deforested after July 2006 (Cargill, 2015b; Cargill, 2017).

Another case of Policy Implementation from the company comes from Paraguay, where they do not acquire soybeans that originated from the Paraguayan Chaco (Cargill, 2017). Moreover, they have been building a sustainable-soy program since 2009 to meet European Union-recognized sustainability criteria. In accordance with this, they have adhered to the 2BSvs (Biomass Biofuels Sustainability voluntary scheme), the ISCC (International Sustainability and Carbon Certification), and Cargill's own certification program known as Triple S (Sustainably Sourced & Supplied), which focus on no deforestation, greenhouse gas reductions and responsible working conditions (Cargill, 2017; Cargill, 2015b). As per their Report on Forests (2017), these policies cover around a third of their supply, the updates for integration of forest

protection policies and updated global land use policies will be released by 2019 (Cargill, 2018b).

ii. COFCO

China National Cereals, Oils and Foodstuffs Corporation, also known as COFCO, is a state-owned food-processing conglomerate founded in 1952 based in Beijing, China (COFCO, 2018a). COFCO is one of the largest food processors, manufacturer and traders with four companies listed in the Hong Kong Stock Exchange, one company listed in the Shanghai Stock Exchange, and two in the Shenzhen Stock Exchange (COFCO, 2018a; COFCO, 2018b).

The increasing awareness and interest from end-consumers towards more sustainable soy seem to have made COFCO move towards removing deforestation risks from overseas procurement (CDP, 2017a). As recent as 2017, the company created a Supplier Code of Conduct with principles that suppliers are expected to adhere (COFCO, 2017c). Among the principles, there is respect for labor rights and sound environmental, and health and safety practices (COFCO, 2017c). Another important matter on this Supplier Code of Conduct is that it requires that suppliers comply with the existing laws and regulations on local forest (COFCO, 2017c).

Likewise, the firm is also developing commodity-specific policies, applying IFC's Global Map of Environmental & Social Risk in Agro-commodity Production[7] (COFCO, 2017a; COFCO, 2017b). So far, the only commodity-specific policy formalized is the Sustainable Soybean Sourcing Policy, which is applied to soybean suppliers in Brazil. As per their International Sustainability Report (2017), COFCO International Ltd. has a direct (pre-financing) contract with suppliers whose production areas are located in the environmentally sensitive areas of Brazil. Under this policy, the firm signed to a

[7] The GMAP is a database aligned to the 2012 IFC Performance Standards that helps users assess environmental and social decisions on financing (IFC, 2018). The GMAP collects environmental and social risk for 235 country-commodity combinations presenting a color-coded risk score (IFC, 2018).

Soy Moratorium. The agreement required companies not to trade or finance soybeans cultivated on land in the Amazon biome deforested after July 2008 (COFCO, 2017a).

Additionally, in Brazil, the firm also participated in the following certifications, 2BSvs (Biomass Biofuels and Sustainability Voluntary Scheme) and the RTRS (Sustainable soy production, processing, and trading scheme) (COFCO, 2017a).

Even though it is recently started and so far there is just one case of implementation, the firm has established that they will continue to work on developing more commodity-specific policies for other commodities and other countries (COFCO, 2017b).

iii. Bunge

Bunge Limited is an agribusiness and food company with operations in 40 countries around the globe founded in Amsterdam in 1818 (Bunge, 2018a). Bunge is an international soybean exporter also involved in food processing, grain, and fertilizer trader listed in the stock market NYSE of USA (Bunge, 2018a).

As with the case of Cargill, Bunge seems to have adopted the 'sustainable' trend earlier than most. Although not the same, their policies towards reaching their sustainable goals are quite similar. As stated on their Sustainability Report (2015), the company is committed to eliminating deforestation from their agricultural supply chains worldwide, employing tested methodologies that incorporate carbon and biodiversity protection. Moreover, in their Non-Deforestation Policy Grains & Oilseeds progress report (2018b), they highlight the objective of eliminate deforestation in its supply chain, reaching full compliance between 2020 and 2025.

