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A greener peace:

Ensuring environmental sustainability in post-conflict Colombia

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> Para ti mi Pacífico, tan lleno de color y encanto, que a pesar de tanta amargura y llanto; solo sabes sonreír. Las manos de tus gentes ásperas de tanto trabajar, tu brisa y tus paisajes hacen inevitable suspirar; no sorprende que hasta las ballenas, una vez por año… te vienen a visitar.
>
> - Alejandro Valencia Andrade

Abstract

Despite its small size Colombia hosts 10% of the planet's biodiversity, in the over 53% of its territory which is covered by different types of tropical and Andean forests. However, decades of war have had devastating effects on the country's environment, which is threatened with deforestation for the clearing for agriculture areas, mostly for illegal crops; as well as on its population, which has seen forced displacement of an estimated 8.1 million people and human rights violations that have often gone unpunished. A peace accord signed between the Colombian Government and the largest guerrilla group FARC in 2016 was celebrated internationally as a victory that would send Colombia on a new path towards economic and social development. The Program of Substitution of Illicit Crops contained in this accord, has the potential to promote environmental sustainability, improve the life of the most marginalized communities living in the remote rural areas that hosted the war, and to rectify the longstanding land distribution inequality issues which have largely been blamed for being the source of the conflict.

Two and a half years after the signing, the implementation of the accord has slowed down, especially in the points directly and indirectly related to the program of substitution. Increases in the extension of coca crops after the signing have emboldened the newly elected administration, into pushing aside the human development components of the substitution program, and focusing on forced eradication, including reinstating the aerial spraying of glyphosate, a practice which had been suspended in 2015 after the WHO raised concerns about its possible negative effects on human health. This thesis aims to contribute to the body of knowledge on the consequences of implementing policies in rural areas, especially of illicit crops, by analysing the environmental and social effects of current practices associated to the cultivation and eradication of coca, and comparing them to those of an alternative crop. Further the study aims to find the necessary steps the state must take to help farmers effectively substitute coca crops, through the analysis of the reasons and motivations guiding farmers' decision to cultivate coca, increase the extension of their crop, eradicate and relapse.

Keywords: Deforestation, substitution of illicit crops, alternative development, environmental justice, glyphosate

Executive Summary

The business of cocaine often gets attention around the world due to imagery of lavish lifestyles by the "Narcos" who sleep in large mansions, drive sports cars and attend the most exclusive parties. However, the story of the farmers who cultivate the coca leaf (raw material for the elaboration of cocaine) could not be further from being lavish.

Colombia is one of the only 17 countries in the world which are considered "mega-diverse", but the way in which biota coexist in the country is in stark contrast with the way in which its people have fought, for centuries, over land. The struggle of the peasant class to be recognized, participate in political discourse, and to be given rights over land, has existed since the colonial era. Not even a series of civil wars in the XIX Century were enough to solve that longstanding land tenure inequality. This violent clash between social classes has also influenced policies and actions by the government which has constantly failed to protect the environment.

In the 1930s, the first ever attempt at a rural reform, resulted in a 20-year period of time simply known as *La Violencia,* out of which the largest and longest standing guerrilla group FARC emerged. During this time, the government's inability to assert control of its rural areas, as well as the low costs of the peasant labour (who were never given land and were now competing with subsidized agricultural products coming from the developed world), gave the drug cartels that had emerged in the 60s, the possibility of producing coca leaves at a lower cost.

The huge profitability margins that the cartels managed, accelerated the concentration of land with the help of paramilitary groups which they could now pay to displace people through violent means, and of government and law enforcement officials, who they could now pay to turn a blind eye. Similarly, guerrilla groups looked for sources of funding to increase their territory through illegal means. A period of dispossession of land, kidnappings, attacks to infrastructure and major war between guerrillas and the Colombian military and paramilitary groups tainted the country´s history with decades of unprecedented violence. Finally, in November of 2016, after four years of negotiations, a historic peace agreement between the Government of Colombia and the biggest guerrilla group (FARC); marking the end of the world's longest internal armed conflict.

The accord includes a Comprehensive Program for Substitution of Illicit Crops which focuses on the development of the countryside through investments into social programs that can help coca farmers switch to a different crop. After two years of the signing of the accord however, the amount of hectares of coca crops actually increased to record numbers. Due to these increases in coca plantations, and the speed at which deforestation is currently occurring, more than ever, the 314 types of natural ecosystems which Colombia currently houses are threatened. Although this increased clearing of the forests can be attributed to the need for land for agriculture purposes, such as illicit crops, it can also be attributed to the vacuum created by the exit of FARC from rural areas. The guerrilla group which controlled these territories for almost six decades, also controlled the clearing of forests through an illegal yet effective system of concessions. The government must then ensure that the void FARC left in rural communities is filled by state presence.

The environmental problems related to illicit crops don't stop at deforestation. The cultivation, processing and even the eradication efforts by the government, put pressure on Colombia's natural resources. The high chemical inputs like fertilizers, pH correctors and herbicides needed to grow coca on poor soils, causes erosion of these soils, and contaminates the air and water. The chemicals used in the processing of the cocaine also leach into the soil and pollute

underground sources of water. To make matters worse, when security forces identify crops they often eradicate with the use of glyphosate, a non-selective herbicide made by Monsanto. The fact that the eradication practices are done via aerial spraying with concentrations, often 10 times larger that those used in other agricultural crops, raises serious concerns about the health of nearby crops, human and non-human populations.

The delays in implementation do not only affect the environment, but also put the rural communities at harm. The slow mobilization of the government into rural areas has left spaces open for smaller armed groups and former FARC dissidents who violently fight for control of those territories. This generates insecurity and further hinders the government's efforts of implementing the program of substitution of illicit crops. Since violence in Colombia has always been tied to inequality, in order to make the substitution work, the Comprehensive Rural Reform must be a priority, as it contains policies for speeding the process of land titling for displaced people, as well as plans for infrastructure spending which include access roads, rural medical centres, schools, energy and financial services, among others.

Colombia has the opportunity to improve its indicators of social and economic development in rural areas. However, it has to make sure that the territories which are no longer controlled by the FARC are served by the state and not absorbed by armed groups. Also important is to ensure that the land that is now available will end up increasing the land inequality, and that people who are planting coca are really offered viable and sustainable alternatives that they may live off of.

This research set out to find the environmental impacts of implementing the policy of substitution of illicit crops under a successful as well as a failed scenario. It also tried to establish the conditions under which the government will be able to help farmers effectively transition from coca crops into a legal and profitable alternative, through an improved understanding of what motivations and external factors are guiding farmers' decision-making process.

Although the policy of substitution has national scope, the study focused in the Pacific Region of Colombia which has some of the highest levels of poverty and inequality as well as some of the largest extensions of coca plantations in the country. The data collected mostly pertains to two of the four departments of the pacific, Nariño and Valle del Cauca.

The research done for this work consisted of three main parts: a literature review, the analysis of a survey of coca farmers and a series of interviews with stakeholders. The literature review included a thorough analysis of documents pertaining to Colombia's history, rural reforms, environmental impacts in conflict areas, coca cultivation, cocaine production, eradication practices, the effects of glyphosate in the environment and human populations, reports on human rights violations, alternative development, among others.

The surveys portion was conducted in five municipalities of rural Nariño and had a target audience of farmers in areas which have traditionally had large concentrations of coca crops. Out of the 264 people surveyed, 234 (or 88.6%) had worked with coca crops in the last 5 years. The surveys contained 107 questions and were a comprehensive look into the living conditions of the coca farmers and their households, including their education level, health, family economy, land tenure, extension and productivity of their land, machinery and labour used, destination of their harvest, income and costs of producing coca, past attempts by them or the government to substitute and their perception of the authorities.

The stakeholder interviews where conducted mostly on-site in Colombia, with public servants in the Colombian Government, international organization officials, members of the academia

and indigenous and peasant farmers, all of whom had been involved with or had been directly affected by the implementation of the policy of substitution of illicit crops.

The study found that the state of implementation of the policy of substitution of illicit crops and its related stipulations are significantly delayed when compared to other points of the accord. This is in part due to the slow deployment of government personnel (both military and civilian) to the territories that the FARC left after the signing of the accord. This creates problems of insecurity, increases mistrust in the government, and puts the families who have signed agreements with the government to substitute at risk.

Further, the study finds that the government's new approach of stripping the policy of its "comprehensiveness" factor, and focusing largely on eradication of crops, hinders the success of the whole peace accord, as it does not provide the necessary conditions to get the communities in rural Colombia out of poverty. Given the long history of violence that has been proven to be strictly related to inequality issues, it is reasonable to assume that if the structural problems are not addressed, then a period of war may soon again follow.

This study offers the the example of an alternative crop with cacao, and shows that it can be a better option both for the environment as well as for the farmers who cultivate it, especially if done in an organic way, which may yield higher returns on investment given the current market for products deriving from cacao. This is only true, however, if the right elements of the policy of substitution are put in place. Access to land, financial services, the agreed-upon payments for voluntary eradication, technical assistance, and markets, are some of the identified components that the government must ensure in order to get the desired results.

Additionally, the study finds that the government must revert back to a path of implementation which has the comprehensive approach, as well as the territorial focus outlined in the policy for substitution. The first one, focuses on investing in human development that allows rural communities to live decent lives through a path of legality, instead of the path of eradication which lessons from past eradication only policies like the *Plan Colombia* show, exacerbates the poverty and inequality in these areas. The territorial focus on the other hand, will be important in tailoring the policies to better fit the different territories where it is applied, as the Colombian population differs so much from region to region, especially in these areas with little communication to the rest of the country.

Finally, the study recommends a coordinated effort by the national and international agencies working to implement these policies, to collect data into a single system which will improve the effectiveness of the monitoring effort and decrease duplication of efforts. The study also recommends for more studies on the factors that affect coca farmers to be conducted in other regions of the country, and for them to dive deeper and include anthropological considerations whenever possible.

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Abbreviations

ANT Land National Agency - Agencia Nacional de Tierras

ART Agency for the Renovation of the Territory

CICAD Inter-American Drug Abuse Control Commision

CRR Comprehensive Rural Reform

DPN National Department for Planning (Colombian Government)

FEDEGAN National Federation of Cattle Ranchers

FARC Revolutionary Armed Forces of Colombia

JEP Special Jurisdiction for Peace

ICA Colombian Agricultural Institute

IGAC Agustín Codazzi Geographical Institute

OAS Organization of American States

PDET Territorial Development Programs

PND National Development Plan

PNS National Sectorial Plans

POLIS Observatory for Public Policy – Universidad ICESI

RRI Comprehensive Rural Reform

UNDP United Nations Development Programme

UPRA Agricultural Planning Unit

1 Introduction

1.1 Backgroud

Despite its small size, Colombia hosts close to 10% of the planet's biodiversity, has 314 types of natural ecosystems and is crossed by mountain ranges of up to 5,775 meters. Due to the geography and its location at the Equator, Colombia is a "megadiverse" country, with more than 53.2% of its 1,14 million sqkm of land area covered by different types of tropical and Andean forests (CBD, 2019). However, the last decades have seen devastating effects on these regions via a period of war that, in its more than 52 years, has seen human rights violations as well as contributed to deforestation for the clearing of agricultural areas mostly for illegal crops of coca and in the most remote rural areas (Álvarez, 2003).

Violence stemming from the war has forcibly displaced an estimated 8.1 million people in the country since 1985 (Human Rights Watch, 2019). During this period of time, when leftist guerrillas fought the Colombian armed forces and illegal right-wing paramilitary groups, an estimated 47,000 people were enforcedly disappeared and 267,000 homicides were committed (García Trujillo, 2018). All parties have been responsible for human rights violations which have often gone with impunity (Amnesty International, 2014; Human Rights Watch, 2019). Environmental consequences related to the war and the illegal activities carried out in areas with limited state presence are also cause for concern.

Illicit crops, which are the basis for the production of illicit drugs, such as cocaine, have a toll on Colombia's natural resources. Even after clearing land for cultivation, high chemical inputs are used (in the form of fertilizers and herbicides) at various times during the growing of coca and prior to harvesting the leaves; and then again during the processing of coca paste and refined cocaine (Mejía 2016). This mixture of chemicals doesn't only erode the soil and pollute underground water, but sometimes end up being dumped directly into the water sources or burned on-site, when the illegal labs have been deemed obsolete or after being detected by authorities (Roa Castañeda et al., 2014; El Tiempo, 2018a).

The environmental and social impacts of illicit crops don't stop there. The Colombian government has tried different strategies in order to reduce coca crops throughout the years, including the spraying of non-selective herbicides to kill off the coca leaf in areas cultivated. These practices often leave small communities of farmers (some of which are harvesting legal crops), with no livelihood as the chemicals sprayed from aircraft affect all their crops and leave them with nothing (El Espcetador, 2018). This is only one example of a long history of a struggling peasant class fighting against land inequality and their exclusion from political participation (Fajardo, 2015).

Violence in Colombia has always revolved around tenure of rural land. A series of civil wars in the XIX century were unable to resolve problems of land, but instead gave way for a "monopolization of property" which only aggravated tensions in the first decades of the XX century (Fajardo, 2015). A first attempt at a rural reform to give rights to *colonos* and tenant farmers in 1936 by then president Alfonso López Pumarejo, culminated in a period known in Colombian history as simply *La Violencia* or "The Violence" (Fajardo, 2015; García Trujillo, 2018). This period which lasted from 1946 to 1966 gave birth to the Revolutionary Armed Forces of Colombia (FARC).

The years of decreased exports left the government that followed *La Violencia* with budgetary constraints to meet quotas of necessary imports to respond to agricultural development needs and to pay for post-war social necessities, such as food supply (Fajardo, 2015). These necessities were then partially met by the US, who had been left with a surplus stock after World War II and who had increased its food production to alleviate reconstruction efforts in Europe. The increase in imports made possible through laws like the *Ley 80 de 1953* along with a series of trade agreements, made it impossible for Colombian farmers to compete with subsidized agricultural products coming from developed nations (Pérez Zapata, 2016, Fajardo, 2015).

Parallel to all this, in the 1960s the country entered a stage of production, processing and commercialization of psychotropics. The traffickers saw the situation of the impoverished farmers who had lost their livelihoods, as a source of cheap labour, as well as a chance to access land far from State control at very low costs (Fajardo, 2015).

The large amounts of capital pouring into these cartels accelerated the concentration of land with the help of paramilitary groups which they could now pay to displace people through violent means, and of government and law enforcement officials, who they could now pay to turn a blind eye (McSweeney et al., 2016, García Trujillo, 2018). Similarly, guerrilla groups looked for sources of funding to increase their territory through illegal means. A period of dispossession of land, kidnappings, attacks to infrastructure (including oil pipelines) and major war between guerrillas and the Colombian military and paramilitary groups tainted the country´s history with decades of unprecedented violence (Fajardo, 2015).

In November 24, 2016, after four years of negotiations, a historic peace agreement between the Government of Colombia and the biggest guerrilla group FARC, was signed in La Habana, Cuba; marking the end of the world's longest internal armed conflict. The final version of the signed accord contains 578 Stipulations which are grouped into the following six items (Oficina del Alto Comisionado para la Paz, 2016):

1) Comprehensive Rural Reform, 2) Political Participation, 3) Agreement on the bilateral and definitive ceasefire and cessation of hostilities and laying down of arms, **4) Solution to the problem of illicit drugs**, 5) Comprehensive system for Truth, Justice, Reparations and Non-repetition (Transitional Justice) and 6) Implementation and verification mechanisms.

Items one and four focus on the improvement of the agricultural industry, the protection of the environment, the right to food, creation of an environmental zoning plan to delimit agricultural frontier and protecting areas of special environmental interest, and the substitution of illicit crops. Given the national scope of the implementation of the accord, both of these mentioned points have the potential to have major social repercussions, and impacts on the environmental sustainability of the country as well as its fragile ecosystems.

Both points of the accord have consequences for both society and the environment in the way of deforestation, soil pollution, as well as water and air pollution. Point four, section one (Substitution of illegal crops) of the accord focuses on changes in land use from illicit crops to something else (still to be defined), and, according to those who participated in writing the accord "goes hand-in-hand" with point one of the accord (V. Sandino, personal communication, February 18, 2019; A. García Trujillo, personal communication, March 6, 2019).

The Comprehensive Rural Reform (RRI) on the other hand is the foundation for rural development on the country and includes formalizing 7 million hectares of land (CINEP/PPP-CERAC, 2019), out of which 3 million hectares are to be given to victims of the conflict. Due

to the target population, a series of other interventions accompany the plan, including technical assistance and investment in infrastructure for tertiary roads, schools, health centres, irrigation systems, rural electrification, among others.

As of February of 2019, there have been little advances in items one and four, despite the significant advances in other points of the accord, like point six (Kroc, 2018). In total, according to the Kroc institute, which is the organization authorized by the Colombian government of monitoring the implementation of the peace accord, out of the 29 stipulations contained in point one, 38% have not yet been initiated and only 3 % have been completed. Point four has similar numbers, with a total 30% of its stipulations not initiated and only 2% being completed (Kroc, 2019).

Although the Comprehensive Rural Reform and the plan for substitution of illicit crops being the most talked about point of the accord, they are the least implemented so far. The ministry of Agriculture presented a resolution for the definition of the agricultural frontier, but delays in establishing legal and institutional measures to incorporate the Development Programmes with Territorial Focus (PDET) into the national participatory process, led to the clearing of more than 219,973 hectares of Colombian forests in 2017 (IDEAM, 2018).

Given the importance that establishing an agricultural frontier, formalizing land, and increasing access to market and to technical assistance (all contained in the RRI) has for small farmers' ability to subsist within legality; it is no wonder monitoring institutions such as Kroc see the implementation of point one as detrimental to point four (Kroc, 2018). In some rural areas of the country this strong connection between the two points is already being felt. El Tiempo reported in April 11 of 2019 that peasants in the Colombian countryside "continue to chop down trees in order to plant crops or place cattle because without coca [which they eradicated as part of the program of Substitution of Crops under the the umbrella of the Peace Accord] they are left with no option of livelihood" (El Tiempo, 2019b).

The lack of clarity on how the government plans to move forward to speed up the formalization of land seems to have had an effect on the people's willingness to move forward with voluntary eradication. Despite this, thousands of peasants have been reported to have removed an estimated 32,929 hectares of coca voluntarily under the PNIS or Comprehensive National Plans of Substitution (CINEP/PPP-CERAC, 2019), a study by US Office of National Drug Control Policy (ONDCP) found an 11% increase in the amount of hectares with coca plantations in Colombia which went from 188,000 hectares in 2016 to a record 209,000 in 2017 (The White House, 2018; Reuters, 2017).

Further, the International Narcotics Control Board, an independent organism within the UN, reported that Colombia continues to be the major producer of cocaine in the world with coca crops having "constantly increased from 2013 to 2017" (El Espectador, 2019), and that 34% of the areas where coca is being cultivated used to be forests in 2014 (UNODC, 2018).

The increase in the extention of coca crops in the Colombian territory, despite the signing of the accord and the removal of FARC from rural areas, along with an increase in cocaine production from 1,053 metric tonnes in 2016 to 1,379 metric tonnes in 2017; have prompted pressure from the US government on the newly appointed Colombian President. During his first official visit to the White House in February of 2019, President Ivan Duque of Colombia met with Jim Carroll, Director of the US Office of National Drug Control Policy. During the joint press conference that followed, Director Carrol emphasized how critical it was for Colombia to "continue to aggressively increase counter-narcotics efforts, including beginning an aerial spray eradication program" in order to reduce coca cultivation (White House, 2019).

This statement marked the beginning of the efforts by newly appointed President Ivan Duque to incorporate a program of aerial aspersion by the Colombian Government, a practiced that had been suspended in 2015 during the presidency of Juan Manuel Santos when a report by the World Health Organization found that glyphosate, the non-selective herbicide sold by Monsanto, was "probably carcinogenic to humans" (WOLA, 2019). On March 7, 2019 the Constitutional Court of Colombia held a hearing to "evaluate the risks of using glyphosate in the health of people" (Espinosa 2019). Pressure has increased ever since, as the US president, Donald Trump announced that he would ask the US Congress for a 46 % increase in the budget for fighting drugs in Colombia, if the country decided in favour of reinstating the use of aerial spraying of the herbicide (Espinosa, 2019).

Despite mixed results on the potential dangers of glyphosate to human health and that of the environment (Brain & Solomon, 2009; Camacho & Mejía, 2017; Dias et al., 2019; Myers et al., 2016; Solomon et al., 2007;); and research by the Universidad de lo Andes finding that "[m]anual eradication of coca cultivation has proven to be considerably more cost effective than aerial spraying with pesticides, while having fewer harmful side effects on the environment and inhabitants" (Mejía, 2016); the spokesmen for the Duque Administration still argued that "all tools must be used in the fight against illicit crops, including the use of herbicides" (Espinosa, 2019).

The transition from a country of violence and little to no state presence in rural communities (both in public goods as well as physical presence of security forces and institutions) fuelled by inequality, to a peaceful country; depends on the success of the implementation of the peace accord. Some of the identified problems hindering implementation are the scale of implementation, the lack of coordination among agencies, trust in institutions, security issues and political will (Kroc, 2018; FIP, 2018).

1.2 Problem Definition

Colombia has the opportunity to improve its economy with the territories that had previously been controlled by armed groups, but the the government has to ensure that this rural development is environmentally responsible, and that it prioritizes improving the lives of the poorest communities of rural Colombia. The alternative, which is expanding the agricultural frontier without proper programs in place, and oversight by a state that is indeed present in the rural territories, will leave small farmers and the environment vulnerable to agroindustry overexploiting in a business-as-usual manner. This means the government will have, for the upcoming years, the complex task of moving with both care and speed.

The internal conflict that lasted six decades has ended, at least in the traditional sense, and the country is now in the first stage of what post-conflict theorists call the stabilization period, which consists of the first 36 months in which the state tries to reduce violence, work with population previously under control of illegal armed groups to move them out of the circle of illegality, and prevent new illegal armed groups from claiming the recently "freed" territory (FIP, 2018). Access to land is therefore the state's best bet at resolving issues of violence, given the long history of the peasantry mobilization stemming from land inequality (Fajardo, 2015; Guereña, 2015), and its importance to satisfying basic needs such as food, housing and work.

Latin America is the number one region in the world when it comes to inequality in land distribution, and Colombia continually ranks as the worst country in the region. As recent as 2010, 62% of the country's best farmland was owned by an estimated 0.4% of Colombians. It is also estimated that 8 million hectares (or roughly 14% of the country's territory) have been

acquired illegally (Amnesty International, 2014; USAID, 2017). The government's subsidies and tax incentive schemes have encouraged Colombia's richest -including drug cartels- to retain land even if used inefficiently (Fajardo, 2015; McSweeney et al., 2017). These problems of inequality, which were to be partially solved by the signing of the peace accord and through the implementation of the rural reform, have only worsened, with the Gini coefficient for land inequality in recent years reaching a staggering 0.88, where 1 would mean all the land belongs to one person (Guereña, 2015).

And it is exactly this inequality, underdevelopment of rural areas, and poverty that fostered militant mobilization, illegal crops and drug manufacturing as well as criminality in the country for half a century. And all of the above problems require the use violence as a means to continue operating. Therefore, land reform that is accompanied by comprehensive socioeconomic development in the Colombian countryside is pivotal to a long-lasting peace (KROC, 2018). This means that any delays or non-compliance in the implementation of these two point could bring both environmental as well as social problems to some of the most vulnerable communities and ecosystems in the country. These problems can come from both legal and illegal activities.

Deforestation

Deforestation in the context of points four and one of the peace accord may occur due to two factors. In terms of illegal activities, the non-compliance by farmers who continue to clear forests in order to plant illegal crops (i.e., coca) or by illegal mining. According to Colombian authorities, the conditioning of areas for coca plantation is often done via burning, since the alternative often has an associated cost and time related to it, this means the under-utilization of the wood-based products (and other goods and services associated). When opportunity cost is considered, these forest areas have a great environmental and socio-economic potential, the loss of biomass reduces their capacity of sequestering carbon dioxide (CO_2) and reducing the release of methane (CH_4) to the atmosphere, affecting regional weather patterns and driving global climate change (Roa Castañeda et al., 2014).

The second factor, pertains to the the dichotomy of clearing land (which is illegal) in order to carry out legal activities. The expansion of the forest frontiers is done in the interest of legal economic interests such as logging, legal mining and oil exploitation, cattle ranching, oil palm and sugarcane plantations, which are generally carried out at large scale. This is specially preoccupying given the fact that the Colombian Rural Agricultural Planning Unit (UPRA) has found that 29 % of land, or 16,893,986 hectares are already underutilized, meaning they are used under the real production potential (Semana, 2019). Therefore, making better use of the land that is already being exploited, before continuing to expand the agricultural frontier, should be encouraged.

The existing discrepancy between the agricultural potential of land and the real use of land in rural Colombia is another problem during post-conflict. Calculations from 2012 by the Agustín Codazzi Geographical Institute (IGAC) placed the land with potential for agriculture at 22 million hectares and for cattle ranching at 15 million hectares. However, the real use in the calculated period was 5 million hectares for agriculture and 34 million hectares for cattle ranching (IDEAM, n.d.).

Although provisions were put in place in the peace accord in order to solve this issue, the ratio seems to be getting worse. In a recent presentation by the Colombian Ministry of Agriculture, their Technical Secretary for the National Council of the Meat Chain reported that currently a

total of 37,490,575 hectares are dedicated to livestock, while only 3,320,755 ha are dedicated to food crop production (Garnica Gómez, 2018).

Some of the ideal conditions which the accord is trying to provide to rural communities, would also translate to benefits for agroindustry and deforestation. Building tertiary roads in order to connect rural farmers will decrease prices agroindustry pays to move their products, while the sole building of roads means clearing forests. Once more remote areas are connected, there will be incentive to continue colonizing forests that are even more remote.

Observing the rate at which forests are being cleared after the signing of the peace accord suggests that forests were better protected when illegal armed groups had established a social order that set rules and monetary costs for clearing forests (Arjona, 2016; El Tiempo, 2019b).

Soil Pollution

Soil Pollution may occur, in the context of illegality, as farmers continue to use large amounts of fertilizers and pesticides on illegal crops to increase and protect the yields of the coca (Mejía, 2016; Brain & Solomon, 2009). Tropical forests have a low concentration of nutrients and high acidity. This gives the microbial life very favourable conditions, but hinders the soil's capacity to accumulate organic matter. This in turn, makes for faster soil carbon cycles and a thinner cover of hummus in the soil. When the burnings of vegetation occur in order to give way to coca plantations and their associated activities, the hummus is lost and the soils are therefore degraded. These changes, along with those in humidity of the soils, albedo, and changes in radiation due to loss of cover, have negative effects on soil biota (Roa Castañeda et al., 2014).

Some indirect causes for soil pollution arise from the processing of coca leaves into base, a process that uses sulphuric acid, lime, kerosene and ammonia, among other chemicals. The process of turning the base into cocaine also uses chemicals such as acetone, ether and hydrochloric acid. All of these chemicals are said to, at some degree, leach into the soil according to studies by the EFFACE.

Continued increases in the amount of land dedicated to illegal crops will likely mean aerial spraying and fumigation with glyphosate. Although mixed results have been obtained from studies on the effects of glyphosate on fauna in Colombia (Brain et al., 2009; Camacho & Mejía, 2017; Solomon et al., 2007) some of these point at negative effects of glyphosate on soils. A study by Myers et al. (2016) found that "the half-life of glyphosate, which gives an indication of its persistence in the soil and water, is believed to be longer than previously thought"; while research by Mamy et al. (2016) found that "the herbicide persists longer with the return of crop residues containing glyphosate to the soil".

Legal alternatives such as logging, legal mining, cattle ranching and sugarcane typically lead to soil pollution due to changes in radiation, high use of fertilizers, burnings and glyphosate for maturation (in the case of sugarcane), among others.

Water pollution

Water pollution may occur due to various factors, again, stemming from illegal practices as well as the legal land use. According to a study conducted by Roa Castañeda et al. (2014) for the Narcotics Division of the Colombian National Police, the majority of the tropical soils on which coca is cultivated are categorized as being nutrient poor and are often saturated with aluminium and acidity. Since these are soils with low agricultural potential, high quantities of fertilizers and pH correctors have to be used in order to keep up production. This means that during the illegal

crop cultivation stage, contamination of water sources via runoff and infiltration of the soils occur.

During the processing of coca leaves into coca base and coca paste, there are additional chemicals used. The European Union Action to Fight Environmental Crime (EFFACE) reports that an "estimated 200 million gallons of kerosene 8 million gallons of solvents, 2 million gallons of sulphuric acid, 1 million gallons of hydrochloric acid and 25,000 gallons of ammonia are used to make cocaine [world-wide] every year"**.** Although these are global numbers, Colombia as the largest producer of cocaine "accounted for more than 60 per cent of the global total" according to the 2018 World Drug Report (UNODC 2018), so it is safe to assume that a large portion of these chemicals are being used on Colombian soil and running off to Colombian water sources.

The most prevalent legal alternative is also of concern, as it has been reported that livestock farming uses up almost a tenth of the total utilization of fresh water by humans in the world (FAO, 2017). The livestock farming sector is probably the mayor cause of water contamination, contributing to the eutrophication, the generation of dead zones in coastal areas and damage to coral reefs. The major causes for water contamination are animal residues, the antibiotics and hormones used in livestock raising, the application of fertilizers, and use of pesticides (FAO, 2017).

Air pollution

Air pollution arising from illegal crops can happen due to many of the practices related to the clearing and adapting land, farming and processing of coca leaves into coca paste and coca base. The first cause occurs during the clearing of the forests and conditioning of the land to plant coca leaf. For logistical and monetary reasons, the clearing of the forests is often done through burning and causes increases in amounts of CO2 emissions. In 2014, Colombia held the third place world-wide in air pollution due to forest burnings (Roa Castañeda et al., 2014).

During the processing stage accumulation and burning of trash occurs. The high temperatures generate chemical transformations that sometimes increase the toxicity of some of these products and generate dioxins, furans and tar (Roas Castañeda et al., 2014).

Legal economic activities that have increasingly been adopted as substitution, such as livestock farming have high carbon footprints. According to FAO, the livestock sector generates 14.5 % of all human-induced CO2 emissions (FAO, 2017), most of it coming from cattle ranching for meat and dairy production. According to the Colombian Ministry of Agriculture and Rural Development, the size of the bovine livestock industry has grown by 16.21 % from 22,689,420 animals in 2016 to 26,367,814 animals in 2018 (Garnica Gómez, 2018).

Similarly, the upcoming years of implementation will have serious consequences on the people who live in the areas that traditionally had coca crops, both in the scenario of continued coca cultivation, or the alternative where substitution happens. The major **social problems** that arise during the implementation of the peace accord identified are poverty and food security, health and security.

Poverty

The peace accord taken at face value has the potential to ameliorate the situation of poverty of many of these rural communities. Infrastructure plans for rural communities include tertiary roads that will give farmers (both who substitute illegal crops or who are being given restitution land) access to markets; access to basic services; schools and health centres; all of which target

the 5 dimensions of multidimensional poverty. However, delays, non-compliance in implementation and lack of state presence also have the potential to worsen the situation for many rural communities. If the farmers substitute to a different crop (perishable crop like pineapple) and they have no access to markets, for instance due to the absence in tertiary roads to transport their goods, they will be left with no profit, rotting products and likely debt from substitution investment (Harris & Thornell, 2018; The Economist, 2018).

Delays in improving the integration between the national registry and national cadastre mean no formalization of rural land titles. Informality not only hinders the states' ability to collect taxes (often from large landowners) (CONPES, 2018), it also disincentivizes people who are working with illicit crops to substitute them (KROC, 2018). Continued cultivation of illicit crops by people who have no other ways of subsistence, leaves them vulnerable to non-selective eradication practices. This is specially preoccupying as a common practice is for small farmers to intercrop the coca with other cash crops (The Economist, 2018).

Informality may also mean that there is no legal person responsible for any violations of environmental malpractices, such as deforestation via burning, as there are no titles linking the land to a particular individual (El Tiempo, 2019b). The Colombian state's capacity to increase its presence in the rural areas where, due to the conflict, they had none; will be of extreme importance during the rolling-out of policies in the accord.

Another possible case to worsen the poverty levels can be done by "legal" actors. Given the frequent informality of land ownership, delays in land titling would allow for economic interest groups the possibility to remove people from the land they are inhabiting. The prospects are not difficult to imagine as Colombia has a long history of this practice, which has displaced thousands of families in the past (Muñoz & Arias, 2011; Centro Nacional de Memoria Histórica, 2015).

Food Security

Continued delays by the government to provide the farmers who signed substitution agreements with payments, seeds and technical assistance promised, may leave these people in dire situations (CINEP/PPP-CERAC, 2019). Delays in providing tertiary roads to remote rural communities may mean the loss of their crops or recidivism. This will make these populations vulnerable to eradication, which, due to intercropping can in some cases mean loss of their livelihoods, or at the very least the loss of months-worth of their work.

Security

If the limited state presence in rural areas continues, then the security issues will continue to occur, given vast amounts of exploitable lands that are now available for smaller violent actors, including the FARC defectors. Lack of guarantees on security for families of cultivators and for verification entities, is one of the major obstacles to the programme of substitution. During 2018, a total of 10 members of the security forces died in the middle of eradication activities, while another 52 were injured by anti-personnel mines. The areas most affected by insecurity derived from the presence of groups associated with drug trafficking are the regions of Catatumbo, Bajo Cauca antioqueño, Cauca and Nariño (CINEP/PPP-CERAC, 2019).

A report from January of 2019 by the United Nations High Commissioner for Human Rights expressed security concerns after finding that massacres in Colombia had increased by 164 % in 2018, compared to 2017 numbers. The report also highlights that in almost 50 % of the

municipalities there has been an increase in the number of homicides, and that 110 social leaders have been murdered (UNOHR, 2019).

Coordination is at the very core of the problems with implementation of the peace accord, especially points four and one. Agencies concerned with agriculture, land registry, economic development, education, health, infrastructure, law enforcement and justice reforms, just to name a few only at the national level, are all meant to work together in the implementation of the policy of substitution of illicit crops (Oficina del Alto Comisionado para la Paz, 2016; CINEP/PPP-CERAC, 2019).

So far no studies looked at the environmental impact of the policy of substitution of illegal crops in both of its possible scenarios (of success and of failure) to establish the environmental effects in each case. Furthermore, no study has been conducted which analyses the dilemma facing the smaller-farmers that includes influences from national and international policies, market drivers and behaviours as well as influence from illegal armed groups.

The purpose of this thesis is to investigate the potential environmental impacts that the policy of substitution of illegal crops may have in the Colombian territory for both a successful implementation scenario, as well as a failed one. I will further discuss the consequences of the most prevalent alternatives to coca, how they are already affecting the environment and communities living in rural areas of the country and finally, whether or not the concept of legality is a differentiator for the environment and the wellbeing of rural Colombians.

Finally, this research aims to identify where the state is falling short in its attempts to give farmers a fair chance at substitution that is both under the parameters of legality and that can allow them to live decent lives; while looking at some of the contradicting policies of substitution and eradication that the government uses. This thesis analyses the dilemma of small farmers, including the external factors -both international and national and both visible and invisible- that are guiding farmers' decision to substitute or to continue cultivating coca.

1.3 Objectives and Research Question

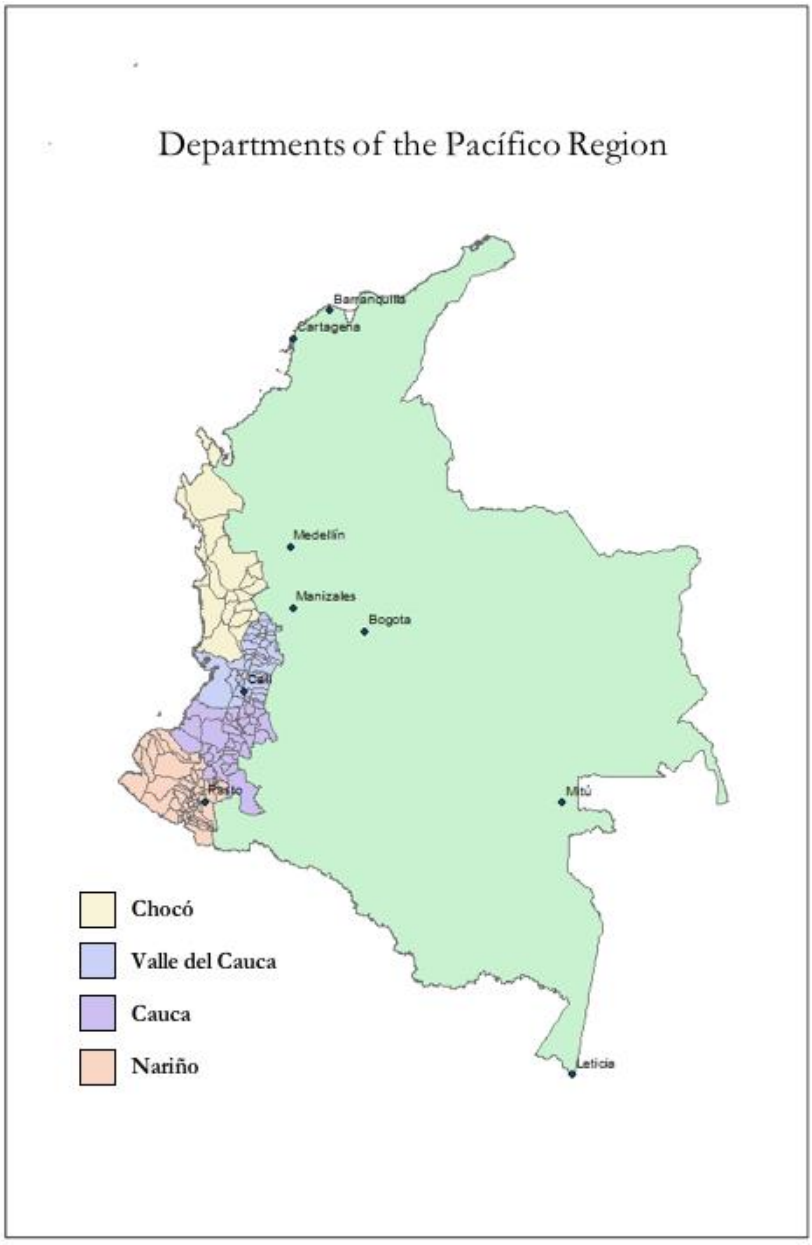
This study aims to enhance the understanding of the environmental and social repercussions of the policy of substitution of illegal crops (and its complimentary comprehensive rural reform) set forth by the Colombian government, taking into consideration the socio-economic and socio-political instances that have led Colombia to become the largest exporter of cocaine, and the factors that small farmers have to consider when making a decision to substitute. The study seeks to answer the following questions:

1. What are the environmental (and social) impacts of the policy of substitution of illegal crops?
    a. Are there environmentally friendlier alternative crops available?
2. How can the state help farmers to effectively substitute coca crops, considering the recent trends?
    a. Why has there been an increase in coca?
    b. What motivates small farmers to continue with coca crops?
    c. How do small farmers perceive the governmental substitution program?

1.4 Limitations and Scope

The research focus is the Pacific Region of Colombia, constituted by the 4 departments of Cauca, Choco, Nariño and Valle del Cauca. The Pacific will receive funding of $136 trillion pesos (US$49.7 billion) for a "Regional Pact" that has been decided in the peace accord. The objective of this plan is to give autonomy to the regions to design their own development plans, based on their own needs, under the umbrella of the national government's finalized National Development Plan. The Pacific Pact has as its objectives to increase the cover and quality of public services, foster legal productive development, improve the environmental management and land-use planning, and improve the infrastructure of intermodal transport, ports and logistics (DNP, 2019).

Figure 1-1 'The four departments of the Colombian Pacific Region'



Source: Author´s elaboration with ArcGis open-source data

The region has experienced high levels of violence after the signing of the peace accord (DNP, 2019; UNOHR, 2019). The removal of the biggest actor (FARC) from rural areas of this region

have created a vacuum where state presence is still not guaranteed. This, in turn, has opened the space for smaller (yet very violent) actors to become more and more prominent, especially in the departments of Nariño and Cauca, which have seen some of the highest concentration of coca crops in the post-conflict, 45,000 ha and 16,000 ha respectively (UNOHR, 2019). This has brought negative environmental consequences to all the Pacific Region like the 13,000 hectares of forest that were cleared in 2017, and which made Chocó sixth in the list of department with the most deforestation for that year. Additionally, the DNP reports that 32.1 % of the population of the region lives under monetary poverty, which is above the national levels (DNP, 2019).

This increase in violence placed a limitation to the study. Authorities recommended not to enter areas of the Pacific region with a history of coca crops, especially those in Nariño and Cauca. The United Nations reported that in 2018 the departments with the highest numbers of massacres included Cauca, where illegal armed criminal groups pressure social leaders in order to continue with delinquent activities (UNOHR, 2019). As a matter of fact, in the weeks previous to the planned visit to Cauca (Corinto), where interviews were going to be taken for this study, 200 people were displaced, and schools were shut down after various shoot-outs occurred (El País, 2019; RCN Radio, 2019). A delegation of the National Unit for Disaster Risk Management that had agreed to let the researcher accompany them on their site visit in Corinto, and who are always accompanied by security forces, cancelled the morning of due to the "high security risk" concerns.

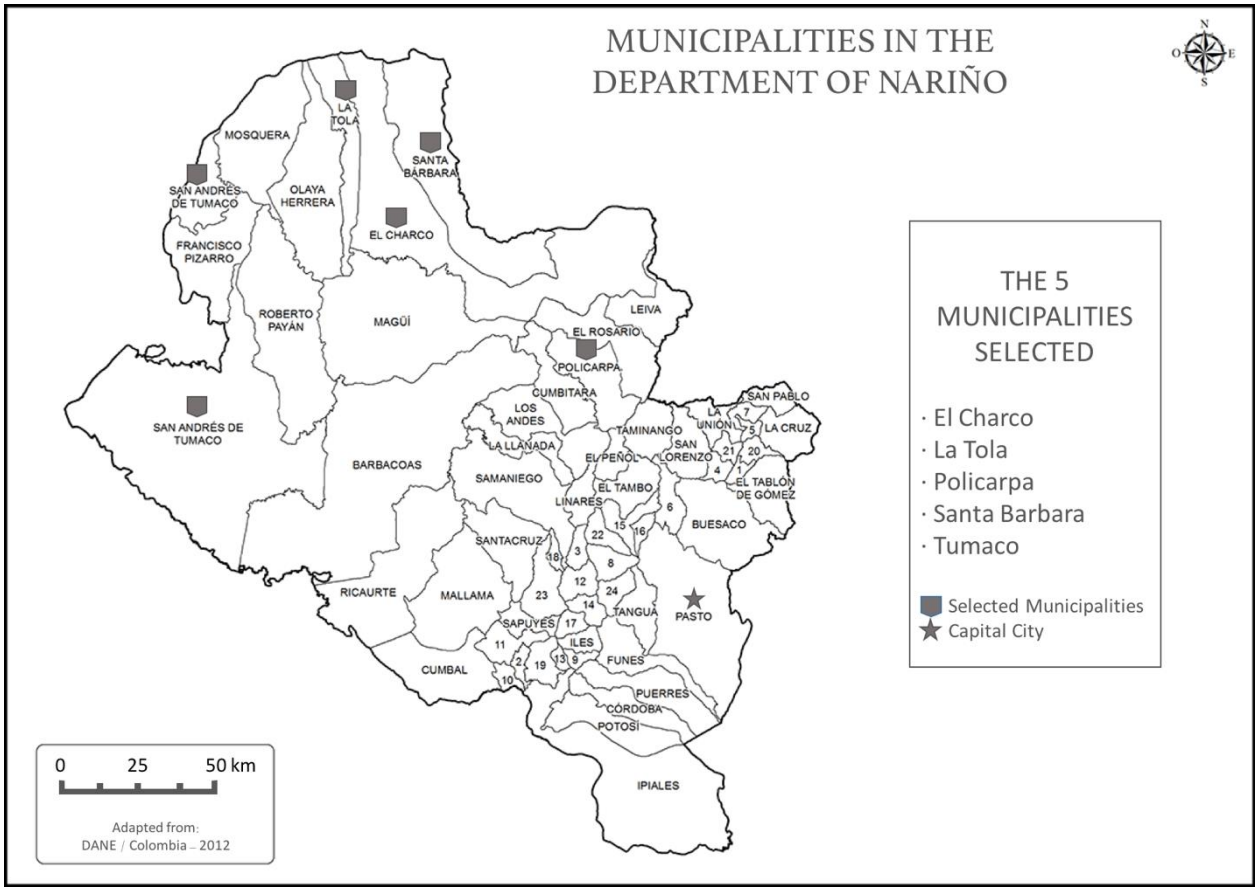
Luckily, during the stay in Cali, a contact was made to speak to the director of the Observatory for Public Policy of Universidad ICESI (POLIS) who, upon listening to the research topic and scope of this research, mentioned she had a dataset that they had recently collected in 5 municipalities of the department of Nariño, through financing by the Ford foundation.

What POLIS did, in order to keep researchers out of danger zones of Nariño and to increase their chances at getting credible and complete information was both simple and genius. They used the help of a group of recipients of a scholarship program that rewarded community leaders of Nariño with the possibility of studying at Universidad ICESI. With their access to the areas as well as their status as insiders, the students were able to complete a total of 264 surveys from peasants in some of the most insecure coca growing municipalities in Nariño. The surveys, which are confidential, were designed in house by POLIS, are a comprehensive set of 109 questions which include questions on demographics, land ownership, extention and productivity of coca crops, income related, perception of authorities, among others.

These surveys were collected by POLIS in the following five Municipalities of the department of Nariño:

- Policarpa
- San Andrés de Tumaco (henceforth Tumaco)
- La Tola
- El Charco
- Santa Barbara de Iscuandé (henceforth Santa Barbara)

Figure 1-2 'Municipalities in the department of Nariño'



Source: DANE Colombia 2012

According to information on the official website of the government of Nariño, in 2016 the department placed eighth in the country in deforested area with a total 7,765 hectares of forest being cleared, most of it for coca crop production, the enlargement of the agricultural frontier and illegal logging.