To reach this 2020-2025 goal there are three main strategies: i) develop traceable supply chains, ii) incentivize sustainable expansion and iii) expand origination in open land and go zones (Bunge, 2018b). According to their 2018 report, the first strategy has been applied successfully in the provinces of Salta & Tucuman in Argentina, with

100% of direct purchase compliant with traceability (Bunge, 2018b, p.2). Likewise, by 2017 they had already blocked farmers who violated Brazilian environmental and labor laws (Bunge, 2018c).

For their incentivizing strategy, the company stresses the importance of compensating farmers willing to engage in the stop of legal deforestation related to agriculture expansion (Bunge, 2018b). Nevertheless, at the time of the elaboration of this report, there hasn't been an incentive scheme put in place.

As for their third strategy, the firm has contributed to the development of an open source platform: agroideal.org. Among its features, the platform provides updated maps that allow users to identify lands suitable for agriculture located in areas that meet environmental pledges regarding the sustainable expansion of soybean production (Bunge, 2018b). At the time of writing this dissertation thesis, the coverage of this tool was limited to Brazil, but it is expected to expand coverage to the Argentinean and Paraguayan Chaco later in 2018.

Moreover, as with the case with COFCO, in Brazil Bunge supports the Amazon Soy Moratorium, of which the firm is a founding member (Bunge, 2018b). Likewise, they have participated in different soy certifications schemes. The company has adhered to 2BSvs (Biomass biofuel, voluntary sustainability scheme), FEFAC (European Feed Manufacturers' Federation), RFS2/EPA (Renewable Fuel Standard), and certified by the U.S. Soybean Export Council (Bunge, 2018c).

iv. LDC/Dreyfus

Louis Dreyfus Company B.V. -also known as LDC-, is highly diversified firm involved in food processing, agriculture, and international shipping -among other activities-, founded in 1851 in Switzerland (LDC, 2018a). LDC is listed at the stock market and

alongside, ADM, Bunge, and Cargill; they dominate the world agricultural commodity trading.

As was with the case of Bunge and Cargill, LDC acknowledges the problem regarding agricultural practices and deforestation. Likewise, they have developed their policies for a more sustainable supply chain that goes beyond applicable laws and regulations (LDC, 2018b). As an example of this, they have adhered to the Brazil Soy Moratorium in 2006 (LDC, 2018b).

What is more, LDC recognizes that some of the challenges in soybean cultivation require a specific approach, and thus the company developed a Soy Sustainability Policy that sets the principals for all soybean-related activities (LDC, 2018b). The goal of this Policy is to eliminate engagement in, or financing of deforestation throughout our supply chain and conserve biomes proven to be of high ecological value (LDC, 2018b).

As part of its policy on forests, the company claims to require its suppliers' compliances with existing local forest policies (LDC, 2018b). For the specific case of Argentina, the firm pledged to enforce adherence to national and regional law regarding forest-zoning -Law No. 26.331-, not financing or purchasing from areas demarcated as categories I and II (LDC, 2018b). Likewise, they stated the requirement of requesting documentation from suppliers' -where applicable-, relating to their adherence to the respective national/regional forest law by 2020 (LDC, 2018b).

When it comes to certifications, they mention to support and implement sustainability requirements as per recommendations by CARBIO (Argentine Chamber of Biofuels) or other recognized industry roundtables (LDC, 2018b). Nevertheless, it is a vague standing since there is no statement as to which certification scheme they have to adhere.

v. ADG

Aceitera General Deheza S.A. -AGD by its Spanish acronym-, is a privately owned Argentinean agro-industrial complex founded in 1948 (ADG, 2018a). ADG is dedicated to the industrialization of oilseeds -primarily soybeans- peanuts and sunflowers (ADG, 2018a).

The firm has neither pledge nor policies on deforestation, nor has set measurable time-bound targets. In spite of this, given that ADG directly exports part of its production; it has voluntarily adhered in certifications schemes. The three certifications ADG is part of are: i) RTRS (Standard for the production of soybeans and derived products of soybeans, including biodiesel) ii) ISCC (standard developed by Germany, essential to enter biofuels into the European Union) and iii) 2BSvs (standard developed by France, required to export biofuels to the European Union) (ADG, 2018b).

It is also worth mentioning that in 2007 Aceitera General Deheza S.A., became the first Argentine company in the agri-food sector to register carbon credits under the Clean Development Mechanism of the UNFCCC Secretariat, (ADG, 2018b).

vi. Vicentin Hermanos y cia.

Vicentin Hermanos y cia is an Argentinean agro-industrial company listed on the stock market and founded in 1929 (Vicentin SAIC, 2012a). In 2007 the company became invested in the biofuel sector, becoming the first company in Argentina to export biodiesel (Vicentin SAIC, 2012a).

As was with ADG, Vicentin is a soybean fuel producer who voluntarily adhered to certifications schemes to improve its market position when exporting biofuel. To lever its position in the European Union, the firm subscribed to ISCC, a certification that has become a leading system for the growing market of biomethane (Vincentin SAIC, 2012b). Likewise, the firm adopted the directive RED 2009/28/EC of Renewable

Energies for soybean biofuels of the European Union (Vincentin SAIC, 2012b). Among the requirements of this scheme it states that: i) biofuel cannot be produced with biomass from lands that before 1st January 2008 were natural forests, ecological reserves, etc., and ii) it requires traceability from raw material to final product (Vincentin SAIC, 2012b).

vii. ADM

The Archer Daniels Midland Company -also known as ADM-, is a global commodity trading and food-processing company founded in 1902 and based in Chicago, USA (ADM, 2018). The Archer Daniels Midland Company has a long history with the stock exchange, beginning trading on the New York Stock Exchange in 1924 (ADM, 2009)

Much like the previous cases, ADM has established policies regarding sustainable practices across their supply chain. Under their Commitment to No Deforestation report (2015), the company is steadfast on building a traceable and transparent agricultural supply chain that protect forests worldwide (ADM, 2015). For the case of their soybean supply chain, ADM policies have been applied mainly in Brazil and expanded to Paraguay, working with partners and suppliers in a variety of ways (ADM, 2017). More notably, ADM was the first company in South America to achieve the International Sustainability and Carbon Certification (ISCC) for soybeans (ADM, 2017).

Moreover, ADM became part of the Brazilian Soy Moratorium and participated in the Brazil Institute of Environment and Renewable Natural Resources (IBAMA) embargo (ADM, 2015). The IBAMA embargo is an agreement in which satellite imaging surveys deforested areas, and if producers were caught clearing even a small fraction of native vegetation or planting soy in said area, all of the production of the farm became ineligible for trading (ADM, 2015).

4.7.3 Deforestation in the supply chain sustainability policies of top Commodities Exporters firms in Argentina

According to this analysis, International traders' firms involved in soybean exports not only acknowledge the commodity-driven deforestation problem but also integrate deforestation in the sustainability policies. The differences in the extent of the integration as well as the measures to reduce or eliminate deforestation from their supply chains seems to be associated with the firm size and the byproduct that they export such as the case of biofuels, which need certifications to reach global markets. Notably, local and smaller firms are significantly less active to set measures targeting forest-risk commodities.

When it comes to pledges, all the international (and thus larger) analyzed companies have voluntarily committed to eliminate deforestation from their supply chains. These commitments might be individual, through their policies on deforestation, or through participation in global initiatives, such as the New York Declaration on Forests.

Although the five more prominent firms have set up concrete actions to eliminate or reduce deforestation from their supply chains, only two of them have established measurable time bound-targets. Which makes it harder to assess the progress towards reducing or eliminating deforestation from a supply chain.

Likewise, only six out of the ten firms examined participate in at least one certification scheme. Assessment that is consistent with the market risk imposed by a growing global demand for sustainable soy due to increased awareness from end consumers, especially in the case of biofuels.

For the case of soy moratoriums, the pictured presented is peculiar since although three firms participate in soy moratoriums, none of the cases were located in Argentina, but Brazil.