The Forest Reserve Zone of the Pacific covers an area of 8,010,504 hectares (IDEAM, 2005), and 22 out of the total 81 Municipalities it has jurisdiction over are in the department of Nariño. All five municipalities surveyed are within this forest reserve. Although only 21.95 % of the area of Nariño is covered by the reserve, when we look at the five municipalities from the study, these numbers are much higher. The area covered by this reserve in the municipalities of El Charco, La Tola, Santa Barbara and Tumaco are 88.5 %, 77.5 %, 76.62 % and 50.11 %, respectively (IDEAM, 2005). The municipality of Policarpa had incomplete data and therefore I was not able to make measurements.

The department of Nariño has the second largest amount of families linked to the PNIS, with a total of 19,151. Further, the five municipalities covered by this study are ideal to understand what type of changes are needed in order to properly carry out the implementation of the program of substitution of illicit crops. The municipalities are in remote areas, far from the department capital; they experience high percentages of monetary and multidimensional poverty; they are amongst the municipalities with the most coca planted; they are currently being disputed by various illegal armed groups; and they are all within natural reserve. The area covered may, therefore, be used as a reference to other regions where there is latent conflict

between conservation efforts, illegality, expansion of the agricultural frontier for legal purposes and rural communities trying to subsist (CITATION).

1.5 Ethical Considerations

This research topic was chosen by the author. The collaboration with the Observatory of Public Policy (POLIS) at Universidad ICESI is the result of common research interest and does not entail any financial contribution.
Students of the Masters in Environmental Science, Policy and Management at the International Institute of Industrial Environmental Economics at Lund University are to carry out their Masters thesis project in accordance with the ethical guidelines described by The Swedish Research Council (https://publikationer.vr.se/en/product/good-research-practice/; ISBN: 978-91-7307-194-9).

The surveys delivered to all 264 respondents in the Nariño region were conducted by Local Social Leaders (through POLIS) and were all kept anonymous in order to keep sensitive information from being attributed to individuals, thus keeping the participants safe from armed groups operating in the area.

Authorization for the use of information was obtained for interviews via forms which were delivered to all interviewees in order to ensure consent to use the information for the final document. Whenever recordings were made during the interviews, the researcher informed the interviewee and requested authorization to do so. The recordings are not to be published or distributed in any way or form and were used with the sole purpose of note-taking to ensure accuracy when quoting interviewees. The researcher committed to send digital copies of the interviews to the interviewees.

1.6 Audience

This thesis project will be relevant to Colombian policy makers, especially those that belong to institutions either established primordially for or strengthened by the peace accord (such as the National Agency for Reintegration - ARN, Special Jurisdiction for Peace - JEP, National Centre for Historic Memory, Land Restitution Unit – URT, and the Unit for Victim Reparations) as it is meant to better inform them on the gaps perceived by local stakeholders, and civil society, which are not permitting a smooth implementation process. The research will also be relevant to countries that have been donating (or are planning to donate) to the fund designated for the completion of the points agreed within the framework of the Peace Agreement.

Lastly, this paper will be relevant to academics who are interested in the implementation of Peace Accords, Comprehensive Rural Reform, Land redistribution schemes, Substitution of illegal substances, governance and policy design for rural development.

1.7 Disposition

This paper is divided into 5 sections. Following this introduction:

Section 2 describes the theoretical considerations, the surveys conducted in the Nariño Pacific region, stakeholder interviews and field visits in Colombia;

Section 3 recounts the data and the results of the study from the literature review, the stakeholder interviews conducted and the data collected from the surveys of Nariño. It also contains a brief summary of the process of coca cultivation as well as the processing into cocaine, due to the importance that that relationship has to the study of the policy of substitution;

Section 4 goes through the discussion and analysis of the data collected and sets the stage for; and finally

Section 5 provides conclusions of the study as well as highlights the need for future investigations into the issues of land inequality, crop substitution, and market connectivity in post-conflict.

2 Methodology

2.1 Overview of the Methodology

The overall approach taken by the author consists of a mix of literature review; interviews with stakeholders including government representatives and civil society, researchers, academics, people affected by aerial aspersion; field visits and lastly; the data analysis of 264 surveys of coca growers collected by POLIS in the Nariño-Pacific Region of Colombia.

The literature review of official documents like the peace accord itself and from monitoring agencies, were initially used as a way to prepare for the field work in Colombia. Gaining knowledge of the peace accord signed between the two parts, as well as the different institutions charged with implementing it, was instrumental in preparing the interview questions. After this stage, the literature review served as a guideline to better understand the pattern followed by responses both from the interviews as well as from the surveys of people in areas of high concentrations of coca crops.

The scope of this study contemplates all state actors involved in the implementation of the Peace Accord including (but not limited to) the Special Jurisdiction for Peace (JEP), Agency for the Renovation of the Territory (ART), National Land Agency, Office of the President of the Republic (of Colombia), members of the Senate, the DNP, as well as policy experts from international organizations such as the Inter-American Drug Abuse Control Commission (CICAD) within the Organization of American States and the United Nations Development Programme, as well as agricultural engineers, small-scale farmers and leaders of peasant grassroots movement.

The interviews with stakeholders were done in a span of 3 months, in person, via telephone and email. They served as a way to gain knowledge of the perspectives of those people who were part of the design, negotiations and now, of the implementation of accords four and one.

The data from the surveys was helpful in putting into perspective the various policies set out by the last government when signing the Peace Agreement and the various modifications that the current administration, has done and is planning on continuing to do through its National Plan for Development. It was also useful in corroborating the trends found by other researchers, or to establish the differences and to understand why those discrepancies where occurring in our sample.

2.2 Theoretical Considerations

Although this research aims to understand the environmental impacts of the policy of substitution of illicit crops, and finding a way in which the state can effectively substitute coca crops specifically; it recognizes that both of those questions are guided by socio-political structures. This structures may be affected (hopefully towards a more sustainable outcome) through better-informed policy. For this reason, the study set out to better understand the decision-making processes of communities who lived in conflict zones as well as the groups that were in control, and how their decisions affect the naturual environment of these conflict zones.

In *War and wildlife: linking armed conflict to conservation*, Gaynor et al. (2016) summarize 144 case studies of armed conflicts and how they affect conservation efforts. Out of the 24 identified pathways linking armed conflict to wildlife outcomes, the most cited pathways reflect changes to institutional and socioeconomic factors and not tactical aspects of the conflict (Gaynor et al.,

2016). This means that it is the activities that come from a state of conflict and not the act of conflict which mostly affect the environment.

Gaynor et al. also identifies that there is often an overlap between the areas where armed conflict and biodiversity occur, and that a better understanding of the links between those two (armed conflict and conservation) is essential to decision making (Gaynor et al., 2016). Although this study does not specifically intent to address the issue of biodiversity but instead focuses on deforestation, soil pollution, water pollution and air pollution; it recognizes the link between those environmental problems and biodiversity loss.

Similarly, conflict researchers Douglass & Alie have identified connections between high-value natural resources to social conflict, insecurity and development concerns (Douglass & Alie 2014). In terms of conflict, Douglas & Alie (2014) argue that although high-value natural resources (commodities that in their natural state have the potential of yielding substantial revenues) have the potential of bringing prosperity and a peaceful future to the areas where they are found; they instead tend to do the opposite, and bring upon the "resource curse" or (the paradox of the plenty). These resources generate a situation that often encourages corruption and directly finances armed uprising (Douglas & Alie 2014; Matthew et al., 2009).

The concept of high value is influenced by the socio-economic structure of the region where its found, the availability of the resource and the strength of the demand for the commodity (Douglas & Alie, 2014). Ross (2004) argues that, although there are often many causes for conflict, these resources exacerbate the problems especially in times of high demand, and in states with weak institutions. In the case of Colombia, for example, the emergence of guerrilla groups and the subsequent internal war did not start with cocaine, but it has in fact worsened the situation of conflict and corruption as it has given these organizations vast financial capital with which to assert dominance over territories via bribery, harassment, threatening, violence, etc.

Douglass & Allie (2014) also identify that although other forces are perhaps more important to the business of these high-value resources, poverty and inequality tempt populations into participating. This study departs from this assessment and studies the choices of those living in where the high value coca is being produced.

Although poverty and inequality bring small players into the business (small *cocaleros* and the *jornaleros* working on coca crops) there are several large-scale criminal organizations involved in taking the coca, processing, trafficking and then selling it in international markets which obtain large financial benefits stemming from these activities. This distinction is important, as currently both the small players (cocaleros and jornaleros) as well as large scale traffickers, under Law 30, are prosecuted in the same way, regardless of the size of their plots or their standing in the or outside a criminal organization.

Research by Le Billion (2012) highlights a problematic that occurs during the post-conflict era. The high prices of these resources creates a perverse incentive, especially in cases where members of armed groups were "demobilized" but are not always reintegrated into the economy (Le Billon, 2012). The danger with these demobilized groups is that their previous training, as well as their knowledge of the areas and businesses related to the high-value resources, puts them in a privileged position to continue exploiting said resource (Douglas & Alie, 2014). This theoretical work may be used in understanding how the government must continue to exercise control over the territories that were abandoned by the FARC and were new groups have moved quickly.

The findings from these works are used to complement the understanding of the the various factors that affect the decision-making process of small farmer. Understanding their response to constraints helps to build a better narrative of what the government must focus on first (from the comprehensive substitution scheme) to get these farmers' buy-in.

Poor governance in states where these resources are found make them vulnerable to corruption and patronage, which can in turn contribute to poverty and a continuous detriment of governance (Douglass & Alie, 2014; Suleiman & Karim, 2015). This corruption can in turn affect the way in which environmental policies are implemented and enforced. Where economic under performance is present and when there are high levels of corruption, officials at every level of the government often become absorbed by the trafficking networks (Douglass & Alie, 2014).

Research by Arjona (2016) identifies how the regimes that armed groups use in order to regulate conduct in an area, depending on the social structures that were already in place before the armed group occupied that territory. The armed group may decide to asses control in a very hands-on way in one town, and then through very indirect ways, like communicating with the community leaders of the town and letting them do their bidding with the community, rather than try to affect the community directly. These strategies used by the armed are proof of the importance of conducting anthropological studies of the various territories where the government plans on implementing the PNIS, as every territory is different and their people will react differently to a particular way of governance. Hence, the Territorial Focus proposed by the accord, and which this administration is not paying much attention too, should be taken seriously.

As expressed in the theory of Wartime social order (Arjona, 2016), the "war zones are not what many would believe them to be chaotic and anarchic, but on the contrary, war zones are often orderly and allow for some sort of normality to exist among those who reside there. One aspect of that sense of normalcy is the fact that there are institutions which the armed group with control of the area use to regulate conduct of the people living there."

We try to understand how this sense of normalcy (in the presence of illegality) could be preventing communities from adapting to the sense of normalcy in legality, which the new group in control of the area (in this case the government), which may have never had presence in some areas.

Finally, based on the theories considered above, and with the understanding that the decision/making process of the farmers' response to exogenous structural conditions that he/she might not be aware of but that nevertheless affect him/her; a sketch of the various factors affecting the farmer is presented. The sketch presented is the "dilemma of the small farmer".

2.3 Survey (from POLIS)

The survey designed by the the Observatory of Public Policy (POLIS) at Universidad ICESI, is a 107-part questionnaire (Appendix 1) which has been designed in order to obtain data that could help the university in finding trends among farmers who are living in areas of high concentration of coca crops. The survey has the necessary information to build a Multidimensional Poverty Index with the answers obtained. The questionnaire is meant to serve as both a source to define, among coca cultivating areas, traditional levels of well-being (as seen by the government) as well as subjective well-being levels.

The sections and themes discussed in the survey are as follow:

Questions 1 – 17 concern demographics including information on the municipality where the respondent lives, gender, year of birth, occupation, ethnicity, marital status, household size, as well as information on the conditions of the house in terms of ownership and the public services to which it is connected;

Questions 18 – 24 concern education of the members of the household, including instances f government assistance;

Questions 19 – 34 are related to the health and subjective well-being of the household, including information on insurance and access to healthcare as well as a question asking for aspects in the respondents life that are missing in order to be "satisfied";

Questions 34 – 38 offers an insight into the families' finance including the individuals' participation in illegal crop activities, and their position and wages in those activities;

Questions 39 – 53 has general information regarding coca crops, including reasons for participation, years of participation, plans to diversify or leave the business, conditions under which they would be willing to move away from coca crops, benefits obtained, occasions in which they have moved from coca crops as well as reasons for relapse;

Questions 54 – 58 delve into land ownership, including their land belonging to athe denominated territorial ethnical entities;

Questions 59 – 69 is very important to this study as it offers detailed information of the coca crop sizes, productivity and increases in yields, intercropping information, water usage and use of chemicals including fertilizers, pesticides, and herbicides;

Questions 70 – 73 deal with machinery and equipment used;

Questions 74 – 76 ask about the destination of the coca crops and the perceived ease of commercialization;

Questions 77 – 79 account for the monetary gains of harvest, as well as initial investment and related costs per harvest cycle, which allows us to calculate profits;

Questions 80 – 87 collects information on proximity to deterrents from government to cease cultivation of coca crops, as well as information on any personal or known case of illness from aerial aspersion;

Questions 88 – 90 asks about participation in coca-producer's associations;

Questions 91 – 101 relates to substitution of coca crops and, the responders' participation in the past and in the future, the motivations to do so, the perceived effectiveness of such programs, knowledge of programs' funding, satisfaction with it, willingness to participate in the future and perceived problems with such programs; finally

Questions 102 – 109 are related to the participants' perception of their local as well as their national government, including a scoring of the different entities and their involvement with their community.

Table 2-1 below, gives a clearer picture of the amount of questions that were dedicated to each of the 14 sections of the survey design:

Table 2-1 'Weight of thematics in questionnaire by POLIS'

	Data type	**Questions**
1	Demographics	18
2	Education	6
3	Health and subjective wellbeing	10
4	Family Economy	4
5	General Information	15
6	Land tenure regime	5
7	Extion and productivity of land	11
8	Machinery and labour	2
9	Destination of the harvest	3
10	Income and costs associated with the production of coca leaf	3
11	Methods of control and sanction	8
12	Coca producers' association	3
13	Substitution of illegal crops	11
14	Perception of authorities	8

Source: Author´s elaboration based on POLIS questionnaire farmers in Nariño

As mentioned before, the sections described above contain the five necessary indicators for establishing a Multidimensional Poverty Index: education conditions of the household, conditions of children and adolescents, health, labour, access to public domiciliary services and housing conditions. However, this study is not a Multidimensional Poverty Index, and will not be using MPI as a framework, instead, it will use those indicators to try to establish a connection between unmet needs and the cultivation of illegal crops.

Although the survey was designed for other purposes; it is evident that the vast majority of it's questions could be used for the purposes of answering this work's research questions. There are a few key questions which allow the possibility for segmentation, like Question 35. (have you worked in illicit crops in the last 5 years?) which allowed me to differentiate the population between those who have been living through legal means, versus those who have either fully or partially been subsisting through the cultivation of illegal crops. This is important, as it allowed me to compare living conditions, profits, use of chemicals, health, among others; of those participating "illegal" activities and those who where not.

The surveys of all the 264 respondents were put into an excel spreadsheet and then categorized into sections. Each one of these sections was meant to find answers to the research sub-questions that this investigation tries to answer. Segmentation techniques were used in order to establish differences between a sub-samples of the population (i.e. coca growers, households under poverty line, those who received threats, size of plot, types of life improvements perceived, landowners, inter-croppers) and try to establish reasons for continued participation in activities related to illegal crops.

The breakdown of the surveys in terms of the municipalities compared to the actual population is as follows:

Table 2-2 'Break down of survey population per municipality v. actual population'

Municipality	Number of respondents	Percentage of respondents in sample	Actual population of municipality in 2018
El Charco	15	5.68%	41,042
La Tola	55	20.83%	14,230
Policarpa	70	26.52%	17,783
Santa Barbara	50	18.94%	14,559
Tumaco	74	28.03%	212,692
Total	**264**	**100%**	**300,306**

Data Source: DANE 2019

2.4 Stakeholder Interviews

Interviews were conducted with members of the current government of Ivan Duque (as well as those involved in negotiating the accord) charged with implementation of Rural Reform and solution to the problem of illicit drugs; international organizations that have supervised the implementation of the agreement; and with members of the rural communities which have either been displaced or whom are living in regions with affluence of illicit drug crops and processing facilities.

Colombia proved to be a country where "who you know" matters. Although it was tried for weeks previous the field work to communicate through official channels with government agencies, most of the interviews, were ultimately scheduled with the help of former work colleagues as well as family and friends are working in different branches and levels of the government. In some cases, the staff of the interviewees were very helpful in scheduling a meeting, in other cases, the most effective way was to sit outside the office of the representatives and wait.

Sometimes the contacts that were given were unresponsive from the beginning, while in other cases the whole bureaucratic process was followed, and after contacting a political or economic advisor, then their administrative assistant, set up a meeting, sending the

questionnaires previous to the actual interview; it was communicated that the meeting had been cancelled hours before it took place.

In such cases either a new contact was tried, or the approach was changed in order to get written responses rather than a face-to-face interview. In other cases, such as the ones with the National Land Agency (ANT), the Agency for Renovation of the Territory (ART) and the Administrative Office of the Presidency, a formal request as a private citizen was filed, in the form of a right of petition, through the System of Petitions, Complaints, Suggestions or Claims. To the day, the ART has been the only agency which responded to the formal request within the law-stipulated time.

Government:
Andrés García Trujillo, Advisor Office of the High Commissioner for Peace of Colombia

Agency for the Renovation of Territory (Through right to petition mechanism)

Hon. Senator Victoria Sandino, The Common Alternative Revolutionary Force (FARC)

Hon. Senator Alejandro Corrales E., Democratic Centre Party

Maria Gabriela Villota, former Territorial Coordinator in Nariño, Agencia para la Reincorporación y la Normalización (ARN)

Oscar Rivera Luna, Advisor, Consejo Territorial de Palmira

International Organizations:
Adriana Henao, Former Director, Comprehensive and Sustainable Alternative Development Program, Inter-American Drug Abuse Control Commission (CICAD-OAS),

John Grajales, Anti-Money-Laundering Specialist, Inter-American Drug Abuse Control Commission (CICAD)

Academia:
Elizabeth Martinez de Londoño, Investigation group in agroecology, National University of Colombia, Palmira campus

Indigenous Leader and Peasant Farmers
Edison Alexander Muyuy Ojeda, Professor, National University of Colombia, Palmira campus

Francisco Narváez, Peasant Farmer, displaced from Putumayo to Cauca

Interview Questions

All interviewees were given the same five questions (see Appendix B) in order to keep consistency for the analysis of their answers. However, in many instances the questions had to be slightly modified as the interviews were in course. The five original questions were as follow:

1. What is your position on the policies included in the point Comprehensive Agrarian Reform in the Final Accord for the Termination of Conflict, and what do you propose for its implementation or modification?
    a. What conditions would be necessary to promote a public policy of land redistribution where it is guaranteed that those people who receive property will continue to own that property in the future?

    b. Do you think that the National Development Plan that is currently being discussed takes into consideration elements which will allow for a fast titling and guarantees that the legitimate land owners will keep their property?
2. What is your position on the policies included in the point Substitution of Illegal Crops of the Final Accord for the Termination of Conflict, and what do you propose for its implementation or modification?
    a. What conditions do you believe cause a person to take the decision to continue with illicit crops?
3. Do you think that the two previously mentioned policies and their implementation lead to sustainable development?
4. What are the political challenges that must be faced in order to move forward with implementation?
5. What is your opinion on the Final Accord for the Termination of Conflict?

2.5 Field Visit

Due to the security concerns mentioned in section "Scope and Limitations" the researcher was unable to visit the areas that had been selected during the research design stages, however, a visit was conducted to the municipality of Palmira, Valle del Cauca, which is 29 km East of Cali. Palmira, was the epicentre of agricultural research in Colombia in the 1980's, but which has since been taken over by large extensions of the crop that has 243,232 hectares of land dedicated to it, and is disproportionately present in the Valle and Cauca departments, sugar cane (Asocaña, 2018).

On the day of the visit to Palmira, a visit to the Natural Reserve of Nirvana the two professors at the National University of Colombia, Palmira Campus. The reserve is located 16 km East of Palmira and around 40 km East of Cali. Although the 100-hectare reserve has not had any incidents of illegal crops, it was an important sight, they said, to be able to appreciate and comprehend the immense biodiversity that just kilometres away is gone due to mono-cropping and the use of glyphosate.

3 Data and Results

3.1 From coca leaf cultivation to cocaine production

In order to have a better understanding on what the policy of substitution of illicit crops is trying to accomplish, as well as to be able to see what its potential shortcoming might be in implementation, a brief explanation of the process of cultivation, as well as the production and how they relate to trafficking is provided.

Legend has is that in the Andes lived a woman named Kuka, who´s beauty could not be resisted by any men. Kuka used this charm to take advantage of men, that is until word of her behavior reached the Inca capital of Cuzco. Upon hearing about her misdeeds, the head of the Incas ordered she be cut in half and buried. Then from her grave grew a plant with alleviating powers and which gave strength to anyone who consumed it. They called it coca in honor of the beautiful woman (Baulenas, 2016). This Andean myth is a testament to the importance that coca has had in this region.

Coca, which has been cultivated in this region for over 8,000 years mostly by Andean tribes has been found to have several medical properties, and is still used by indigenous communities to decrease the pain of menstrual cramps, to treat altitude sickness, boost energy and to suppress hunger (Baulenas, 2016).

The coca is a bush grows up to 6 feet in altitudes of up to 1,700 meters above sea level . Research from Mejía (2016) found that in 2008, the average yearly output of coca in Colombia was 5,500 kg of coca leaves per hectare. Close to a third of the coca growers will sell their leaves directly to cocaine producers while the other two thirds process it into coca paste or coca base, which they can then sell at a higher price to large scale producers (Mejía, 2016).

After leaves are collected, the next step is referred to as "salting", a process in which leaves are chopped and put into a cement in order to "basify" them. After this the leaves are decanted in gasoline and an acid solution in order to reduce the leaves' lead content. After some hours of being in the mix, the leaves are drained, then an oxidizing agent is used to remove the organic content in a process of acidification-basification. It is here where producers extract the alkaloid or "cocaine sulfate". The coca paste obtained is mixed with ore gasoline and sulfuric acid along with some other chemicals which eliminate impurities and whiten the coca base. This product is known as coca base (Mejía, 2016).

The next stage of the process is converting the coca base into cocaine which is done in a laboratory, usually nearby, with supervision of a "chief chemist". The finished product, cocaine, may be ready in six hours, where its now ready to be distributed. Calculations from 2008 had total labor costs of a laboratory, which employed 12 workers and the "chief chemist" at around US$200 per kilogram of cocaine processed (Mejía, 2016).

Given the large initial investment needed to build a lab and the payment of salaries to the people who work in them as well as those who provide security, some believe the authorities should focus on the detection and dismantling of these operations, rather than focusing on the coca crops (production); as attacking the already processed cocaine is further down in the distribution chain and therefore hit the cartels harder. The way in which the first stage of production, which is the coca cultivation, is attacked also matters, as some eradication methods are more effective than others.