It is worth to notice that private approaches towards deforestation seem to be country-specific, reflecting differences in regulations, and in the relevance of commodity-driven deforestation in the political agenda of the countries. The results of these findings were mapped and are shown in the following Table 4-4.

Table 4-4: Summary of findings in the top 10 soybeans traders in Argentina

	POLICIES					
FIRMS	Pledge	Policy on Forest	Measurable time-bound targets	Certification schemes	Moratorium	Country specific policies
Cargill	O	O	O	O	O	O
COFCO	O	O	X	O	O	O
Bunge	O	O	O	O	O	O
Dreyfus	O	O	X	O	X	O
A.G.D.	X	X	X	O	X	X
Vicentin	X	X	X	O	X	X
A.D.M.	O	O	X	O	O	O
Oleaginosa Moreno	n/a	n/a	n/a	n/a	n/a	n/a
A.C.A.	n/a	n/a	n/a	n/a	n/a	n/a
Molinos Agro	n/a	n/a	n/a	n/a	n/a	n/a

Source: Author's elaboration

4.7.4 Assessment of supply-chain efforts in the forest-risk commodities

In 2014, 191 governments, private companies, and civil society organizations adopted the voluntarily non-legal binding New York Declaration on Forest (NYDF) (Haupt, Streck, Bakhtary, Behm, Kroeger, & Schulte, 2017, p.4). Among others, the NYDF aims that private sector eliminates deforestation from supply chains of major agricultural commodities by 2020 (Haupt, Streck, Bakhtary, Behm, Kroeger, & Schulte, 2017; Climate Focus, 2016). As of September 2017, more than 470 companies in the agricultural sector had pledged to this goal, committing to eliminating deforestation

from their supply chains (Haupt, Streck, Bakhtary, Behm, Kroeger, & Schulte, 2017, p.4).

The Climate Focus Progress Assessment (2016) reports the improve made by supply-chain efforts in five commodities -palm oil, soy, and cocoa, beef and wood products-, with focus on data analysis of palm oil, soy, and cocoa.

According to the Climate Focus Report (2016), implementation of private-sector forest commitments comprise actions concerning adoption, traceability, and reporting-; it is a critical first step in the adoption of commodity-specific policies. While the majority of the companies have operationalized their commitments, a closer inspection suggests that there is a vast room for improvement (CDP, 2017b; Climate Focus, 2016; Haupt, Streck, Bakhtary, Behm, Kroeger, & Schulte, 2017). For example, although 88% of the companies have conducted risk assessments, only 13% of them meet the established criteria (comprehensive, frequent, and forward-looking)(CDP, 2017b, p.11). Regarding supplier engagement efforts, they do not extend to the entire supply chain either (Haupt, Streck, Bakhtary, Behm, Kroeger, & Schulte, 2017; CDP, 2017b). In this regard, according to the report, about 1/3 of manufacturers and retailers utilized supplier audits -timber companies being the highest-, here are joint projects on 7-18% of the firms, lending of technical support in only 2-9% of the companies (Haupt, Streck, Bakhtary, Behm, Kroeger, & Schulte, 2017, p.8). Moreover, monitoring systems are particularly rare, and less than half of the companies had time-bound actionable plans (Climate Focus, 2016).

Traceability is another particular issue that seems to be challenging many companies -predominantly those of soy and palm oil- (Climate Focus, 2016). While transparency efforts are gaining impetus, tracing commodities to the producer level has been taxing (Haupt, Streck, Bakhtary, Behm, Kroeger, & Schulte, 2017; Climate Focus, 2016).

As for procurement, companies seem to lean on certification more than establishing their standards; soy and beef certification are the slowest to progress (Climate Focus, 2016). Nevertheless, there is ample room for the study in regards to the efficiency and impact that certification has on large-scale and long-term impacts on forests (Climate Focus, 2016). So far, studies have resulted in short-term positive impacts, yet it has not been universal (Climate Focus, 2016).

Moreover, although there are no current studies on leakage effects concerning certification, the literature suggests that there are indications of leakage between regions and commodities. For example, the protection of the legal Amazon enhances the risk for landscape conversion on the Cerrado or Chaco. Full supply-chain traceability could shed light on commodity-driven deforestation leakages between regions and commodities. A good note on this point is that companies engaged in production or sourcing from high-level-of-deforestation areas are among the most advanced in the operationalizing their commitments; it suggests that the successful implementation of these policies could lessen deforestation (Climate Focus, 2016).

Haupt et al. (2017), research shows more information regarding the progress the firms have made with the commitments. Particularly interesting, is that there is information for only 51% of the firms' commitments and 1/5 of these commitments were past its due date, didn't have a target date, or were not transparent -also known as 'dormant'- (Haupt, Streck, Bakhtary, Behm, Kroeger, & Schulte, 2017, p.11).

Despite the facts that companies started to translate announcements into actions there is no clear evidence that these initiatives actually translate into measurable, reduced deforestation area, as pointed out by Haupt et al., (2017).

There were still no comprehensive data sets that point out to a reduction of deforestation through efforts from agricultural commodity supply chains (Haupt, Streck,

Bakhtary, Behm, Kroeger, & Schulte, 2017). Nevertheless, tools like the Global Forest Watch-Commodities (GFW-Commodities), Transparency for Sustainable Economies (TRASE) and the Accountability Framework are being developed (Climate Focus, 2016; Haupt, Streck, Bakhtary, Behm, Kroeger, & Schulte, 2017). GFW-Commodities is a system comprising online forest monitoring and alerts that, utilizing satellite technology and open data, provides essential forest information. For its part, TRASE is planned to be a dynamic online forest-monitoring system, while the Accountability Framework would work on the harmonization of definitions, and improve compliance, transparency, and traceability (Haupt, Streck, Bakhtary, Behm, Kroeger, & Schulte, 2017).

Commitments towards the elimination of deforestation from supply chains are difficult to compare since variables such as geography, commodity, suppliers, and companies change the equation (Climate Focus, 2016). Furthermore, commitments vary widely. As Haupt et al. (2017) mentions, in order to have a better picture of the progress made, supply-chain commitments need to follow a set of consistent definitions; external assessments of the degree of compliance should be put in place.

Chapter 5 Conclusions

There is a consensus that in Argentina the production of commodities is a driver of deforestation since it pushes the expansion of the agricultural frontier whereas global demand is risen and expected to rise more. For countries exporting forest-risk commodities -soy, palm oil, timber, and cattle- further developing of exports can be a strong driver for economic growth as well as deforestation. Although several policy actions have been implemented, deforestation is still a challenge in Argentina and other agricultural forest-risk commodities producers. Attempting to shed a new light under the hypothesis that the production of commodities is not taken into account when designing Public Policies addressing deforestation, this study focuses on the case of soy production and export in Argentina. The main research question is *"to what extent the production of forest-risk agricultural commodities is integrated into the design of forest protection policies?"* To answer the research question, International Deforestation Policies, Argentinean Forest Policy, and the Sustainability Policies of top Commodities Exporters firms in Argentina are examined. The methodology, proposed to answer the research questions comprise the elaboration of an Analytical Policy Framework and the search of references on the export of commodities, agricultural production, and expansion of the agricultural frontier through Content Analysis' techniques. Hereafter the conclusions of the study are presented.

Global demand for agricultural forest-risk commodities such as soybeans, timber, and palm oil increasingly drives deforestation. To be effective, policies aimed at addressing agricultural-commodity driven deforestation should include supply and demand-side measures. International and National Public Policies, targeting producers, and Demand-side measures, implemented throughout the supply chain, are complementary when it comes to addressing deforestation.