Mejía (2016) analysed the cost of aerial spraying and compared it to manual eradication during the 15 years of implementation of the *Plan Colombia*, a bilateral agreement between the US and the Colombian government signed within the framework of the "war on drugs". After 4.9 billion dollars spent in the program, the United States Government Accountability Office reported that the goals of drug reduction were not fully met as opium poppy cultivation had ben reduced by more than 50% but coca cultivation and cocaine production had increased (GAO, 2008).

Mejía (2008) found that during the last decade of *Plan Colombia,* the government sprayed an average of 128,000 hectares per year, out of which more than half took place in he departments of Putumayo and Nariño. Further, the study suggests that on top of the potential environmental effects, there is a high monetary prices to be paid, as it found that "for each kilogram of cocaine ultimately removed from the retail market through aerial spraying, the marginal cost is approximately US$240,000". This can be explained in part by the very small effect that the spraying has on coca cultivation. According to the study, in order to eliminate one hectare of coca, a total of 32 hectares must be sprayed. This means that at a cost of US$2,400 per hectare for spraying, it costs US$57,150 to eradicate one hectare of coca. In contrast, the cost of buying leaves from one hectare was calculated at US$450 (Mejía, 2016).

The work by Mejía (2016) goes on to explain that the the efficiency is very low because farmers have found several ways to prevent their crops from being completely wiped out including spraying the foliage of the coca plant with substance which prevents the herbicide from killing the plant; cutting the stem of the coca bushes within hours of spraying so that the plant may regrow; and finally by replanting with extra seed beds the farmers often keep around.

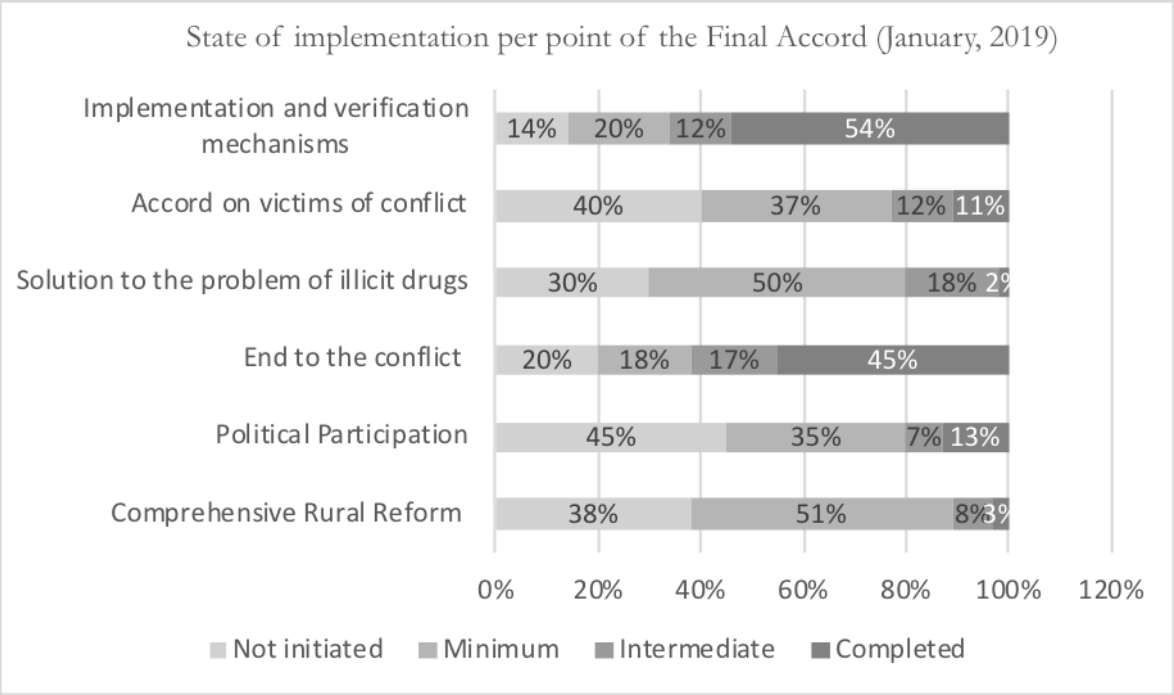
The findings from this study reinforces the idea that the Colombian government should work to push the implementation of the comprehensive substitution program as it currently stands in the accord. The other option of eradication, comes with high price tag for implementation, poor indicators of effectiveness in removing coca crops and uncertainty in terms of the environmental and human health effects it may have.

3.2 The Final Accord signed

Both the Comprehensive Rural Reform, as well as the Solution to the problem of illicit drugs, are the points with the smallest percentage of fully completed stipulations, 3% and 2% respectively. The Kroc Institute recognizes that the slowing down of the implementation of the accord during the first few months of the Duque Presidency were normal in a country where transition from one administration means an almost complete overhaul of the personnel in governmental agencies (Kroc, 2019). However, the changes that Kroc expected to see from this administration moving forward, and which were supposed to appear in their National Development Plan, with regards to tracing the roadmap of implementation of the accord in the next four years; do not seem to be there.

To that date, two thirds of all the compromises made in the accord had either been initiated or been completed. Out of those initiated 34% had displayed minimum advances, while 23% had been completed. However, the amount of stipulations that have not been initiated are not evenly distributed through the accord. Figure 3-1 illustrates the state of implementation as it pertains to each of the 6 points of the accord (Kroc, 2019).

Figure 3-1 'State of implementation per point of the Final Accord'



Source: 'Author's elaboration with data from the Kroc Institute's Third Report of stata of implementation'

According to the Senator Sandino from the FARC party "The main problem with the National Development Plan (PND) is that it does not have the Framework of Implementation Plan (Plan Marco de Implementación) included in it. This is something that was signed and was supposed to be in the development plans of the next 15 years after the date of signing of the accord" (V. Sandino, personal communication, February 18, 2019).

A lack of political will continues to stall some major parts of the accord, which are necessary for provisions in other points of the accord to be initiated. Budgetary constraints worth at least 76 trillion pesos are also hindering the implementation of the accord, which represent almost 1,1% of the Colombian GDP (Contraloría General de la República, 2018). Although the mayority of the resources accord had been budget for the RRI, these constraints hit points one and four of the accord particularly hard, according to the Comptroller General's Office.

3.2.1 Substitution of Illicit Crops under the Peace Accord

The fourth point of the accord "Solution to the Problem of Illicit Drugs" is divided into two sections, crops of illicit use and the production and commercialization of illicit drugs. According to the original document signed, the path forward will be through the "promotion of a new vision that gives a differentiated treatment to the phenomenon of consumption, to the problem of illicit crops… ensuring a general focus of human rights and public health, differentiated and gender" (Oficina del Alto Comisionado para la Paz, 2016).

The Government and the FARC-EP recognized in the accord, that the "persistence of the crops is tied in part to the existence of poverty, marginality, weak institutional presence, in addition to the existence of criminal organization dedicated to drug trafficking" (Oficina del Alto Comisionado para la Paz, 2016). It recognizes the importance of maintaining the recognition of the ancestral and traditional uses of the coca leaf and the possible utilization of the crops, which have been deemed as "illegal", for medical, scientific and any other purposes that may be established (Oficina del Alto Comisionado para la Paz, 2016).

The two signing parties also recognize that the Comprehensive Rural Reform is a "necessary" part of the definitive solution to the problem of illicit crops, as it will "contribute to generating the conditions of wellbeing and good living for the populations affected by those crops" (Oficina del Alto Comisionado para la Paz, 2016). The post-conflict high commissioner of the government said in an interview that "peace is unsustainable unless the government solves the coca problem. That is not because the FARC will return to war, but because coca crops will always feed a market that is accompanied by violence. Small-scale coca-growers, caught between the security forces and the drug gangs, are among the most vulnerable to it." (The Economist, 2018)

The main focus of this study is section 4.1 which concerns the "National Program for the substitution of illicit crops. Comprehensive development plans with community participation in the design, execution and evaluation of substitution programs and environmental recovery of areas affected by such crops", in its long-form or simply the National Comprehensive Program for Substitution of illicit Crops (PNIS). This plan has as its objective to promote substitution that is voluntary through a series of productive programs and projects that can help families overcome poverty conditions (Oficina del Alto Comisionado para la Paz, 2016; FIP, 2018a).

So this program does not have as its sole purpose the (voluntary) eradication of illicit crops, but also a change in socio-economical conditions of rural families within the framework of the Comprehensive Rural Reform. Although the plan is very complex in its implementation, the core idea behind it is very simple. Families who want to join the program have to sign collective accords as well as individual accords with the government. The difference between the the two is that the first is a document written between the community and the government in which the citizens don't only commit to eradicate, but also design the way in which they themselves will monitor the compliance among other. This process for these communities which are in remote rural areas, in many cases are a first look at what a participative democracy is like. As it appears on the accord, the program for the substitution of illicit crops is supposed to be count with the participation of the community in the design, execution and evaluation of substitution programs and environmental recovery of areas affected by such crops" (Oficina del Alto Comisionado para la Paz, 2016)

The second commitment is done individually by every family and is meant to prove their commitment to voluntarily eradicate the coca crops they have, as well as to not plant again, and to not participate in any business related to coca. In exchange for the successful eradication (which is verified by the United Nations Office of Drugs and Crime), the family receives payments every 2 months for a total of 2 years, accompanied by technical assistance for their productive project (FIP, 2018a). As expressed few times through this report, the substitution program runs in parallel with other programs of the RRI, like "Formalize to substitute" which intends to speed up the process of formalizing land for those who participate in substitution of illicit crops.

There is particular stress in the voluntary nature of the substitution of illicit crops and to the need of the government to generate trust among the communities and create conditions that allow for the substitution to move forward without deteriorating the economic, social and environmental sustainability of the communities and respective territories (Oficina del Alto Comisionado para la Paz, 2016). This trust is to be gained back, through actions that promote substitution as a viable alternative, as something that is adequate and that may guarantee the dignified life for those affected. The fourth accord also contains a provision to recognize and have considerations for socio-environmental sustainability, along with those for indigenous and afro communities.

3.2.2 Elements of the Program

Under the section of *Security conditions for the communities and territories affected by the crops of illicit use,* the Accord maintains that provision of guarantees and conditions of security for the communities and territories affected will be achieved through strengthening of State institutional presence as well as its capacity of protection to the communities "especially against any type of threat" (Oficina del Alto Comisionado para la Paz, 2016).

The agreement states that in the event that cultivators did not manifest their interest in participating in the substitution of crops or in cases in which these cultivators breach their agreement to do so, the government will proceed to do eradication. The agreement is specific and clarifies that the means will give priority to manual eradication wherever possible, and that a socialization and information process will be done previously and keeping in mind the respect for human rights, the environment, health and good living (Oficina del Alto Comisionado para la Paz, 2016). The way in which eradication is to be done was one of the most contested parts of the accord. FARC-EP makes it clear that eradication should only be carried our manually and not by the use of glyphosate.

The prioritization of the territories chosen for the PNIS (which is of full national coverage) is done by applying three criteria 1) Zones prioritized within the framework of the PDET 2) Density of crops of illicit use and population and 3) National Natural Parks, all of which place the Pacific Region, and specially Nariño, on the top of the list.

Community assemblies are to be put in place in order to kick off the bottom-up approach to a participative planning, as well as monitoring bodies at the municipal and community assembly levels. The municipal plan is based on the proposals of the communities and constructed by the community plans, is the basis for the implementation of the PNIS (Oficina del Alto Comisionado para la Paz, 2016).

The comprehensive plans of substitution has a component (c) on "sustainability and environmental recovery" which focuses on recovery and adequacy of soil for the cultivation of licit crops; mitigation of environmental damage in zones of special environmental interest, fragile ecosystems and vulnerable hydrography, and for the recovery of forests; and environmental and productive protection projects (Oficina del Alto Comisionado para la Paz, 2016).

The component (d) Formalizing of property, with the purpose to promote access to land for people, and to incentivize the substitution of crops of illicit use, is intended to speed-up the process of formalization, whenever the commitments made by cultivators have been met.

3.2.3 State of Implementation

3.2.3.1 In terms of coverage of PNIS

The programme was supposed to link families to the program by the signature of collective agreements with families which manifested their interest in voluntarily removing illicit crops, and then, upon reporting the extension of their crops, each family would sign individual agreement of substitution. The government would commit to implement programs of technical assistance, food security, among others. Since November of 2018 there have been no registration of new families into the program. The families which are currently in the program account for an estimated 102,089 ha of illicit crops, which corresponds to the maximum coverage allowed by the PNIS programme. However, this only represents 60% of the 171,495 ha of illicit crops that were reported to the Integrated System of Monitoring of Illicit Crops in 2017 (CINEP/PPP-CERAC, 2019).

The halt in linking new families to the programme is not, per se, non-compliance by the government as the accord does not specify percentage of cover of families nor hectares or land. The new administration, however, had expressed their desire to stop linking new families to the programme. The verifying entities have interpreted it as the government's desire to halt linking families only through collective agreements, as it continued receiving individual agreements throughout 2018. (CINEP/PPP-CERAC, 2019).

CINEP also reports that a total 12,399 families (or 12.45%) had been suspended from the programme until November of 2018, a number that has not changed since. Although no information has been given by the government on how these families' cases will be fixed, if at all, the reasons for their suspensions have been expressed. Most of them are from inconsistencies in the paperwork, incomplete forms and classification errors, which is not considered to be non-compliance by the families, but still means these families wont receive benefits. This could lead to families going back to growing coca due to lack of other opportunities.

The CINEP mentions in their last quarterly report that no new announcements of the PNIS have been socialized after November of 2018, in stark contrast of the 1,081 reported sessions during the last quarter by UNODC.

3.2.3.2 On the voluntary substitution of illicit crops

The UNODC has verified 2,664 hectares of voluntarily eradicated crops between November of 2018 and February of 2019, by families linked to PNIS. This adds-up to a total of 27,555 hectares that have been verified by UNOC since May 2017 (CINEP/PPP-CERAC, 2019). An estimated 5,374 hectares have been eradicated with the assistance of security forces in areas where it is to dangerous for the families to do it themselves. These numbers have been reported by the security forces but have not yet been verified.

The CINEP also reports that a "territorial focus" (which the agreement specified the PNIS must have) has not been identified in any of the programmes that have special measures to reaching more remote areas or those with low population, something which is crucial in reducing economic and social gaps between rural and urban Communities (CINEP/PPP-CERAC, 2019).

3.2.3.3 On monitoring of the PNIS

The competent verification mechanisms still find a difficulty in the systems of monitoring compliance as well as the impacts of the PNIS. Since the change of government in August of 2018, there have been no updates to the measurements of the number of voluntarily eradicated hectares reported by the families of PNIS.

The new administration has made changes in the goals of forced eradication as well as its implementation so far. In 2018, the Duque administration exceeded the yearly goal of forced eradication set forth by the 2018-2023 plan of 70,000 hectares, by nearly 17,000 hectares. The administration then went on to increase its goals of forced eradication and voluntary substitution for the four-year presidential tenure, to 280,000 and 50,000 hectares respectively (CINEP/PPP-CERAC, 2019).

The combined number of hectares (330,000) is much larger than the then even the most negative calculations of coca leaf plantations, and this is partly due to the high incidence of re-cultivation in "eradicated" areas, as well as the emergence of new, larger extensions of crops in new areas (CINEP/PPP-CERAC, 2019).

Table 3-1 'Current state of implementation'

Specific point	Importance for the environment	Social sustainability	Have they been met	Reason	Threats
PNIS Coverage	The less coverage nationally the more opportunities for deforestation to occur in order to plant coca	Families that cannot be added to the program or who eradicated and are not getting benefits	No	Government compliance and insufficient funds allocation	People are relapsing and started cultivating coca
Monitoring PNIS	The correct data being measured can better inform the agencies on the environmental and other impacts Aerial spraying will be increased	Aerial spraying of Glyphosate will increase	No	Government changed strategy from voluntary substitution to forced eradication. There is no territorial focus	Increase in use of glyphosate No territorial focus means lower rates of success in implementation
Urgent assistance to families and communities	Increase deforestation for replanting	Complementary projects in health, education, food security are not starting Payments for not planting coca are only being delivered to a small percentage of families	Partial	Delays in implementation	Increases in poverty, poor health and nutrition Increased chance or replanting coca
Comprehensive community plan	Lack of technical assistance may mean productive projects which are not environmentally sustainable	No advances in land titling	Partial	Very little coverage	Lack provision of technical assistance may lead to projects that are not productive for the farmer and re panting may occur Farmers may start environmentally harmful practices like cattle ranching
Forced eradication	Increases in eradication including glyphosate	Focus on eradication rather than substitution may lead to more misplaced people and less	Partially – this is an adjustment from this administration	Pressure on the government to show results on decreasing extension of coca crops	Negative environmental and social repercussions Public mistrust

		opportunities of subsistence			
Guarantees and conditions of security	Proliferation of crops and deforestation causing soil, water and air pollution	Massacres and displaced people	No	Government's inability to expand its presence in rural areas	Continued violence and conflict to control territory
Differentiated penal treatment	Continued environmental damage from cultivation of illicit crops	Displaced people and loss of livelihood for families	No	Lack of political will/ non-compliance by government	Recidivism

Source: Style 'Author's elaboration based on report by CINEP/PPP-CERAC'

3.2.3.4 On urgent-assistance to families and communities

There have been no registered advances in the commitments by the government in such programs as rural day-care centres, food security for the elder, programs of for poverty alleviation, among others. These delays represent non-compliance according to the verifying mechanisms as they are an essential part of the point 4 of the agreement, and its implementation generates improvements in the social and economic conditions of people in the areas where substitution of illicit crops is occurring (CINEP/PPP-CERAC, 2019).

The number of families who signed individual agreements that have received at least one of the payments for urgent-assistance is 55,518 (or 56 %) as of November 31, 2018. The verifying mechanisms have also reported implementation of the component of food security and self-sustainment in eight municipalities, via the adaptation of home gardens. Similarly, an 11.6 % of families linked to the program through individual agreements have received assistance for the implementation of food security projects. The advances in implementation of food security programs are over-shadowed by the very low percentage of families being integrated into them (CINEP/PPP-CERAC, 2019).

3.2.3.5 On comprehensive community y municipal plans of substitution and alternative development

This critical component of point four of the accord, was the integration of technical assistance to the plans to develop productive projects for post-eradication of illicit crops. Up to the last report by CINEP/PPP-CERAC, a total of 33.3 % of the families linked to the PNIS had received some form of technical assistance. Despite the seemingly small numbers, the verifying agencies acknowledge the increase in both number and percentage of families receiving technical assistance and comment that this promotes sustainability of the PNIS (CINEP/PPP-CERAC, 2019).

In regards to the compromise made by the government to design productive projects with community input from small farmers, within the framework of the Comprehensive Rural Reform, which is of immense importance to the implementation of point four, especially in areas with high concentration of illicit crops; there have been no such plans reported to the moment. This point has great potential to discourage communities to replant, and therefore promotes sustainability of the PNIS (CINEP/PPP-CERAC, 2019).

The government has partially followed-through with their commitment to employ collectors (of coca leaves) in different infrastructure programs stemming from the implementation of the accord. To the day, the government has employed, temporarily, a total of 1,789 collectors to work on construction or improvements to roads, school gardens, community centres, etc. in a total of 15 municipalities in 10 departments (CINEP/PPP-CERAC, 2019).

No advances were reported in terms of land titling under the plan to promote land access and incentivize substitution of illicit crops. There was however a "significant" change in the program "Formalize to Substitute" which was moved originally a task of the ANT and was moved to the PNIS, and which has given 1,437 land titles to families linked to the PNIS program (CINEP/PPP-CERAC, 2019).

3.2.3.6 On forced eradication of crops

In addition to the 19,098 hectares eradicated from November 14, 2018 to January 31, 2019, the new administration has promised to eradicate 29,754 hectares in the period from January 1, to august 6 of 2019; going from an average of 136.5 hectares a day (from the last administration), to 211.6 hectares a day (by the new administration). The highest concentration of these efforts of eradication were in the departments of Nariño, Putumayo, Guaviare and Norte de Santander; an area that they plan to continue to focus on in the upcoming years (CINEP/PPP-CERAC, 2019).

Additionally, the Colombian government has put two municipalities under "maximum-alert" for having an "elevated extension" of coca crops: the municipality of Tumaco, Nariño which is the area with the highest concentration of coca crop cultivation world-wide (32,000 hectares); as well as Puerto Asís, Putumayo (10,000 hectares); according to reporting by El Tiempo in 2019 (CINEP/PPP-CERAC, 2019).

CINEP identifies this increase in the projections of eradication by the government of Ivan Duque not only coming from the increase in "mobile eradication groups" which will go from 23 in august of 2018 to 100 in 2019, it is also due to the use of drones for fumigation of crop, as well as with the possibility to reinstate policies of aerial aspersion.

3.2.3.7 On offering guarantees and conditions of security

There has been an identified non-compliance by the government as there are still many areas where PNIS is carrying out eradication and substitution, which present high security risks. Among the most affected regions are El Catatumbo, Bajo Cauca antioqueño, Cauca and Nariño, which experience the presence of various illegal armed groups (CINEP/PPP-CERAC, 2019).

Lack of security guarantees in some municipalities covered by the PNIS has been identified as one of the major risks to the implementation of the peace accord. Obstruction to PNIS activities as well as to the work of verification teams mean delays in the implementation. The lack of guarantees also affects all population associated with the PNIS, such as security forces and the farmers who are eradicating, as well as the populations in the areas where illicit crops are present (CINEP/PPP-CERAC, 2019). Since the benefits that families receive (i.e. food assistance) depend on the verification of the removal of illicit crops, these delays can additionally have consequences on the well-being of these communities.

Blockages of roads by peasants who are against eradication have been a contributing factor to the security risks. Farmers who don't want to allow forced eradication by security forces to

happen in their area, have been part of at least 23 incidents of violence in 2018 (El Tiempo, 2019c).

3.2.3.8 On differentiated penal treatment

The differentiated penal treatment is meant to make a distinction between those farmers who have small extensions of coca planted, and those who have large extensions. Under the current law, people with coca crops could face up to 10 to 18 years of prison time, regardless of the hectares of coca cultivated. No advances in this front have been reported. This point has been one of the most discussed by members of congress representing the FARC party, yet, its implementation which was supposed have happened within the first year of the signing of the accord, as it is of normative priority; has yet to be discussed formally in congress. The delays establishing the criteria for identification (for people's who should get the differential treatment, including a maximum size of their crops), translate to a delay in the the implementation of the substitution of illicit crops (CINEP/PPP-CERAC, 2019).

3.2.4 Comprehensive Rural Reform under Peace Accord

The Comprehensive Rural Reform is point one of the accord and is also the largest in terms of its budget and number of stipulations and provisions, which is not surprising given the accord strongly focusing on rural development. Only in areas of Rural Development, the agreement contains 17 provisions and 93 stipulations (García Trujillo, 2018). Research by García Trujillo (2018) of comparable peace agreements with a Comprehensive Rural Reform component, such as the ones signed in El Salvador 1992, South Africa in 1993, Guatemala in 1996 and Nepal in 2006; shows that combined, all these country's peace accord contain a total 56 rural development related provisions.