Regarding the first research question **"to what extent international deforestation policies acknowledge the production of commodities as a deforestation driver?"** The literature review suggests that international policies addressing deforestation are essentially climate change policies. The second finding is that within the United Nations Framework Convention on Climate Change, Argentina has subscribed to the Programme on Reducing Emissions from Deforestation and Forest Degradation, recognizing the export of agricultural commodities as deforestation drivers in its REDD strategy. "Subscribe" here means that the country has officially signed and ratified the agreement and enacted domestic laws and rule in the Parliament to promote activities to comply with this Programme. However, as a party of the Paris Agreement, in its document of Nationally Determined Contributions the country has stressing that "it did not wish to see climate policies restricting international trade." The NDCs contains an unconditional emission reduction goal, which also includes the "promotion of sustainable forest management." In fewer words, the country acknowledges the production of agricultural commodities as deforestation driver in the international policies addressing deforestation that it subscribes to.

Regarding the research question **"to what extent the Argentine Government integrated the export of commodities in the design of its forest protection policies?"**: the content analysis conducted on the Native Forest Law of Argentina and the 48 subnational laws and decrees that regulate its implementation in the 23 provinces of Argentina suggests that the Argentine governments (both central and subnational) have poorly integrated the export of commodities in the design of their forest protection policy.

None of the 23 provinces have included references to agricultural exports in their norms. The only reference to exports is in the article 31 of the National Forest Law, that stipulates that the Fund for the Enrichment and Conservation of Native Forest be

composed of two percent (2%) of the total revenues of export taxes on agricultural products (besides allocations from the National Budget). However, this article has not been implemented yet; consistently there are no mentions of exports in the 48 subnational laws and decrees responsible for the implementation of the forest policy at the provincial level.

Contrary to the previous findings, the content analysis shows explicit references on the relation of expansion of the agricultural frontier, agricultural production, and deforestation. The National Forest Law expressly establishes that one of its objectives is to "regulate the expansion of the agricultural, mining, oil and urban frontier and any other change in land use that could affect the areas with the presence of native forest." (Ley Nacional No.26.331, 2007, p.2). The forest law also defines clearing as "any anthropogenic action that makes the 'native forest' lose its character as such, determining its conversion to other land uses such as, among others: agriculture, livestock, afforestation, the construction of dams or the development of urbanized areas" (Ley Nacional No.26.331, 2007, p.2). On a subnational level, only ten provinces include this definition in the text of their norms while only seven provinces mention the regulation of the expansion of the agricultural frontier in the text of their norms.

The analysis of the documents also sheds lights in two implementation issues: the timeframe of the implementation of the forest policy and its funding. Even though the National Forest law requires that the provinces carry out their Territorial Organization of its Native Forests within a maximum period of one year from its sanction, this was severely underdone. None of the 23 provinces complied with carrying out their OTBN by 2008: 3 took 2 years to elaborate and approve their OTBN, 11 took 3 years, and the rest of the provinces elaborated and passed their OTBN from 2011 to 2017. In other words, it took several years for the Forest Policy to be implemented. Nevertheless, on a positive note, Santiago del Estero and Salta -the provinces most

affected by deforestation- were among the first ones to implement the policy. Additionally, it is worth mentioning that the Forest Policy of Argentina was severely underfunded since it came to existence. From 2010 to 2017, the Fund for the Enrichment and Conservation of Native Forests only received -on average- 5.5% of its shared of the National Budget, according to the provisions in the Forest Law, whereas the two percent (2%) of the total revenues of export taxes on agricultural products has never integrated the Fund due to lack of implementation of the item b of article 3.

Regarding the research question **"To what extent the top Commodities Exporters firms in Argentina integrate deforestation in their policy options for environmental sustainability?"**: the first finding is that International traders' firms involved in soybeans exports not only acknowledge the commodity-driven deforestation problem but also integrate deforestation in the sustainability policies. The differences in the extent of the integration, as well as the measures to reduce or eliminate deforestation from their supply chains, seems to be associated with firm size and the byproduct that they export. Notably, local and smaller firms are significantly less active to set measures targeting forest-risk commodities.

The second finding is that private approaches towards deforestation seem to be country-specific, reflecting differences in regulations or the pressure exerted by civil society. For instance, the evidence suggests that International traders' firms in Brazil had made further advances regarding targeting deforestation in the soybean supply chain.