The Comprehensive Rural Reform (RRI) has as its objective to establish the foundation for achieving inclusive development in the Colombian territories which will generate the following four changes in the 15 years following the signing of the accord ():

1. Erradicatin of extreme poverty in rural areas
2. A reduction of the Multidimensional Poverty Index by 50% in rural areas
3. Universal coverage for comprehensive early childhood care in rural areas
4. Eradication of rural illiteracy

The Comprehensive Rural Reform focuses on seven pillars and sixteen National Sectorial Plans (PNS). Table 3-2 below, shows the way in which those National Sectorial Pland align with the different pillars set forth in the peace accord.

Table 3-2 'Pillars and National Sectorial Plans'

Pillar	**National Sectorial Plan**
Social development: Education	Special plan for rural education
Social development: Health	Rural health plan
Social development: housing, culture and sports	Rural social housing plan
	Water supply and basic sanitation plan
Social order of rural property and land use	Property formalization plan
	Environmental zoning plan
Infrastructure and land suitability	Irrigation and drainage plan
	Rural electrification plan

	Rural connectivity plan
	National regional integration roads plan
Agricultural production and economy of solidarity and cooperation	Plan to foster an economy of solidarity and cooperation
	Commercialization of peasant, family and community agriculture plan
	Income-generation plan
	Social protection and rural workers rights guarantee plan
	Comprehensive technical assistance, technologies and promotion of research plan
Progressive guarantees of right to food	Progressive guarantees of right to food plan

Source: Author´s elaboration based on information from Contraloría General de la República and the Office of the High Commisioner for Peace

The Rural Reform compiles a set of strategies and measures that look to tackle the main problems hindering rural development found in various diagnostics over the last decades and carried out by several Colombian agencies. The measures have as their main objective to decrease the high concentration of land, to facilitate land formalization, improve rural order through the provision of administrative and justice mechanisms to rural communities (CINEP/PPP-CERAC, 2019). In its initial conception, all measures and strategies put in place through the RRI, were designed to have the Colombian peasantry front and centre, according to a former Advisor to the High Commissioner for Peace:

"Due to their contributions to rural developmet in terms of income generation, job creation, pushing towards eradication of rural poverty, provision of environmental services and even governance; the RRI had peasantry and family farming front and centre. Obviously with a territorial focus" (A. García Trujillo, personal communication, March 6, 2019).

but perhaps the most contested issu within the accord, is that of land. Land is of great importance in the context of a rural reform because of its connection with peoples' access to food and work, it also plays an important role both for objective well-being, which is usually determined by indicaters that measure aspects of education, physical environment, community and economy (Huppert & Baylis, 2004), as well as for subjective measures of well-being which are more related to internal well-being, and the perceived ability to succeed (Alatartseva & Barysheva, 2015). A recent study from the University of Marburg found that property rights [for land] had a significantly positive effect on a household's agricultural income, profit per acre and perceived future security (Vath & Kirk, 2014).

In the Colombian context, land has been the underlying issue for the longest periods of violence like the civil wars era of the XIX Century as well as the period of *La Violencia* in the 1940s and 1950s which gave way to the creating of guerrilla groups such as FARC (Fajardo, 2015). FARC's awareness of the importance that land has both for rural communities, as well as for their recruiting efforts and expressed at the centre of their political discourse, has been present from the beginning of the groups creation in 1946. García Trujillo's (2018) analysis of over 50 years of discourse of the FARC since their beginning. Table 3-3 is a compilation of the different discourse used by FARC in their own documents and speeches, in which land was part of the main clain and compiled (García Trujilo, 2018):

Table 3-3 'The evolution of FARC discourse on land'

Year	**Claim**
1964	Confiscation of the landowner property. Free access to land for peasants
1966	Constitution of the Revolutionary Armed Forces of Colombia (FARC) "New stage of struggle and unity with all the revolutionaries of our country, with all the workers, peasants, students and intellectuals, with all our people, to promote the struggle of the great masses towards the popular insurrection and to take the power for the people"
1969	Confiscation of the large estate property. Free access to land. Confiscation of all lands occupied by North American companies. Nationalization of the oil industry, gold, silver and platinum
1982	All properties or concessions of foreign companies, oil, mining, banana or timber companies are abolished All properties over 1500 ha are abolished
1984	"to vigorously promote the application of an Agrarian Reform policy in recognition of the fact that land problems are present in the current social conflicts, and the other actions of state agencies should aim to expand permanently the services to the peasantry in order to improve the quality of life and the normal production of food and raw materials for the industry ... "
1992	"Redistribution of land should be made where the latifundio prevails. Build the road infrastructure and provide the necessary transport in rural areas in the country, set up low credits for agriculture and livestock, crop insurance, provide materials and modern technology to all who generate wealth in our fields and ensure the commercialization of their products"
1993	"Agrarian Policy that democratizes credit, technical assistance and marketing. Total stimulus to industry and to agricultural production. State protectionism against the unequal international competition". "Each region will have its own development plan jointly constructed with community organizations, eliminating the latifundio where it subsists, redistributing the land, defining an agricultural frontier that rationalizes the colonization and protects our reserves from devastation. Permanent support for national and international marketing. "
1999	Recovery of unproductive land and drug trafficking properties. Substitution of illicit crops
2010	Return the lands usurped in all these years to their true owners, *colonos* and peasants Restitute lands to indigenous communities and give lands that belong to black communities Eliminate the latifundia

	"A modern land law with a strategic vision, which fosters peace, must inexorably include economic and technological aids, facilities for marketing, roads, but above all, it necessarily has to harmonize in it the social, territorial, cultural, environmental and the spatial, in all its considerations and prospections"
2011	Land for peasants Reconsider the unfair contracts that benefit transnationals
2012	Comprehensive agrarian development policy

Source: Adapted from García Trujillo, 2018

The issue of land continues to be in the discourse of FARC now they are a political party. Unfortunately, the issue of land has also been slowly removed from the agenda of the current administration. "Land issue is being pushed to the background, with no apparent political interest displayed. To the point where restitution does not appear as an item in the public agenda and that worries us because rural reform is based on the idea that land is a fundamental asset for rural communities to do their productive initiatives and that way get out of poverty" (A. García Trujillo, personal communication, March 6, 2019).

3.2.5 Overall Results

The environmental impacts of the policy of substitution of illicit crops depend on the way in which the government decides to moves forward with implementation. Findings on the effectiveness of eradication programs of past administrations by Mejía (2016) suggest that if the government continues its current path of focusing solely on eradication, while paying little or no attention to the social programs needed for substitution, there will continue to be increases in the amounts of coca crops in the country. As a consequence, the government does not pay subsidies on time (or at all), there is no guarantees of security or technical assistance, while continuing to spray glyphosate. The families, which have no other option, either go back to illicit crops or move to alternatives that are legal but that, due to the lack of technical assistance guiding them, are not necessarily better for the environment (i.e. cattle ranching). Delays in implementation and limited state presence also leaves territories vulnerable to large scale farming and mining, and the families to threats and displacement. The environmental impacts under these circumstances will be increased deforestation, leading to soil pollution, water pollution and air pollution (Roa Castañeda et al., 2014), as well as the potential effects on human health, crops and the environment, due to the increased use of glyphosate.

The two scenarios were chosen in order to make a comparison between what seems to be the trend of the new administration, and what would be a scenario where all of the developmental goals of the policy which are set forth in the peace accord, are followed strictly. It is important to point out that the impacts mentioned below will be potential impacts if these scenarios where to happen.

The alternative in implementation of this policy is one where the government focuses on social investment in and pushes for substitution rather than solely eradication. By better communicating the existence of viable alternative crops to rural communities and providing technical assistance and access to markets. The implementation is successful in removing illicit crops through voluntary eradication pacts already signed. This scenario is one where the studies of soil, that have already been carried out by the government, inform the farmers on the best alternative crops both for the environment and for their families to live a decent life. The "successful" scenario is one where the government fulfils the promises made in the agreement through a comprehensive approach, where farmers change to a crop that they will be able to take to market with the help of investment in public goods, such as roads and infrastructure of

commercialization and financing. In order to be able to compare both of these implementation scenarios, a crop alternative that has already been proposed had to be selected for the study.

The choice of cacao as that alternative crop, was based on the following reasons. Cacao has been pushed by the government as a viable substitution, since the beginning of negotiations with FARC. The estimated yield of 1,500 kg per hectare, a signed partnership with FEDECACAO (Colombian Federation of Cacao Farmers) in 2017, the environmental friendliness, and the projections for world cacao exports; were all contributing factors (Consejería Presidencial, 2018). Research by Universidad de La Salle also found that due to the

Table 3-4 'Environmental impacts of implementation of the policy of substitution of illicit crops: two scenarios'

Scenario	**Impact**		**Direct cause**	**Indirect cause**
Eradication: Increased/sustained cultivation of coca crops met by eradication only approach	Deforestation	Increase	Clearing for new or relocation of crops	
	Soil pollution	Increase	Use of fertilizers, herbicides and pH correctors for crops	Leaching from chemicals used for processing into coca paste/base Glyphosate used to eradicate
	Water pollution	Increase	Runoff and infiltration of fertilizers, herbicides and pH correctors	Runoff and infiltration chemicals used for processing coca paste/base
	Air pollution	Increase	Burning to clear forests	Burning of trash
Comprehensive Substitution: Focus on social programs and substitution with cacao	Deforestation	Reduced increase initially		Building of tertiary roads necessitates clearing of forest
	Soil pollution	Decreased	Cacao trees	Organic cacao may be sold at a higher price, incentivizing reducing inputs
	Water pollution	Decreased	Require less inputs and water	

	Air pollution	Decreased	Manual clearing which means no burnings	

Source: Author's elaboration

Additionally, the surveyed small farmers from Nariño gave a very positive perception of cacao. Out of the surveyed farmers who responded that they had considered substitution, 50% of them chose cacao as the crop they would like to substitute to. Added to this buy-in from farmers, was the opinion of Centro Democrático. Although the Senator interviewed proposed moving towards an approach solely focusing on eradication, and to suspend all payments to farmers who voluntarily eradicated; he also mentioned cacao as a good alternative for farmers who committed to substitution (A. Corrales Escobar, personal communication, March 28, 2019).

Increased/sustained cultivation of coca crops met by eradication only approach

Several studies have reported on the mass deforestation via burning that occur in order to clear land to cultivate coca (IDEAM, 2005; El Tiempo, 2019c). Large amounts of chemical fertilizer and pH correctors used in order to get the poor soils the nutrients necessary to grow crops, further erodes the soil and filtrates to underground water sources (Roa Castañeda et al., 2014). During the processing of the coca into paste and base, which is in most cases done on-site; toxic chemicals used also erode soil and pollute water.

The surveys collected in the five municipalities of Nariño corroborate that in coca crops the usage of chemical pesticides, herbicides and fertilizers is very high in the sample. Out of those respondents who said they had participated in illicit crops, a total of 86.7% used pesticides, 88.5 % used herbicide, while 89.07 % of them used fertilizers. Additionally, those who used a river as their main source for irrigating their crops, where on average 233 meters away from that water source. This means that the potential of contaminating the water is higher.

Instances in which authorities detect the crops and/or cocaine processing labs, also have negative impacts on the environment. In December of 2018, news outlet El Tiempo (2018a) reported that in only one raid that month, a total 25 labs used for processing cocaine were destroyed by the authorities. During another raid in Nariño on May 2019 security forces destroyed four laboratories used for cocaine manufacturing. In both cases, as its customary, the sites, including all the electronics such as microwaves, gasoline powered electric generators, coca paste, dried leaves and chemicals used for processing found; were destroyed via burning. The burning of these type of chemicals increases their toxicity, while also releasing considerable amounts of CO_2 to the atmosphere (Roa Castañeda et al., 2014).

The spike in coca crops in the last few years and the pressure from the US government have put the new president of Colombia in a difficult situtation. The new administration is pushing for big increases in eradication efforts. Since forced manual eradication is perceived as costlier and more dangerous, the government favors the application of glyphosate via aerial spraying. Although mixed results have been found in studies testing the impacts of glyphosate on human health, animals, the environment, and the ones testing accumulation in soils (Camacho & Mejia, 2017; Dias et al., 2019; Brian & Solomon, 2009; Mamy & Gabrielle, 2016); the government has said it will increase its use in the upcoming year (El Tiempo, 2019c).

This has put the question of whether or not to use glyphosate for eradication at the center of Colombian courts and the House of Congress, but citizens are also weighing in. The people interviewed during the visit to Palmira overwhelmingly supported the hypothesis that glyphosate is not only causing severe and irreversible health problems in the communities exposed to it, but that it also has major effects on the biodiversity of the region, and in the "extermination" of small farmers' legal crops. The group of people interviewed, consisting of an agricultural engineer, a famer and professor of agro-ecology, a peasant farmer who had been displaced, and a member of the Nasa tribe all of whom work with food crops. When asked about their thoughts on aerial spraying, all four of them echoed the same message about glyphosate: "it kills everything it touches" *todo lo que toca, lo mata*.

The group of citizens of Palmira related stories of the damages caused by glyphosate that they have seen first-hand in the community and in their own crops. The exposure of this region to glyphosate is mainly due to its application as a pest control and ripener of sugar cane, and not as an eradication practice. However, the responses collected on the effect of glyphosate seen by farmers on their community and crops, are important in answering the research question regarding the environmental and social effects of the herbicide, especially for the scenario of "increased/sustained coca crops" and the scenario of "eradication".

Glyphosate is widely used in the country for agricultural purposes with amounts used for eradication accounting for only 10 to 14 % of all the use in 2005 and 4.5 % in 2013 (Solomon et al., 2005; Semana, 2015). A key to understanding why the focus of the debate on the effects of glyphosate is centred in its use for eradication and not for agricultural purposes, lies on understanding the differences in dosis and in the way they are applied in both cases. The doses of glyphosate used when applied for eradication of coca is 10 litres per hectare sprayed at a height of 40 meters. On the other hand, the doses of glyphosate used to spray legal crops as a pest control and ripener varies between 1 and 3 litres (depending on the crop) per hectare, and is mostly done with manual sprayers at ground-level. When sprayed via light aircraft, it is done at a distance of 10 metres from the plant (Semana Sostenible, 2015). Additionally, when sprayed for agricultural purposes, previous notice is given and people have team to wear protection to avoid direct contact, while during eradication operatives there is no previous notice given, which leads to the chemical occasionally falling directly onto communities, animals and sometimes neighbouring crops.

Elizabeth Martinez de Londoño, a professor of Agro-ecology at the Palmira Campus of the National University of Colombia, is part of a group of agro-ecologists and agricultural engineers who have been fighting against the use of glyphosate. Mrs. Martines de Londoño related how she had been forced to sell off piece by piece most of the initial 50 hectares of land her dad had passed on to her, as she "made the mistake of taking out loans in order to produce, and as the planes passed by with the glyphosate, well everything started dying, all of the production" (E. Martinez de Londoño, personal communication, February 22, 2019).

She went on to talk about one of her latest attempts to advocate the ceasing of aerial spraying of the herbicide. "The 14 of June of 2018 I participated in a public audience which was organized by Senator Robledo and sugar cane "cutters". I presented my case and made complaints about glyphosate but it was worse as they then started spraying my fields even more. But if you ask me whether I regret any of these things I have done, I will say no I regret nothing. My family sometimes doesn't understand my position, but I don't regret it. Because somebody has to be willing to take the risk to do something" (E. Martinez de Londoño, personal communication, February 22, 2019).

Similarly, the Senator for the FARC party was firm in defending the party's position, which since the signing of the accord is against the use of glyphosate for any eradication purposes, as they expressed in the signed document. The former guerrilla member, who served as a commander of the 21st *Frente* mentioned that "fumigation is a very big issue. One thing is for people to be planting an illegal crop, but another very different one is for us to contaminate water, plants, soil, the environment as a whole, with glyphosate" (V. Sandino, personal communication, February 18, 2019).

A former government official who worked as the Territorial Coordinator of the Agency for Reincorporation and Normalisation for the department of Nariño, talked about the effects she had seen in rural Nariño caused by aerial spraying. "the problem is that it does not just kill coca; it kills all the soil". Additionally she recalled that after the government promised to the communities she served that they would not spray, they sprayed anyways. "after this the people protested and were blocking access to the port of Tumaco, I think with just cause. The high commissioner for peace then came to the area and sat down with people. He said 'you people are right to be upset and will make it right, we will work together towards this, just sign these agreement'. And then, literally a week later, they were spraying again" (M. G. Villota, personal communication, March 8, 2019).

A small farmer who was originally from Putumayo but was forced to migrate to Cauca after his crops started dying, also spoke strongly against the use of glyphosate. When asked if he thought glyphosate was an efficient way of reducing illicit crops he answered "not only the illicit ones. The water, the fish, fruit trees and the ones used for wood. Human health. Basically, anything it touches it destroys. The locals have to emigrate because there is only desolation and ruin left behind" (F. Narváez, personal communication, March 2, 2019).

While sitting at a *cafetería* in Palmira, where at least five people passing by greeted the agricultural engineer Oscar Rivera Luna with a friendly "*ingeniero",* Mr. Rivera Luna told the story of a community of blackberry farmers in Guática, Risaralda where "an airplane had passed spraying glyphosate". He then was contacted by a group of worried farmers as "the blackberries started falling off all bushes in all 205 parcels" (O. Riveral Luna, personal communication, February 23, 2019).

The story Mr. Rivera Luna told was in fact reported by and article in El Tiempo, where he is mentioned as being the "ecological advisor of Palmira who provided the technical concept" for the court investigation. The story also highlighted the comments by the president of the Committee for the Defence of Peasants who said that there were "more than 200 hectares of blackberry crops" and that "at least 1,500 people earn their living from this activity" (El Tiempo, 1996).

Although the story of the blackberry farmers is two years after the first cases of aerial spraying of glyphosate by the government in an attempt to control coca crops within the framework of their "war on drugs", it is important to recognize that in this case the aspersion was being done for pest control in a near-by pine tree farm owned by Carton de Colombia, and not the government. However, this is preoccupying according to both Mrs. Martinez de Londoño and Mr. Rivera Luna, as the doses of the herbicide used in eradication practices is higher, often by a factor of 10 to 1, than it is when used as "pest control" in agriculture.

Problems caused by the herbicide on crops are begging to get recognized by Colombian courts. In December of 2018 the Colombian State Council gave the order to the Administrative Tribunal of the department of Cauca, to pay 500,000,000 pesos (approximately US $150,000) to a farmer in the municipality of Guapi. The farmer filed a lawsuit after his crops were affected

by the aerial spraying of glyphosate done by the government in nearby coca crops in efforts to eradicate (El Espectador, 2018).

Previously, the Constitutional Court had only made provisions to protect people's health, saying simply that "the use of glyphosate must never harm the health of persons". In this case however, the lawsuit only specifies the harm done to the crop as the reason for the filling, and the court still recognized it as a legitimate claim. This sets an important precedent, as the court declared that "whenever risk is created while in execution of a licit activity, any harm must be repaired, without withstanding any requirements of due diligence", meaning that in execution of the legal activity of eradication, the government would have to pay for any harm done to any persons, regardless of government's compliance with regulations to do so in a safe manner (El Espectador, 2018).

Despite news of the court's decision, as many as 25.9% of the population is still in favour of aerial spraying of the glyphosate according to a poll by Datexco (La W, 2019). Someone else who sees aerial spraying of glyphosate as something beneficial was Alejandro Corrales Escobar, the Senator for *Centro Democrático*, the party that was staunchly against the peace accord and to which the current president belongs to. When asked about his party's proposal for implementation of modification of the policy for substitution of illicit crops, the senator answered that his proposal was to "reinstate the aerial spraying programs". When asked about the major political challenges to move forward with Comprehensive Rural Reform and Substitution of illicit crops, Senator Corrales, who often describes himself as a "third generation coffee grower" again answered "reinstating the eradication via aerial spraying" (A. Corrales Escobar, personal communication, March 28, 2019).

Adriana Henao, who served as Alternative Development Specialist and Social Integration Manager at CICAD, managed the team that investigated the effects of aerial spraying of glyphosate used for eradication, in human health as well as in the environment of Colombia (Solomon et al., 2005), also commented on the effectiveness of glyphosate and the potential harm it may cause. "I think it effective as a strategy for intimidation, and it works in some territories, not all. And it also depends on the culture". However, she mentioned that aerial spraying "is only one of multiple tools available" and believes it should not be the one prioritized. Instead she said "priority should be given to ensuring state presence and social investment, but in a way that shows full commitment by the government" (A. Henao, personal communication, March 13, 2019).

The surveys from Nariño, reveal an additional dimension to the problem of glyphosate in communities that plant coca. In the sample from the five municipalities, a total 87.6 % of those who participated in coca in the last 5 years, have food crops intercropped with the coca. This means that the glyphosate fumigation, especially given the higher doses have the potentially to wipe out their illegal crops as well as all their legal ones. As explained by the former Territorial Coordinator to Nariño "These communities do a lot of bartering, so the lettuce or corn they exchange with the people nearby. Whatever they cannot trade or grow in that area, they use the money they get from selling coca to purchase. Since they have such small plots, less than one hectare, well the natural thing for them to do is have the highest price crop they can have mixed in there. And that is coca" (M. G. Villota, personal communication, March 8, 2019).

There are other negative environmental and social consequences that come from implementation of the policy of substitution of illicit crops under the current approach which focuses on eradication practices, but lacks the necessary state presence in rural territories and pays little attention to advancing social programs stipulated in the Comprehensive Rural Reform

that are supposed to accompany this comprehensive substitution plan. Delays in offering small farmers guarantees such as formalization of land, offering them viable crop solutions, passing the differentiated penal treatment laws, and ensuring rural communities access to justice leave them and the land vulnerable to both legal and illegal actors (UNOHR, 2019; CINEP/PPP-CERAC, 2019; Human Rights Watch, 2019). These consequences are already being seen in many rural territories.

Access to land continues to be a problem in implementing the peace accord. In the last report by the international verification mechanism, CINEP expresses their concern with the little progress displayed in terms of access and use of land, including a lack of clear goals set to move forward (CINEP/PPP-CERAC, 2019). Additionally, USAID reports that the land market inefficiencies in Colombia are caused by continued "tax incentives and government subsidies that support large holdings by wealthy families/groups, even if the land is under-utilized" (USAID, 2017). This often translates to deforestation as land clearing is seen as an improvement which increases land property value in the long-run, and because it neutralizes indigenous and conservationists' "claims to the land based in the use value of forests or inherent value of biodiversity" (McSeeney et al., 2017).

In an interview with a former Advisor to the High Commissioner for Peace who was part of the team that wrote point one of the accord, voiced his concerns in how the land issue is being handled. According to him the "land issue is being pushed to the background, with no apparent political interest displayed. To the point where restitution does not appear as an item in the public agenda and that worries us because rural reform is based on the idea that land is a fundamental asset for rural communities to do their productive initiatives and that way get out of poverty. Formalizing is being talked about and it is important, but for example the root problems of land are being sent to the background" (A. García Trujillo, personal communication, March 6, 2019).

The low levels of formalized land generate several problems in the government's attempts at exercising control of territories. According to an April 22 report by El Tiempo (2019b) setting punitive measures becomes very difficult in cases where people are illegally clearing land, because without titles there is simply no one the government can sanction. In addition to this, government agencies that are trying to improve the efficiency with which the land is utilized for agriculture in Colombia don't have sufficient data to work with, given informality (Semana, 2019). The surveys from Nariño showed that a small portion of those municipalities have titles for the land they occupy. Out out of the 264 surveyed only 74 of them or 28% had land titles.

Rural communities' difficulty in accessing justice is another issue that has had negative effects. The annual report by the UN Office of Human Rights in Colombia found that the the state is facing difficulties in getting these rural communities access to justice, and therefore impunity has risen. The report attributes the lack of access to justice to the state's limited presence due to insufficient material, technical and human resources (UNOHR, 2019). Small farmers don't have institutions defending their right to the land and the the territories are not properly being monitored to ensure that illegal activities, such as land clearing, don't continue to occur. The UN also reported that the lack of state presence has lead to an increase in the number of violent criminal armed groups formed by FARC dissidents (ONUHR, 2019), some of which continue to cultivate and process coca.

The issue of differentiated penal treatment for small growers, has still not been approved, despite the accord signed stipulating it had to be prioritized in the post conflict. This is cause for concern as further delays may increase dispossession if small farmers continue to face long jail sentences and if their land is taken away. Senator Sandino mentioned that "the law of

Differentiated Penal Treatment is very important, because currently what we have is the Law 30, which penalizes drug traffickers and cultivators alike. But it turns out there are no attacks on trafficker but the cultivators get sent to jail, get their land taken away". If the land is not taken by the state, the remaining family may still lose the land, because as Senator Sandino explained "in this patriarchal society the titles were under the name of the men, and women are never included in them. So this has made it easier for someone to come and dispossess them of their land, no matter if everyone knows that was the land they have occupied for years" (V. Sandino, personal communication, February 18, 2019).

As mentioned previously, the land use in Colombia is very much tilted towards cattle ranching rather than agriculture, and unfortunately, the trends of people who are gaining access to land in the post conflict era point at even more land devoted to the practice. Increases in cattle ranching reported by the Ministry of Agricultures' National Council of the Meat Chain (Garnica Gómez, 2018) are preoccupying due to the various negative environmental effects of cattle ranching on water and air pollution, and soil degradation (FAO, 2017), as well as the increase in the ratio of land used for animal husbandry and food crop production. Illegal mining has also seen an increase during the post-conflict era.

Focus on social programs and substitution with cacao

The alternative scenario, in which the government focuses its efforts in implementing the comprehensive policy for substitution of illicit crops has some initial negative environmental effects, but with time, they may be offset. The implementation of point four of the accord, is tied to the completion of some of the components of the Comprehensive Rural Reform. Such is the case of investments in infrastructure from the RRI, which includes building new rural educational centres, health centres, housing, aqueducts, irrigation systems, and roads, among others. The construction of all these new infrastructure projects in rural areas means the clearing of thousands of hectares of land needed for the new constructions to be settled on.

Additionally, the foreseen improvements in quality of life as well as the reduced prices in transport could generate a rebound effect, where there is an increase in population, people live longer lives, and increase their consumption given the greater purchasing power. The access to these new territories also may drive people to continue exploiting in even more remote areas. (Banks & Beale, 1973). However, these environmental impacts may be offset through the use the correct crops for each climate and soil type, a reduction in the gap between the food production crops and animal husbandry, improvements in technology and varieties of cacao and a reduction in the inputs to agriculture such as fertilizers, herbicides, pH correctors, etc. (FAO, 2013).

In order to compare the two scenario (eradication v. comprehensive substitution), the case of cacao is presented. The Colombian government, the US Embassy and the United Nations' Office of Drug and Crime Prevention in Colombia, have pushed the cultivation of cacao as an alternative to coca crops years before the signing of the peace accord (US Embassy in Colombia, 2018). The reasons for the push are the climate favourability of Colombia, positive market conditions and the environmental friendliness of the crop.

Cacao is not only an agricultural activity but a productive chain all the different end products that may come from it. According to the Universidad de La Salle this industry could represent subsistence for 100,000 jobs for Colombians in all the different intermediate and final products. Additionally, the Colombian government and private sector are currently working on policies and projects that will favour the cacao industry (Cely Torres, 2017).

Some "cacao for coca" programs which have already started with the participation of the Colombian Government, small farmers and some private sector players; all of which are being supported by international organizations such as the United Nations' Office of Drug and Crime Prevention. In one these project started in Vichada in 2016, Casa Luker, one of the largest producers of chocolate in Colombia, committed to buying all the cacao that is produced under that program and even signed a pact with the small farmers as proof of their commitment (El Espectador, 2016).

Additionally, some technical assistance projects with the auspice of international community for cacao in Colombia, have the potential to improve yields for all future cacao farmers. The project *Cacao para la Paz* launched by the United States government and the UNODC in Colombia, is an example of the interest that other countries have in Colombia increasing their production of cacao. The project intends to help farmers increase the productivity through joint efforts between the US and the International Centre for Tropical Agriculture (CIAT) by conducting studies of soil and finding cacao varieties that will yield better results (US Embassy in Colombia, 2018).

According to a study by Universidad de La Salle, "the geographical position of Colombia makes it a perfect place to grow cacao", as the country is located within the zone where 70% of the world cacao is produced The quality of the cacao produced in Colombia is also a reason for its consideration as a viable substitute to coca. Colombia has already proven the quality of its fine cacao at the Salón du Chocolat. During the event, which takes place in Paris, a sample from the region of Arauca, qualified among the top 10 of the world. The trinatario variety found in Colombia, is a which is a cross breed of two creole varieties from South and Central America, has some of the "traits that are desirable for fine chocolate manufacturing" (Cely Torres, 2017).

Additionally, there are some interesting developments in Climate Smart Agriculture (CSA) practices which could make cacao more productive. Studies in cacao-producing countries where canopy cover is introduced to cacao trees indicate "a doubling of yields when going from zero to approximately 30% crown cover" in contrast with a yield increase of 7% when using fertilizer (Asare et al., 2018). This type of CSA option in one of the ways in which an increase in the environmental sustainability of cacao may be obtained. The increases in productivity, accompanied by the resilience adaptation and the capacity of the trees to sequester carbon, make cacao a promising crop for Greenhouse Gas Emissions mitigation (FAO, 2013).

Additionally, projections of the international cacao market look promising for Colombia due to a projected shortage in 2020 of the product, out of which 5% represents fine aroma and flavour cacao, which is the type Colombia has the potential to produce. The Free Trade Agreement with the European Union signed by Colombia in 2003, also offers the possibility to sell the product to a market that has been growing, and which, due to its certifications labelling, like the Fair Trade and Rainforest Alliance Certified; may offer farmers of Colombian fine cacao the opportunity to sell at a higher price (Cely Torres, 2017).

But according to the Territorial Coordinator of Nariño, people are not easily convinced by the switch, due to the difference in time that coca and cacao have in harvest. The cacao tree requires an initial investment which will not pay off until the second or third year, when the fruits start growing. "Especially in a humid area like Nariño, the coca leaves rot quickly after recollection, so the farmers have gotten used to a very quick dynamic and turnover". The farmers also suffer from anxiety related to the wait related to the first harvest of the cacao, she explained that farmers would often tell her "well what am I going to do while the cacao is harvested, and how will I sustain myself. I'm getting paid this much for coca every 3 months or so… I am not dumb, if people are going to offer me more for coca, why would I change. I have mouths to feed, is

the government going to come and feed my children?" (M. G. Villota, personal communication, March 8, 2019).

Given the current perception of the government in rural areas after the new administration's decision to suspend payments for farmers who substituted and of increasing aerial spraying operatives; selling farmers the substitution to cacao will require full commitment from the government. Added to this is the profit that farmers stand to make with cacao, which depending on the achieved yields and the price they can sell for, might be smaller than selling coca.

According to data from the surveys of Nariño, farmers participating in illegal crops are making an average net profit of $4,797,091 pesos per hectare per year without accounting for initial investment, which is in most cases very high. Table 3-5 shows the average initial investments and costs incurred as well as the incomes per harvest and year. According to Mejía (2016), harvest of coca happens between two and six months depending on the variety and the climate conditions. Based in information provided from interviewees who have directly worked with cocaleros in the areas studied in Nariño, the harvest is on average every 3 months. This study, therefore, chose a total of 4 harvests per annum in order to make the profit calculations.

Table 3-5 'Costs and income related to coca crops'

Initial Investment

Item	Cost
Average initial investment to cultivate (regardless of hectares)	$5,638,883 pesos
Average initial investment to cultivate per hectare	$2,752,017 pesos

	Per harvest per hectare	Per hectare/year (4 x annum)
Income	$2,683,639 pesos	$10,734,558 pesos
Average cost	$1,484,366 pesos	$5,937,467 pesos
Net Profit	$1,199,273 pesos	4,797,091

Source: Author´s elaboration based on data from surveys conducted with farmers in Nariño

In contrast, the Net Profits from harvesting cacao may need, in most cases, to be complemented by the payments coming from the PNIS to farmers who substitute crops. The delays of the government in paying these out in the first year of implementation (where according to FIP only 51.4% of the linked families were paid), as well as the sudden halt in payments and of new families being subscribed to the program, by the new administration; are not good precedents for move that means farmers disposing of their way of subsistence to depend on the government, for at least 2 to 3 years.

According to estimations from the national supervisor of Fedecacao and reported by El Heraldo, the price of producing one kilogram of cacao is $4,000 pesos (approximately US$1.2). In return, the farmer could sell that kilogram for $7,000 to $9,000 pesos (approximately US$2.0 to 2.68). But the price at the time of selling is not the only variable that could make the difference, yields og the fruit may fluctuate drastically. With improvement in technology, such

as the ones being carried out jointly by the CIAT and US Government in Colombia, the yield of cacao, which in Colombia currently averages between 350 to 400 kg per hectare; could be turned into 1,500 kg per hectare (El Heraldo, 2016).

Table 3-6 'Profit potential of Cacao'

Yield (Kg/ha)	Cost to produce/ha	Sold at 7,000	Net Profit	Sold at 9,000	Net Profit
350	$2,800,000	$4,900,000	**$2,100,000**	$6,300,000	**$3,500,000**
400	$3,200,000	$5,600,000	**$2,400,000**	$7,200,000	**$2,000,000**
1,500	$12,000,000	$21,000,000	**$9,000,000**	$27,000,000	**$15,000,000**

Source: Author´s elaboration based on data from El Heraldo (2016)

As seen in Table 3-6, the only way in which the farmers that substitute would be better off, monetarily, from switching to cacao, would be in the scenario where yields are 1,500kg/ha. Even if the subsidies from PNIS (which are worth 1,000,000 pesos per month) for substituting are paid in full and on time, the farmers will only be better off monetarily at yields of 1,500 kg/ha. This analysis is a good reminder of the importance that modern processes have in the economy of small farmers, and further proof of vital role that technical assistance plays in the implementation of the substitution policy.

How can the state help farmers to effectively substitute coca crops, considering the recent trends?

The government has to make big changes in order to help farmers **effectively substitute**. Working on reaching the most remote areas of the country where there is still no state presence, is required for implementation. This will offer security guarantees, improve perception of the government. Speeding up processes of rural reform to give land titles, to define differentiated populations, to expand coverage of the PNIS, etc. are necessary for implementation of the policy of substitution of illicit crops. Infrastructure projects, especially those for tertiary roads are extremely important to connect farmers to markets.

A study by the Washington Office for Latin America (WOLA) suggests six major causes for the proliferation of coca crops in post-conflict Colombia. The study concluded that the increase had happened due to (WOLA, 2019):

1. Suspended fumigation in 2015 with no back-up solution,
2. Reduction in ground-based eradication programme,
3. Fall in prices of gold making some turn back to coca,
4. A stronger dollar/ better price when selling coca (in pesos),
5. Expected benefits from having coca plantations, and
6. Resistance from coca-growers to manual eradication.

This study takes the six suggested causes for proliferation of illicit crops presented by WOLA as a reference in answering the question of how the government can help farmers in effectively substituting coca, with full knowledge that the six reasons presented come from a top-bottom approach in what the state can do. However, given the transition period the country is facing, in which the government is experiencing problems in asserting control over rural territories; this study looks through the stakeholder interviews as well as the responses from the surveys to coca growers in Nariño, in order to establish an implementation roadmap for the policy of substitution of illicit crops, that has a more bottom-up approach.

In order to establish the reasons why small farmers are driven to coca, this study first analysed data on why farmers have stopped cultivating, returned to cultivating and increased the extension of their coca crops, as well as what would help them, in their own opinion, to move towards ultimately leaving those practices. The study, therefore, focused on the following four questions from the survey of farmers in Nariño:

Q44. Under what conditions would you be willing to stop cultivating coca in the following 12 months?
Q47. What motivated you to stop cultivating? (Contingent on Q46. On whether they have halted cultivation of coca for a period of more than 12 months)
Q48. What motivated recidivism?
Q51. What motivated you to increase the extension of the coca crops?

Table 3-7 'Conditions under which farmers would be willing to stop cultivating within the next 12 months'

Condition	Number of respondents	Percentage of sample (n=234)
Profitability of the new product substitute	111	47.7%
Technical Assistance	44	18.8%
Access to financial services	36	15.4%
Formalizing land	34	14.5%
For the program to be driven by the National Government	19	8.1%
For the program to be driven by an NGO or International Org.	17	7.3%

Source: Author´s elaboration based on data from surveys conducted with farmers in Nariño

As seen in Table 3-7, the results from the survey align with the findings from several of the monitoring organizations and stakeholders interviewed, in recognizing the lack of alternatives to coca as the main reason leading communities to partake in illegal economies in order to survive (UNOHR, 2019). The responses from the surveys of the coca-farmers in Nariño (Table 3-8) on why they continued to cultivate coca after they had abandoned the practice, are a clear indicator of why the government should focus its efforts on creating opportunities for farmers to switch to legality through the comprehensive solutions set-forth in the substitution policy under the accord, instead of the "intimidation strategy" of spraying glyphosate.

Table 3-8 'Reasons for recidivism'

Reason	Number of respondents	Percentage of the sample (n=76)
There was no other option for income	56	73.7%
Halt of aerial aspersion	19	25%
Recovery of the price of coca leaf	16	21.1%
Failure of the productive program	7	9.2%

Pressure or threats by illegal armed groups	3	3.9%

Source: Author´s elaboration based on data from surveys conducted with farmers in Nariño

When asked about the reasons farmers have for continuing to work in illicit crops, the former advisor to the High Commissioner for Peace said "I would say that the problem is not the culture of illegality, but rather an economic decision and one about lack of opportunities" (A. García Trujillo, personal communication, March 6, 2019). The Specialist in Alternative Development from the OAS echoed that message when asked about the motivation of farmers, by saying that "when you talk to a producer, a normal profile of a producer from the area; they want to be within legality, and for their families to live within legality, they all want that, the peace of mind that legality gives. That's the producers. They don't have the malice and just want sustainable means of living. So if there are no opportunities, I think that is the main reason (A. Henao, personal communication, March 13, 2019).

Table 3-9 illustrates the reasons coca-producers in Nariño gave for what had motivated them to increase their extension of coca. Responses show that in the last 2 years, 82 farmers or 35 % of the 234 ha increased the extension of their crops. Those who had increased the size of their crops had on average a total 3.1 hectares of coca planted, which was 1 hectare larger than those who had not increased their extension.

When asked for the main reasons for the increase, the suspension of glyphosate fumigation had a big role, suggesting the the use of glyphosate is an effective deterrent, at least to the farmers' decision to increase their production. Table 6-5 shows the reasons farmers gave for why they increased their coca crops in the last 2 years.

Table 3-9 'Reason why farmers have increased the extension of their coca crops'

Reason for increase in extension	**Number of respondents**	**Percentage of sample (n=82[1])**
Suspension of fumigation with glyphosate	42	51.2%
Lack of alternatives of profitable production	31	37.8%
Increase in the price of coca leaf	30	36.6%
The economic crisis	23	28%
Introduction of a new prototype of coca leaf which is easier to plant and resistant to pests	10	12.2%
Expectiations from the peace accord with FARC	7	8.5%
Fall in price of gold	3	3.7%
Pressure from armed groups which encouraged the increase	0	-

[1] The sample size here varies due to this question being dependent on the previous question which asked if they had increased the extension of their coca crops. 82 farmers answered they had increased extension.

Source: Author´s elaboration based on data from surveys conducted with farmers in Nariño

When asked if they had stopped cultivating coca leaf for a period longer than 12 months, 76 of the respondents answered positively. This is equivalent to 32.4% of those who had participated in illicit crops. When asked why they had suspended cultivation, the main reason given was eradication. However, it is important to point out that, given the way the question was formulated, there is no way of separating results of eradication via fumigation from those that were done manually.

Table 3-10 'Reasons for suspending cultivation of coca for more than 12 months'

Reason	Number of respondents	Percentage of the sample (n=76)
Got fumigated and/or erradicated	44	57.9%
Decrease in price of leaf	30	39.5%
Health issues associated with crop	12	17.1%
Pressure/Threats from illegal armed groups	10	13.2%
Participated in a productive program	7	9.2%
Pressure from authorities	4	5.3%

Source: Author´s elaboration based on data from surveys conducted with farmers in Nariño

The "health issues associated with crops" in Table 6-7, were assumed to be due to the use of chemicals for by the farmers themselves, as there was a specific section which asked about health issues to to aerial spraying. When asked if they or someone they knew had suffered health problems due to aerial spraying, 13.6% answered that they had been affected and 25.2% answered someone they knew had been affected.

What the four tables showed, is that for every action that farmers took (substituting, relapsing, increasing territory), the decision making was in the most part based in the farmers' ability, or inability, to meet the economic needs of his/her family.

But an alternative crop is not the only thing lacking. The interviews revealed that most agree that farmers don't have feasible alternatives because they lack connection to markets. The Advisor for the High Commissioner for Peace pointed out that although economic decisions play a major role, "In those peripheral/ rural areas there is little access to legal markets, little access to public goods such as roads and infrastructure of commercialization and financing, and they have fragile soils. So there are structural conditions that affect that subjective or individual decision" (A. García Trujillo, personal communication, March 6, 2019).

The Territorial Coordinator for Nariño, expressed similar concerns moving forward. She spoke about the various instances in which farmers had told her that if they didn't have access roads, they would not be able to move their products out. She recalled a small farmer saying:

"Look, *doctora*, I go out with a backpack and I put all of the coca leaves from my crop, but if I harvest cacao, how am I going to transport, if I can barely make it into this place as it is right now?".

She explained that these were areas with very difficult access. In order to visit the place were she had spoken to that particular farmer, she would have to take a speedboat for 4 hours, and then have to climb a mountain. Additionally, the remoteness and the lack of infrastructure, make the the prices of transportation very high. "When visiting the the town of Olaya Herrera I had to pay 200,000 pesos[2] (approximately 60 dollars) for the 4-hour speedboat ride. The situation of Colombia is very messed-up" (M. G. Villota, personal communication, March 8, 2019).

When asked if the lack of infrastructure was particular to the area of Tumaco where she was based, she explained that "there are many areas with absolutely no roads. One of the towns we had to visit was called Tallambi, which is a Colombian territory. However, in order to get there, we had to travel to Ecuador and then go back into Colombia because the Colombian side lacked access roads… its very unfair to the rural communities of Nariño, which are easily 70% of the population" (M. G. Villota, personal communication, March 8, 2019).

Part of the problem with the remoteness of these territories, is that communicating any implementation of programs to the communities that would potentially benefit from these becomes a project of its own. In a policy like substitution of illicit crops, which requires not only buy-in from the communities, this can make or break implementation. The implementation of this policy cannot only rely on punishment to those who do not comply and replant, as that has been shown time and time again to not be effective (Mejía, 2016), especially with a state that has a long history of its inability to assert control over its territory. Further, the non-compliance by the side of the government in paying subsidies, delivering on the changes of law for differentiated penal treatment and the suspension of families from PNIS due to incomplete information, with no plan on how to evaluate their cases, among others; puts the government in a position where punishing someone for not keeping their word, is inexcusable in the eyes of these rural communities.

In the case of Nariño, the Territorial Coordinator spoke about the importance for the government to "establish a more direct communication with communities, and it can't continue to not honor its promises, especially because this legitimizes the illegal groups. I observed that in many areas, due to the lack of state presence, FARC were considered heroes, even if they killed and did bad things, people respected FARC because they always would honor their promises. And people felt in some way protected, the kind of protection people feel from a state-like figure"(M. G. Villota, personal communication, March 8, 2019).

Similarly, when asked if she had perceived that the situation for farmers is now worse in terms of security than before signing the accord, the Expert in Alternative Development, who had recently been in Colombia visiting communities answered "Yes, because when FARC were in control, the pressure and the standards were more uniform. What was expected of people. And now there is bombardment from smaller groups on all sides. I have heard [during visits to territories] that some of these groups are more sanguinary. A producer told me 'FARC had codes, now codes don't exist. Now it's the law of the jungle'" (A. Henao, personal communication, March 13, 2019).

Surveys perception of the government is not very positive both at the municipal, as well as at the departmental level. When asked to grade the Mayor's Office efforts to promote the substitution of illicit crop program from 0 to 10, a total 44.1% of respondents gave the Mayors

[2] Minimum wage in Colombia was $781,242 pesos in 2018 according to records from the Labour Ministry of Colombia. Source: http://www.mintrabajo.gov.co

office a low mark (between 0 and 2), while only 4.9% gave the mayors office a high mark (between 7 and 10)

Similarly, when asked to grade the Departmental Government's efforts to promote the substitution of illicit crop program from 0 to 10, a total 41.1% of respondents gave the Departmental Government a low mark (between 0 and 2), while only 21.7% gave them a high mark (between 7 and 10).

However, the perception of the substitution program, some farmers seemed to like it as it was promised, but not how it has been implemented so far. Francisco Narváez, a peasant farmer who was displaced from his land in Putumayo and now lives in Cauca said "we must defend the Peace Accord, which is comprehensive in agrarian policies and in its defence of the Colombian countryside. It must be communicated to all corners of the country" (F. Narváez, personal communication, March 25, 2019).

In the survey from Nariño, the farmers were asked what they thought was the main reason why implementation of programs for substitution of illicit crops did not work. Out of the sample, 167 of the farmers (or 64.4% of those who answered) said that the main reason the programs did not work was because the government failed to comply what what had been previously promised. This is preoccupying given the trust that rural communities must have in the the figure of the government in order for the state to continue adding more families to the PNIS program.

During the country visit portion of this research, a very interesting was raised during one of the interviews, concerning the structural conditions that affect that subjective decisions made by coca farmers. For this reason, this study decided to map out the decision-making process of coca in hopes of gaining a better understanding. The figure below (Figure 3-2), shows the five factors that this study identified as affecting the small farmers in areas where, traditionally, there has been high concentration of coca crops. Some of these factors are not always visible to the farmer (who will only see the consequence stemming from the factor), and in all cases the factors are exogenous to th farmers and to their communities. The five factors presented are external drug policies, internal drug policies, armed violent groups operating in their area, the implementation of the peace accord and free trade agreements.