To sum up, the literature review suggests that Argentina acknowledges the production of agricultural commodities as deforestation drivers in the international policies addressing deforestation that it subscribes to. However, the content analysis conducted on the documents related to the Forest Policy of the country suggests that the Government has poorly integrated the export of commodities in the design of its

forest protection policy. Beyond the results of the content analysis, the lack of implementation of the article establishing that the Fund for the Enrichment and Conservation of Native Forests will be integrated with the two percent (2%) of the total revenues of export taxes on agricultural products suggests a reluctant attitude of the Government towards integrating the production of agricultural commodities in its Forest Protection Policy. On the contrary, forest protection policies implemented by International traders' firms involved in soybeans exports not only acknowledge the role played by commodities productions as a driver of deforestation but also integrate it in their sustainability policies. The extent of these efforts varies according to firm size and commercialized byproduct on the one hand, and country of operation on the other.

International and National Public Policies, targeting producers, and Demand-side measures, implemented throughout the supply chain, are complementary. A stronger acknowledgement of the linkages between the production of agricultural commodities and deforestation might allow for more effective public policies. A closer collaboration with the private sector could enhance the enforcement of the Argentinean Forest Policy.

Finally, the following questions remain to be studied further in the future. First, the Forest Policy of Argentina, contained in the Forest Law and the subnational norms in charge of its implementations, is in line with international standard. In spite of this up-to-date nature, why do forest conservation laws not incorporate the production and export of forest-risk commodities as deforestation drivers? Socio economic background should be studied further in the future. Second, when it comes to the assessment of the impact of the policies taken by global commodity trading firms, to reduce or eliminate deforestation from their supply chains, further work remains to be done. Third, international comparison among "Soy Bean Republics" in the southern cone of South America should be tackled in the future to identify peculiarities of Argentina *vis-à-vis* other soybean exporters in the region. Fourth, the question of how

to change or improve our Forest Policy so it can incorporate concerns for the production and export of agricultural forest-risk commodities is another academic challenge to be undertaken in the near future.

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Annex: laws and decrees analyzed in this study

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- Decreto 2.785/2009. Ordenamiento Territorial de Bosque Nativo-Zonificacion- Ley 7543. June 30, 2009, Official Gazette: July 13, 2009, Salta.
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- Decreto 3.676/2009. Crea consejo asesor del ordenamiento territorial del bosque nativo de la provincia de Salta. August 25, 2009, Official Gazette: September 1, 2009, Salta.
- Decreto 366/2017. Decreto Reglamentario de la Ley 14.888 - Establece las normas complementarias para la conservación y el manejo sostenible de los bosques nativos de la Provincia de Buenos Aires. June 27, 2017, Official Gazette: August 14, 2017, Buenos Aires.
- Decreto 5242. Reglamentación de la ley No. 13.372. December 30, 2014, Santa Fe.
- Decreto 67/2011. Decreto Reglamentario de la Ley XVI-Nro.105. Ley de Ordenamiento de los Bosques Nativos. January 14, 2011, Official Gazette: May 14, 2011, Misiones.
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- Ley 13.372. Mapa de Ordenamiento de Bosques Nativos. December 7, 2013, Santa Fe .
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- Ley 2.589. Aprobando Convenios celebrados entre la Secretaría de Ambiente y Desarrollo sustentable de la Jefatura de Gabinete de Ministros y el Ministerio de Producción de la Provincia de La Pampa del "Programa experimental de manejo y conservación de los bosques nativos 2009" . September 9, 2010, Official Gazette: November 5, 2010, La Pampa.
- Ley 2.601. Ley n° 2601: aprobando Convenio suscripto entre la Secretaría de Ambiente y Desarrollo Sustentable de la Jefatura de Gabinete de Ministros de la Nación y el Ministerio de la Producción de la Provincia de La Pampa, cuya finalidad es coadyuvar a la implementación efectiva y eficaz de la Ley Nacional n° 26331, sobre el ordenamiento de los bosques nativos . November 18, 2010 , Official Gazette: December 23, 2010, La Pampa.
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