Figure 3-2 'Coca farmer's dilemma'

Source: Author's elaboration

The drug policies both internal (Colombian) and external (United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances) may have several consequences that affect the decision-making process of these small farmers. The external policies enacted in countries where Colombian cocaine is exported, have the potential to change the price of the cocaine, which in turn can change the price that the cartels and any other organization producing cocaine, will be willing to pay for the coca leaves, coca base and coca paste. Further, the severity as well as the scope with which these international laws are implemented, has the potential to alter the amount of the finished cocaine that is available. Since the price of cocaine, like any other commodity (Mejía, 2016), is dependent on supply and demand; this too may alter the price that farmers would be offered for the leaves, coca paste and coca base.

The internal policies by the Colombian government also influence the choices of the small farmers, but in a more direct way. Laws criminalizing the cultivation of coca crops can play a big role in the decisions that small farmers make. The survey sample of Nariño suggests otherwise. When asked if they believed the chances of being captured for cultivating, 151 of them (or 57% of al respondents). However, 135 of them (or 89.4%) still cultivate. So the threat of going to prison does not seem to be as effective as glyphosate is as a deterrent in the sample.

Part of this could be explained by the lack of knowledge about the law displayed in follow-up questions from the survey. When asked if they knew what the sentence for growing coca was, only 26 of them (or 9.8%) answered yes. However, when pressed on that knowledge (how many years was the sentence according to law), only 2 of them knew the right answer which was 8 to 18 years currently. Out of those who answered the question of the prison time, 22 (or 84.6%) undershot, while 1 overshot. One person did not complete this portion of the question. So the limited understanding of the law that affects them is further proof of the government's need to have better channels of communication with these rural communities. Defining the issue of differentiated penal treatment would also be recommended, especially given the current prison overcrowding of these facilities being 49% (El Colombiano, 2018).

Other internal drug policies have greater effects in deterring farmers from cultivating coca, and some affect them and their crops even if they are not cultivating coca themselves. Such is the case of the eradication policies for aerial spraying of glyphosate and manual eradication, which have been covered in earlier by this report. As mentioned before too, these policies often face pushback from these communities, like the closing of major roads by farmers to impede security forces from coming to do their eradication practices, or the farmers covering their crops, replanting and cutting off the stem of plants before and after the spraying of the herbicide occurs.

The illegal armed groups often have a big influence in the decisions of these farmers. As explained by Arjona (2016), these groups in control of an area may use different governance structures in order to assert control of the area. Given the history of how the beginnings of coca cultivation in Colombia occurred, the years of speech by guerrilla groups like FARC using the argument of inequality and land to get small farmers to comply, and based on the interviews to experts who have worked in these coca growing areas, it can be inferred that the; this study concludes that the farmers often are influenced to grow coca by the armed groups controlling the area, although the don't always see as an obligation.

The expert in Alternative Development from OAS said that "some [farmers] are being pressured by the different groups and if you don't produce then they'll kill you, and you hear all sort of stories, that they will rape their daughters, etc." (A. Henao, personal communication, March 13, 2019). Similarly, Muyuy Ojeda, professor at the National University and Indigenous Leader from the Nasa tribe, said that "although there are special rules to cultivate coca in indigenous territories, as the special indigenous jurisdiction permits it, it is only for the ancestral uses and not for commercialization. However, some of out brothers have to cultivate because armed groups are threatening them to do so" (M. Ojeda, personal communication, February 23, 2019).

The peace agreement, if correctly implemented should have the necessary components to influence the decision of these farmers. Of particular interest to the farmers are the implementation of the Comprehensive Rural Reform and the policy for Substitution of Illicit Crops. These two policies, as has been pointed out previously, has repercussions in the farmers' land tenure, access to market, access to justice, access to technical assistance, etc.

Free trade agreements are perhaps the least visible of all the factors included in the "coca farmer's dilemma" but have been crucial components to the lack of development of the agricultural sector of Colombia for years. A series of treaties that have been signed by past neo-liberal administrations in Colombia, which have allowed for subsidized agricultural products from developed nations to come into the country at 0% tariffs (Pérez Zapata, 2016), have led to a countryside that is underdeveloped and that either overutilizes or underutilizes its soils (Semana, 2019), and to a peasant class that has been marginalized. This all combined with tax incentives and subsidies which incentivize large land-holdings from wealthy groups (USAID, 2017) have shaped the lack of opportunities that have led these small farmers to either cultivate coca, or go with the legality route and continue living under poverty.

It is important to note that there was one of the farmers interviewed who was aware of how some of the decisions of previous administrations affects him and his family. When asked what he saw as the reason for the increases in coca crops after the signing of the accord, Mr. Narváez answered that it was "a response to a agrarian policy by the Colombian government that has been against the peasants and can be summarized in never implementing a comprehensive agrarian reform for those who work the land… the massive imports of the food since the 60s and the free trade agreements liquidated the national production" (F. Narváez, personal communication, March 25, 2019).

The relationships between the different factors in the "coca farmers' dilemma" can also shape their decision. As an example, the drug policies implemented by a country like the United States which has the resources to provide monetary funds as well as military equipment, personnel and training to the Colombian government and its military, heavily influences the policies that are implemented within Colombia. The government's inability to implement parts of the accord, or to implement them without delays, have given spaces for armed groups to spread and to take control over many of the territories previously occupied by FARC.

All the components of the "coca farmers' dilemma" are a reminder of the very complex considerations that a person that lives in the Colombian countryside has to phase when one of the external factors, which they have no control over, is modified. The notion that the problems of agrarian communities can be solved with a simple step, or with a one-size-fits-all solution for all territories needs to be reconsidered.

4 Discussion and Analysis

This research set out to answer two questions regarding the implementation of the Colombian Government's policy of substitution of illicit crops within the framework of the peace accord. The two research questions were:

1. What are the environmental (and social) impacts of the policy of substitution of illicit crops?

2. How can the state help farmers to effectively substitute coca crops, considering the recent trends?

In answering research question one this study offered two scenarios; one where the state continues to focus on the eradication of illicit crops with no major changes in their decision of splitting this "comprehensive" policy into pieces which are implemented separately. This approach has had to date, paid little or no attention to the territorial focus which is meant to ease implementation tailored to the specific region in which it is being carried out; had a very slow role-out of the rural reform components of the accord, which are necessary for substitution efforts to work; had little or no state presence in the rural areas where the policy is to be implemented which has increased public mistrusts of the state and has allowed for new armed groups to occupy territories which were supposed to have been claimed back, upon the signing of the accord. Additionally, in an attempt to decrease the amount of hectares dedicated to coca crops, under this scenario the government continues to spray glyphosate in high dosages on both illegal and legal crops alike, which can have several negative impacts. The environmental repercussions under this scenario were increased deforestation, which would in turn cause increased soil pollution, as well as increased water and air pollution. Something important to notice is that although the policy is supposed to focus on illicit crops, the government's inability to implement also leaves these rural areas vulnerable to exploitation from both legal and illegal economic interests, which further increases the negative environmental and social impacts.

The second scenario offered is one where the comprehensive focus of the program for substitution of illicit crops is respected. In this scenario the government has as its main focus to develop all the components of the policy which are meant to encourage the voluntary move by communities into legality, such as land titling, technical assistance, access to market and finance, improved security and access to justice. For this human development approach to work, the pacts made by the state with these communities need to be respected. In order to offer a comparable case to the first scenario, the alternative crop cacao was used. Cacao has many qualities which make it a viable alternative, such as government buy-in, support from private sector and international actors, a promising future market, recognition as an environmentally friendlier option, and interest shown by coca farmers in the Nariño sample. Additionally, the geographical and climate conditions of Colombia allow for production of a quality of cacao which has a comparative advantage. Some of the areas where the crop shows drawbacks are the perceived long period between initial planting and first harvest, which can be 2 to 3 years. This problem can be curtailed with the payments from PNIS to farmers who substitute, and by providing them access to credit.

Work being done by the CIAT and other agriculture research centres will be pivotal in making this a viable crop, as the improvements in yields promise to more than triple the amount of cacao per hectare (from 400kg to 1,500kg). Some potential environmental problems are the rebound effects that can be generated by the development of the rural areas in which it is implemented. The lowered prices of transport, the increased levels of life quality and purchasing power, and access to energy; have the potential of increasing consumption in these areas, which may lead to greater negative environmental impact. The clearing of land for the various

infrastructure projects proposed, like roads, schools, health centres, irrigation systems, sanitation is another potential negative repercussion of implementation. However, these negative effects may be mitigated through the use of climate-smart agricultural practices.

It is important to note that although this study relied on the case of cacao as an alternative to coca, there are other viable substitutes that have been contemplated and recommended by the government. Also important is that the crops which are chosen for substitution are chosen with special regard to the various soil studied that the government has done in the last years and for which results need to be better communicated with farmers. The environmental sustainability of these productive projects will be highly dependant on choosing the right crops for the right areas, soils, elevations, water availability, etc. Also important will be to try to match the vocation of the farmers in a certain territory as best as possible with the new agricultural activity that they will be most suitable for given their past experience.

This is why the consultation component is so important. In order to establish where people come from, what their past vocation was, what their reason for being there, or having been displaced, their past encounters with armed groups and their preferences on what crop to specialize; it is important to create the spaces for dialog with these communities as well as a system in which all the agencies working towards the same aim in the country; may record their findings.

Then the territorial component becomes very important in the next stages of implementation, as the various plans to move forward can be informed by the data collected in each territory, and the roll-out of the project may be modified to meet the needs and preferences of the people it is trying to serve. This requires better systems of coordination among agencies both at the national level, as well as NGOs, international organizations and other governments which are providing their knowledge for the implementation of the accord.

In answering the second question, regarding the ways in which the government can help farmers effectively substitute, this study focused on better understanding what has caused proliferation of coca crops, what the motivations and limitations of farmers were, and what was the general perception of the policy by farmers. The study finds that the government has to completely change the way in which it is carrying out the implementation of the substitution program if it wants to see positive results for the environment and the rural communities.

The government must adopt a comprehensive approach in order to provide the necessary conditions for these rural communities to see voluntary substitution as a viable option. This includes increasing state presence in all the territory, giving payments for PNIS on time, providing access to markets, providing the technical assistance, improving coordination among agencies, and revaluating the budget.

State presence is important for many reasons. This will mean a better communication between the government and rural communities in order to ensure buy-in from farmers, as well as to be able to design better implementation plans with the participation of the community. Arjona (2016) can provide insight into the ways in which to better establish control over a territory, based on the already existing power structures in each area. This will result, if done properly, in an improved perception of the government in these rural areas which, in many cases, do not know what government presence looked like.

But although the state presence should focus on providing access to justice, it cannot continue to be understood as only asserting control over territories through the use of security forces (UNOHR, 2019). Having other government figures in those communities will be important in

speeding up processes such as the formalization of land which is an essential part of the substitution of illicit crops program.

The territorial vision set forth in the accord must not be forgotten. As Adriana Henao mentioned during her interview, where she stressed the need for "an anthropologic study to ensure that we understand the territories of the country. This includes the vocation of these people, where they came from and how they got here" (A. Henao, personal communication, March 13, 2019). This is important because Colombia is a very diverse country with communities that drastically chance from one town to another.

Additionally, the government has to provide access to markets, which means several things. The farmers must have assurance that once they have switched from growing coca to the alternative chosen with the help of the technical experts, they will be able to get their product to market. This means having knowledge on how to sell their product, and the government helping by acting as an intermediary to connect these farmers to buyers. Cases like the one of cacao farmers from Vichada who made a pact to sell all of their production directly to Casa Luker (El Espectador, 2016), are good examples of what can be done with the cooperation of the state and private sector.

Access also refers to the farmers' inclusion into the financial market. Both private banks and other financing mechanisms provided by the government are important especially for initial investments by farmers into their productive projects. This will make substitution to products like cacao more viable, given the 2 or 3-year period between preparation of the soil, planting and first harvest.

The third meaning of access is what most people interviewed referred to as the major problem hindering implementation of the substitution program, and that is roads. The bad conditions of the main roads connecting the port of Tumaco to the Department's capital of Pasto is indeed preoccupying, and improvements to that already existing main road should be a priority for the government in the upcoming years. However, both the RRI as well as the people interviewed display a conviction that the focus moving forward should be on the construction of tertiary roads. This study would like to push back on that idea, relying once again on the concept of territorial focus.

A quick look at a satellite image of the municipality of El Charco (Figure 4-1), will probably give away the reasoning behind the push-back. The municipality is in a remote area that has no roads in site, however it is located at the basin of the Tapaje River. The picture used is of El Charco, however all municipalities from the study have these same characteristics.

Colombia has for a long time suffered from very high transport costs, because most of internal transport of merchandise has to be done through terrestrial means. According to a study by ARCADIS, the total cargo moved in 2014 in Colombia was equivalent to 300 million tonnes. Out of those only 1% was moved via rivers, while 73% was moved via roads (Arcadis, 2015). However, the poor conditions of the roads make it costlier to move a container from the port of Buenaventura, Valle to Bogotá, than to bring that same merchandize from China to Colombia (Silvera Escudero & Mendoza Valencia, 2017).

Figure 4-1 'El Charco fluvial potential'

Source: Google maps

The Pacific Region has great potential for fluvial transport, and prove of it are some of the plans proposed by the regional governments, like the *Acuapista* or water highway proposed between the ports of Buenaventura and Tumaco (Arcadis, 2015). The reasoning for not initiating any of the projects to improve fluvial infrastructure, had always been attributed to security concerns. This study therefore proposes a look into getting the communities that are planning to substitute, access to market, but to do so taking into consideration the options that were not available while the country was in conflict, and which are now an option. In the specific case of the Nariño Pacific area, this may mean considering fluvial transport to move merchandise. This has the potential to reduce both environmental effects and the costs of transport.

5 Conclusions (and recommendations)

Research Question 1

What are the environmental (and social) impacts of the policy of substitution of illicit crops?

The study concludes that the policy of substitution of illicit crops has two sets of environmental impacts depending on the government's decision of how to move forward with implementation. It was found that the negative environmental impacts are larger in the scenario where the government focuses primarily on implementing the portions of the policy which deal with eradication. The negative environmental impacts under a continuation of the current state of implementation, are increases in deforestation, increases in soil degradation, increases in water pollution and finally increases in air pollution. Additionally, some negative social aspects were also found, like the continued high levels of violence in rural areas, food security issues, displacement of people, the possible detriment to health conditions of rural communities, poverty and marginality.

The alternative approach, where the government implements the policy as what it was intended to be, a comprehensive substitution policy, with care for the human development aspect; will lead to less deforestation (although some is anticipated in the first years due to preparing land for new crops), a decrease in soil degradation, a decrease in water pollution and a decrease in air pollution. The extent to which the government is able to pair up the farmers with the right technical assistance that will recommend the best crop in terms of their economic benefits and environmental benefits; will determine how environmentally friendly this scenario may be. A potential for rebound effect caused by the improvements to peoples' life conditions and the increased purchasing power, can be curtailed with good practices in agriculture.

Are there any environmentally friendlier options?

The study found that there are environmentally friendlier options, including but not limited to the example presented of cacao. Once again the conditions of the territories where crops are placed and their compatibility of the crop with the soils, as well as decreases in inputs, which are possible through the joint effort of the farmer and the organizations providing the technical assistance; will determine the improvements of the current environmental conditions.

Research Question 2

How can the state help farmers to effectively substitute coca crops, considering the recent trends?

In answering question two, this research looked into the reasons for increases in illicit crops (specifically coca) after the accord, the motivations of farmers and finally the perception farmers have of the governmental substitution program.

Why has there been an increase in coca crops?

The increases in coca were found to be due to various factors. The study set out to prove the 6 reasons found by WOLA (2019), which are the following

1. Suspended fumigation in 2015 with no back-up solution,

2. Reduction in ground-based eradication programme,
3. Fall in prices of gold making some turn back to coca,
4. A stronger dollar/ better price when selling coca (in pesos),
5. Expected benefits from having coca plantations, and
6. Resistance from coca-growers to manual eradication

The suspended fumigation was found to be an important factor as proved by answers from 25% of the coca farmers who said they had restarted their coca cultivation because they had seen a halt in aerial spraying in the last few years. Additional insight from the interview with the specialist in alternative development, who had visited some of these communities and had seen first-hand that aerial spraying did work as a scare tactic, served as further proof if this factor's importance.

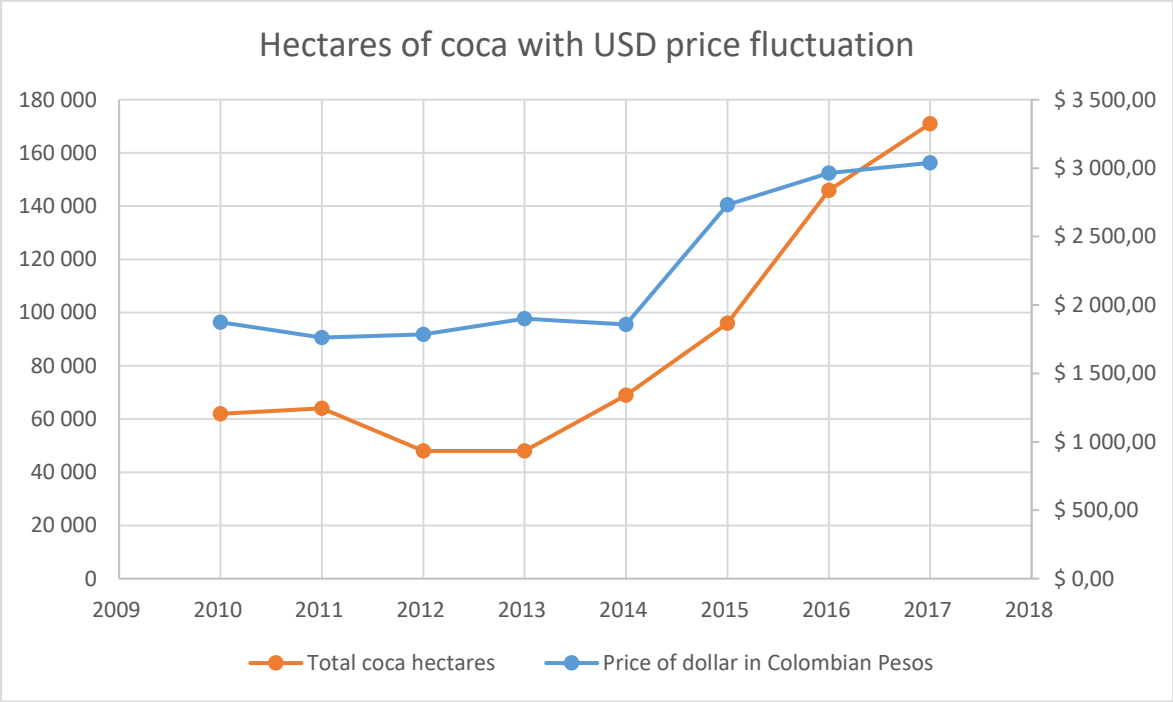
The reduction of the ground-based eradication programme claim can be answered by looking at the data on hectares of coca eradicated per year, which went from 61,000 hectares in 2009 to 13,000 in 2015. Data on the amount of hectares of coca cultivated show a steady decline in the amount of coca when grown-based eradication efforts are increased, and an increase in coca hectares in 2013 when manual eradication programs where decreased. Additionally, research by Mejíia (2016) concluded that manual eradication was more effective than glyphosate in keeping coca crop numbers down. A halt of both types of eradication practices simultaneously would be expected to show an increase in the hectares of coca cultivated in the country.

The data on the price of gold offered by WOLA shows a decrease in price after a big spike that occurred shortly after the 2008 economic crisis. These numbers coincide with the years when the extension of coca crops started going up again. No further data analysis was done to establish a connection. However, out of the respondents from the survey of coca farmers in Nariño, only 3.7% of them gave "a decrease in the price of gold" as their reason to replant coca. A possible explanation for this is the remoteness of the areas surveyed which are also far from the area of central Nariño where illegal mining happens. Only one of the municipalities surveyed (Tumaco) has been reported to have problems with illegal mining (UNOCHA, 2017). Also, according to two of the interviewed who had worked in Nariño many of the people who are cultivating coca in the Pacific Region of Nariño are displaced people who come from other departments like Putumayo, and their vocation is coca cultivation (A. Henao, personal communication, March 13, 2019; M.G. Villota, personal communication, March 8, 2019).

The case of the stronger dollar was also compelling given the data. Historical data on the price of the dollar from the Bank of the Republic of Colombia was used in order to compare it to the numbers reported by Simci. Figure 5-1 shows the relationship between the increase in the price of the dollar and the hectares of coca.

Additionally, 36% of the coca farmers surveyed in Nariño said they had been motivated to go increase the extension of their coca crops due to the increase in the price of coca leaves. When calculating the profit of farmer who cultivated coca, this study found that the amount in pesos was larger than what Mejía (2016) had found in his study which was only a few years apart. A closer look into the data showed that although the profit in pesos was higher, the price paid for the coca leaves remained steady when seen in US dollars. Also, the study found that despite receiving more money in pesos for their crop, the farmers' net profit was 44.6% while the farmers in Mejía's study were getting a 47% return.

Figure 5-1 'Historical hectares of coca and price of US dollar'



Source: Author's elaboration based on data from historical of the Bank of the Republic of Colombia and El Tiempo (2018b)

On the issue of farmers expecting to receive benefits from planting coca, this study was not able to establish a relationship. Data from the survey of farmers in Nariño showed that only 8.5% of them expressed "expectations from the peace accord" as one of their motivations to increase the extension of their coca crops.

The resistance from coca farmers is evidenced by the several reported cases of disturbances and road blockages by farmers in order to stop security forces from carrying out eradication operatives (El Tiempo, 2019c; UNOHR, 2019). Some of the people interviewed also attested to several mobilizations they witnessed in the regions with high coca concentration as protests to the eradication practices (M. Ojeda, personal communication, February 23, 2019; M. G. Villota, personal communication, March 8, 2019).

This study proposes two more reasons for the increase in hectares of coca crops be included in the list, given the results obtained from the surveys as well as the responses from personal communications. The two other reasons are the lack of viable economic opportunities faced by farmers and the government's non-compliance with the pacts signed with families of the PNIS. This is further proved by the results of the motivations of farmers to continue with illicit crops which will follow.

What motivates small farmers to continue with illicit crops?

The reasons expressed both in the surveys as well as in interviews for farmers continuing working in coca crops were overwhelmingly related to economic decision. In all questions related to the decisions to grow, expand, substitute or relapse; the top answer was always related to the economic factors, either the profitability of the crop or the absence of an alternative that could help meet basic needs.

How do small farmers perceive the governmental substitution program?

The perception of the governmental substitution program was good, as expressed both in the interviews as well as the survey responses. However, this was in stark contrast to the perception that the farmers have in the government's implementation of the accords. The study found that 64.4% of farmers believe the program of substitution of illicit crops mainly does not work because of the government's non-compliance with what was agreed. The negative perception of the government is at the local, department and national level.

This study concludes that the government must focus on the multiple components of the comprehensive program for substitution of illicit crops. The well coordinated execution of this policy will generate improvements in the environmental sustainability of the country as well as in the lives of the poorest rural communities. Stronger commitment by the government to make available funds for implementation as well as to assert their presence in the rural territories through more than military operations, will help communicate the alternatives to coca cultivation in rural areas and will also improve the perception of the government by the communities in these areas.

The development of the Colombian rural territories is possible. But for the policy of substitution to work, the focus of the government cannot only be in fighting illegality, but instead needs to focus on working with the communities towards viable alternatives for their development. Although the program is set to be executed at a national level, there are provisions, such as the territorial focus, that will allow the government to implement successfully in the different territories where the program is needed, with approaches that will be tailored to the specific area. The government can take lessons from rebel groups which asserted control of population, by paying close attention to the complexities of these rural areas, and understanding that there is no such thing as a one-size-fits-all solution.

This can only be achieved if there is presence of the government in rural areas, not only to exercise control through security forces presence or airplanes flying by spraying glyphosate, but with administrative and social agencies that may help these rural communities participate in the states decision-making process. Citizens perception of their government is always desired, but it is especially important in instances where that government is a new figure for the citizens. Showing these communities, which have never seen governance (other than that established by rebel groups), that their government cares, will help build the trust necessary to continue with a successful implementation.

But the trust can only be built if the government that is in power understands that commitments made by past administrations are state decisions, and therefore need to be followed through. The Colombian state signed a compromise, not only with FARC, but also with communities in rural Colombia. This group is comprised by hundreds of thousands of people who have the potential to speed-up the development of the countryside, and who will be both contributing to the state coffers and voting in upcoming elections. So they should be taken seriously and not continue to be overlooked as a marginalized group.

Coordination among all state agencies, international organizations and NGOs working on the same issue, should also be pushed. This will not only decrease the duplication of efforts, but will also strengthen the monitoring capacity that such a large-scale implementation task is in such dire need of.

Finally, this study was conducted for the Pacific region of Colombia with data mostly coming from the departments of Nariño, and to a lesser extent Valle del Cauca. Given the importance of the territorial focus that is stressed throughout this study, it is therefore recommended that similar studies be conducted in the different regions of the country which have limited state

presence and/or have high concentration of coca crops, both presently as well as historically. This will both inform implementation of the accord as a whole and prevent territories from being taken over by coca crops and armed groups.

The study also recommends the creation of a system where the different agencies, both internal and international, that are working in implementing the accord; can compile information about the territories they serve. This will be important both to avoid the duplication of efforts and to have a centralized dataset of the demographics of the different territories and the monitoring of implementation approaches attempted that either failed or succeeded. Closer attention to the characteristics of these territories should be encouraged. One way in which the implementation can be informed is by conducting anthropological studies which may help better understand the behaviour of people in a certain area in order to try an anticipate the necessary tweaks to the programs' implementation. It may also help answering the question of why people have decided to locate in such remote areas which are difficult and costly for the government to get to. If the reasons are related to the structures which were in place during the time when Colombia was in conflict, perhaps it may help the government to assess if they should enter into an agreement with these communities in order to give them lands which are closer to populated areas which already have government presence. This could help in reducing costs by the government and would place the farmers closer to markets, technical assistance, and other infrastructure which can help them in their productive projects.

Bibliography

Alatartseva, E., & Barysheva, G. (2015). Well-being: Subjective and Objective Aspects. *Procedia - Social and Behavioral Sciences*, Volume 166, 36-42.

Álvarez, M. (2003) Forests in the Time of Violence, Journal of Sustainable Forestry, 16:3-4, 47-68,DOI: 10.1300/J091v16n03_03

Amnesty International. (2014). *A land title is not enough: Ensuring sustainable land restitution in Colombia*.

ARCADIS Nederland BV. (2015). *Plan Maestro Fluvial de Colombia*.

Asare, R., Markussen, B., Asare, R. A., Gilbert, A. K., Anders, R. (2018) On-farm cocoa yields increase with canopy cover of shade trees in two agro-ecological zones in Ghana, Climate and Development, DOI: 10.1080/17565529.2018.1442805

Asocaña. (2018). Aspectos Generaled de Sector Agroindustrial de la Caña. Informe Anual

Banco de la República. (2012, February 7). Tasa de cambio del peso colombiano (TRM). Retrieved from Banco de la República (banco central de Colombia) website: http://www.banrep.gov.co/es/tasa-cambio-del-peso-colombiano-trm

Baulenas, A. (2016). Coca: A Blessing and a Curse. (n.d.). National Geographic Magazine. Retrieved from https://www.nationalgeographic.com/archaeology-and-history/magazine/2016/11-12/daily-life-coca-inca-andes-south-america/

Brain, R. A., & Solomon, K. R. (2009). Comparison of the Hazards Posed to Amphibians by the Glyphosate Spray Control Program Versus the Chemical and Physical Activities of Coca Production in Colombia. *Journal of Toxicology and Environmental Health, Part A*, *72*(15–16), 937–948. https://doi.org/10.1080/15287390902929683

Camacho, A., & Mejía, D. (2017). The health consequences of aerial spraying illicit crops: The case of Colombia. *Journal of Health Economics*, *54*, 147-160.

Cely Torres, L. (2017). Oferta productiva del cacao colombiano en el posconflicto. Estrategias para el aprovechamiento de oportunidades comerciales en el marco del acuerdo comercial Colombia-Unión Europea. *Equidad Y Desarrollo*, (28), 167-195. doi: 10.19052/ed.4211

Centro Nacional de Memoria Histórica. (2015). *Una nación desplazada. Informe nacional del desplazamiento forzado en Colombia*

Colombia is a Haven for Biodiversity. (2017). *National Geographic*. Retrieved from https://www.nationalgeographic.com.au/nature/this-country-is-a-haven-for-biodiversity.aspx

Consejería Presidencial para la Estabilización y la Consolidacion. (2018). Sustitución de cultivos: llegó la hora del cacao. (2018, April, 4). Retrieved March 23, 2019, from http://www.posconflicto.gov.co/sala-prensa/noticias/2018/Paginas/20180418-sustitucion-de-cultivos-llego-la-hora-del-cacao.aspx

Consejo Nacional de Polílica Económica y Social (CONPES). (2018). Concepto favourable a la nación para contratar operaciones de crédito con la banca multilateral hasta por USD 150 millones destinados a financiar parcialmente el programa para la adopción e implementación de un Catastro Miltipropósito Rural-Urbano

Contraloría General de la República. (2018). Segundo informe al congreso sobre la ejecución de los recursos y cumplimiento de las metas del component para la paz del Plan Plurianual de Inversiones

Convention on Biological Diversity (CBD). (2019). Country Profile – Colombia. Retrieved May 10, 2019, from https://www.cbd.int/countries/profile/default.shtml?country=co

Demir, J. (2018). Understanding the causes of Colombia's conflict: land ownership. Retrieved from https://colombiareports.com/understanding-the-causes-of-colombias-conflict-land-ownership/

Dias, M., Rocha, R., & Soares, R. R. (2019). *Glyphosate Use in Agriculture and Birth Outcomes of Surrounding Populations*. 49.

Departamento Nacional de Planeación (DNP). (2019). Diversidad para la equidad, la convivencia pacífica y el desarrollo sostenible. (n.d.). Retrieved May 28, 2019, from https://www.dnp.gov.co/DNPN/Plan-Nacional-de-

Desarrollo/Paginas/Pactos-Regionales/Region-Pacifico/Diversidad-para-la-equidad-la-convivencia-pacifica-y-el-desarrollo-sostenible.aspx

Dirección Nacional de Estadística (DANE). (2019). Boletín Técnico: Pobreza Monetaria y Multidimensional en Colombia Año 2017

El Colombiano. (2018). Hacinamiento carcelario en Colombia es del 49% segun defensoría. (2018, October 25). Retrieved from https://www.elcolombiano.com/colombia/hacinamiento-carcelario-en-colombia-es-del-49-segun-defensoria-BH9559201

El Espectador. (2018) Estado tendrá que compensar a campesino afectado por uso de glifosato (2018, December 18). Retrieved from https://www.elespectador.com/noticias/medio-ambiente/estado-tendra-que-compensar-campesino-afectado-por-uso-de-glifosato-articulo-829828

El Espectador. (2019). Colombia todavía es el mayor productor de coca del mundo: ONU | ELESPECTADOR.COM. (2019, March 5). Retrieved from https://www.elespectador.com/noticias/nacional/colombia-sigue-siendo-el-mayor-productor-de-coca-del-mundo-onu-articulo-843260

El Heraldo. (2016). Siembra de cacao, una actividad rentable | El Heraldo. (2016, December 13). Retrieved from https://www.elheraldo.co/cordoba/siembra-de-cacao-una-actividad-rentable-310935

El País. (2019). Continúa la tension por enfrentamientos de grupos armados en Corinto, norte del Cauca. (2019, February 1). Retrieved from https://www.elpais.com.co/judicial/continua-la-tension-por-enfrentamientos-de-grupos-armados-en-corinto-norte-del-cauca.html

El Tiempo. (1996). Glifosato, dolor de cabeza de Quinchía. - Archivo Digital de Noticias de Colombia y el Mundo desde 1.990 - eltiempo.com. (1996, March, 10). Retrieved from https://www.eltiempo.com/archivo/documento/MAM-340908

El Tiempo. (2017). Armada destruye cuatro laboratorios e insumos de droga en Nariño - Cali - Colombia - ELTIEMPO.COM. (2017, March 6). Retrieved from https://www.eltiempo.com/colombia/cali/armada-destruye-cuatro-laboratorios-e-insumos-de-droga-en-narino-64608

El Tiempo. (2018a). Destruyen 25 laboratorios de coca en el Bajo Cauca antioqueño - Medellín - Colombia - ELTIEMPO.COM. (2018, December 27). Retrieved from https://www.eltiempo.com/colombia/medellin/destruyen-25-laboratorios-de-coca-en-el-bajo-cauca-antioqueno-309366

El Tiempo. (2018b). Variación de cultivos de coca en Colombia entre 2010 y 2017 - Otras Ciudades - Colombia - ELTIEMPO.COM. (2018, September 19). Retrieved June 2, 2019, from https://www.eltiempo.com/colombia/otras-ciudades/variacion-de-cultivos-de-coca-en-colombia-entre-2010-y-2017-270790

El Tiempo. (2019a). Amenazas a líderes sociales aumentaron un 47 % el último año - Investigación - Justicia - ELTIEMPO.COM. (2019, May 5). Retrieved from https://www.eltiempo.com/justicia/investigacion/amenazas-a-lideres-sociales-aumentaron-un-47-el-ultimo-ano-357578

El Tiempo. (2019b). Investigarán causas del aumento de la deforestación en Amazonas en el posconflicto - Conflicto y Narcotráfico - Justicia - ELTIEMPO.COM. (2019, April 19). Retrieved from https://www.eltiempo.com/justicia/conflicto-y-narcotrafico/investigaran-causas-del-aumento-de-la-deforestacion-en-amazonas-en-el-posconflicto-348082

El Tiempo. (2019c). Meta de erradicación de coca sube a 100.000 hectáreas: 43 % más. (2019, February 1). Retieved from: https://www.eltiempo.com/justicia/conflicto-y-narcotrafico/como-sera-el- plan-de-erradicacion-de-cultivos-ilicitos-en-2019-321580

Espinosa, J. E. (2019). Opinión | El glifosato no es la solución para Colombia. *The New York Times*. Retrieved from https://www.nytimes.com/es/2019/04/15/glifosato-colombia-duque/

Fajardo, D. (2015) Comisión Histórica del Conflicto y sus Víctimas. *Contribución al entendimiento del conflicto armado en Colombia* (pp. 352-399).

Food and Agriculture Organization FAO. (2013). Climate-smart agriculture sourcebook. Rome. Retrieved from http://www.fao.org/docrep/018/i3325e/i3325e.pdf.

Food and Agriculture Organization FAO. (2017). Modelo de Evaluación Ambiental de la Ganadería Mundial (GLEAM). Retrieved from http://www.fao.org/gleam/es/

Fundación Ideas para la Paz (FIP). (2018a). ¿En qué va la sustitución de cultivos ilícitos? La implementación, los rezagos y last areas pendientes. ISBN 978-958-59924-7-4

Fundación Ideas para la Paz (FIP). (2018b). La Estabilización en la fase de transición ¿Cómo responder a la situación de crisis y fragilidad estatal? *Notas estrategicas.*

García Trujillo, A. (2018). *Yes but No: Havana Peace Agreement's Ambiguous Sway on Colombia's Rural Development Policy*. 297.

Harris, J., & Thornell, C. (2018). Why Colombia is losing the cocaine war. Retrieved January 11, 2019, from https://www.vox.com/videos/2018/12/18/18146474/colombia-losing-cocaine-war-coca

Huppert, F. A., & Baylis, N. (2004). Well-being: towards an integration of psychology, neurobiology and social science. *Philosophical transactions of the Royal Society of London. Series B, Biological sciences, 359*(1449), 1447-1451.

Human Rights Watch. (2019). *WORLD REPORT 2019 events of 2018*. Retrieved from https://rbdigital.rbdigital.com

Instituto de Hidrología, Meteorología y Estudios Ambientales (IDEAM). (2005). Zonas de Reserva Forestal de Colombia, ley 2a. de 1959 – Atlas Temático. Ministerio de Ambiente, Vivienda y Desarrollo Territorial. Bogotá D.C.

Instituto de Hidrología, Meteorología y Estudios Ambientales (IDEAM). (2018). Resultados monitoreo de la Deforestacion 2017. Centro de Documentación e Información Científico Técnica. Bogotá, Colombia

Island Press (2010). Livestock in Changing Landscape: Drivers, Consequences, and Responses. Volume I

Kroc Institute for International Peace Studies. (2018). Second Report - *State of implementation of the Colombia Peace Agreement*. University of Notre Dame.

Kroc Institute for International Peace Studies. (2019). Third Report - *State of Implementation of the Colombia Peace Agreement*. University of Notre Dame.

Le Billon, P. (2012). Bankrupting peace spoilers: can peacekeepers curtail belligerents' access to resource revenues? In: Lujala, P., Rustad, S.A. (Eds.), High-Value Natural Resources and Peacebuilding. Earthscan, London.

Mamy, L., Barriuso, E., & Gabrielle, B. (2016). Glyphosate fate in soils when arriving in plant residues. *Chemosphere*, *154*, 425-433. doi: 10.1016/j.chemosphere.2016.03.104

McSweeney, K., Richani, N., Pearson, Z., Devine, J., & Wrathall, D. J. (2017). Why Do Narcos Invest in Rural Land? *Journal of Latin American Geography*, *16*(2), 3–29. https://doi.org/10.1353/lag.2017.0019

Mejía, D. (2016). Plan Colombia: An Analysis of Effectiveness and Costs. Universidad de los Andres. 17.

Muñoz, C., & Arias, L. (2011). Prácticas de las organizaciones de población desplazada y el restablecimiento de derechos. Los rostro de la autonomía y la visibilización. *Revista Colombiana de Ciencias Sociales*, *2*(1), 17.

Myers, J. P., Antoniou, M. N., Blumberg, B., Carroll, L., Colborn, T., Everett, L. G., … Benbrook, C. M. (2016). Concerns over use of glyphosate-based herbicides and risks associated with exposures: a consensus statement. *Environmental Health*, *15*(1), 19. https://doi.org/10.1186/s12940-016-0117-0

Oficina de Naciones Unidas para Derechos Humanos (UNOHR). (2019). Informe anual del Alto Comisionado de las Naciones Unidas para los Derechos Humanos e informes de la Oficina del Alto Comisionado y del Secretario General. Situaciόm de los derechos humanos en Colombia.

Pala, C. (2011). Coca Farming Linked To Deforestation In Colombia. *Chemical & Engineering News*, 010411144514. doi: 10.1021/cen010411144514

Pérez Zapata, H. (2016). *Sin maíz no hay país* (2nd ed.). Medellin, Colombia: InfoAgro Colombia.

Pissoat, O., & Hoffmann O. (1996). Les quatre départments du Pacifique colombien [map]. Paris

Plan Maestro Fluvial de Colombia. (2015). 108.

RCN Radio (2019). Nuevos hostigamientos en puesto military en Corinto norte del Cauca. (2019, February 20). Retrieved from https://www.rcnradio.com/colombia/sur-del-pais/nuevo-hostigamiento-puesto-militar-en-corinto-norte-de-cauca

Reuters. (2017). Colombia defends anti-drug efforts after Trump critique - Reuters. (2017, September 14). Retrieved from https://www.reuters.com/article/us-usa-colombia-drugs/colombia-defends-anti-drug-efforts-after-trump-critique-idUSKCN1BP1VV

Roa Castañeda, J. J., Núñez Dueñas, J., & Kolumbien. (2014). *Coca: deforestación, contaminación y pobreza: acercamiento a la actividad agronómica y la problemática ambiental de los cultivos de coca en Colombia.* Bogotá, D.C: Policía Nacional, Dirección de Antinarcóticos.

Robustelli, T. (2018). Challenges to Land Reform in Colombia. Retrieved from https://www.newamerica.org/future-property-rights/blog/challenges-rural-land-reform-colombia/

Ross, M. L. (2004). How do natural resources influence civil war? Evidence from thirteen cases. Int. Org. 58, 35–67.

Secretaría Técnica del Componente Internacional de Verificación CINEP/PPP-CERAC. (2019). *Quinto informe de verificación de la implementación del Acuerdo Final de Paz en Colombia para los Verificadores Internacionales Felipe González y José Mujica.* Bogotá. Retrieved from https://www.cinep.org.co/images/2019Noticias/5to-Informe-Secretara-Tcnica.pdf?fbclid=IwAR3LtnQEdsBkgpxjlvoTnVnEnRW6Lm6cAPJHi_cJtENH8jedNPStlaZXGrs

Semana. (2015). Glifosato, ¿malo para la coca y bueno para la comida? (2015, June 3). Retrieved from https://sostenibilidad.semana.com/medio-ambiente/articulo/glifosato-malo-para-coca-bueno-para-comida/33149

Semana. (2019). Los bosques concentran más de la mitad del uso de la tierra en Colombia. (2019, April 22). Retrieved from https://sostenibilidad.semana.com/medio-ambiente/articulo/los-bosques-concentran-mas-de-la-mitad-del-uso-de-la-tierra-en-colombia/43888

Silvera Escudero, R. & Mendoza Valencia D. P. (2017).Costos logísticos del transporte terrestre de carga en Colombia: Estrategias para la generación de valor en la logística del transporte terrestre con plus agregado. Barranquilla, Colombia: Educosta. ISBN: 978-958-15-0264-6

Solomon, K. R., Anadón, A., Cerdeira, A. L., Marshall, J., Sanín, L. E. (2005). Estudio de los efectos del Programa de Erradicación de Cultivos Ilícitos mediante la aspersión aérea con el herbicida Glifosato (PECIG) y de los cultivos ilícitos en la salud humana y en el medio ambiente. Informe preparado para la Comisión Interamericana para el Control del Abuso de Drogas (CICAD), División de la Organización de los Estados Americanos (OEA)

Suelos Colombia - IDEAM. (n.d.). Retrieved from http://www.siac.gov.co/sueloscolombia

Suleiman, M. N. & Karim, M. A. (2015). Cycles of Bad Governance and Corruption: The Rise of Boko Haram in Nigeria. SAGE Publications.

The Economist. (2018). Colombia's two anti-coca strategies are at war with each other - See it. Spray it. Sorted. (2018, February 20). Retrieved from https://www.economist.com/the-americas/2018/02/20/colombias-two-anti-coca-strategies-are-at-war-with-each-other

The White House (2018). New Annual Data Released by White House Drug Policy Office Shows Record High Cocaine Cultivation and Production in Colombia. Retrieved from https://www.whitehouse.gov/briefings-statements/new-annual-data-released-white-house-drug-policy-office-shows-record-high-cocaine-cultivation-production-colombia/

The White House. (2019). Director Carroll Statement on Working Visit with Colombian President Duque. Retrieved from https://www.whitehouse.gov/briefings-statements/director-carroll-statement-working-visit-colombian-president-duque/

United States Government Accountability Office. (2008). *Plan Colombia: Drug Reduction Goals Were Not Fully Met, but Security Has Improved; U.S. Agencies Need More Detailed Plans for Reducing Assistance*. Retrieved from https://www.gao.gov/assets/290/282511.pdf

UN Office for the Coordination of Humanitarian Affairs (UNOCHA). (2017). Informe MIRA. Municipio de Tumaco, Consejo Comunitario Alto Mira y Frontera (Nariño)

USAID. (2017). Colombia – Property rights and resource governance

US Embassy in Colombia (2018). Nuevo proyecto para apoyar el crecimiento del sector de cacao (2018, June, 14). Retrieved from https://co.usembassy.gov/es/nuevo-proyecto-para-apoyar-el-crecimiento-del-sector-de-cacao/

Vath, S. J., & Kirk, M. (2014). Do contract farming and property rights matter for rural development? Evidence from a large-scale investment in Ghana. Institute for Co-operation in Developing Countries, University of Marburg

Washington Office for Lating America (WOLA) (2019). Restarting Aerial Fumigation of Colombia Drug Crops is a Mistake. Retrieved from https://www.wola.org/analysis/restarting-aerial-fumigation-of-drug-crops-in-colombia-is-a-mistake/

W Radio. (2019) ¿Qué opinan los colombianos del uso del glifosato para erradicación de cultivos ilícitos? (2019, March 6). Retrieved from http://www.wradio.com.co/noticias/actualidad/que-opinan-los-colombianos-del-uso-del-glifosato-para-erradicacion-de-cultivos-ilicitos/20190306/nota/3872814.as

Appendix

Appedix A.

UNIVERSIDAD ICESI — CULTIVOS ILÍCITOS — POLIS

Fecha aplicación: Día | Mes | Área: 1 Rural 0 Urbana

Nombre del encuestador(a): | Hora de Inicio: | Hora de finalización:

DATOS DEMOGRÁFICOS

1. Zona de realización de la encuesta

1 Policarpa
2 Tumaco
3 La Tola
4 El Charco
5 Santa Bárbara

2. Sexo

1 Hombre
2 Mujer
3 Intersexo

3. Año de nacimiento: _____

4. ¿Qué posición ocupa la mayor parte del tiempo en el hogar?

1 Jefe (a) de Hogar
2 Ama de casa
3 Hijo(a)
4 Otro, ¿cuál? _____

5. De acuerdo con su cultura, pueblo o rasgos físicos usted se reconoce como:

1 Blanco
2 Mestizo
3 Indígena
4 Negro/Afro
5 Otro
6 Ninguno

6. ¿Cuál es su estado civil?

1 Casado(a)
2 Unión Libre
3 Separado/Divorciado
4 Soltero(a)
5 Viudo(a)

7. Incluyéndolo a usted, ¿cuántas personas viven en su hogar?

_____
(N° de personas con las que comparte alimentos)

8. ¿Cuántas personas aportan recursos económicos para el sustento de su hogar?

_____
(No puede tomar el valor de cero)

9. Su tipo de vivienda es: (LEER OPCIONES)

1 Propia pagando
2 Propia
3 Arrendada
4 Familiar
5 Otra, ¿cuál? _____

10. ¿Cuál es el material predominante de los pisos de la vivienda? (ÚNICA RESPUESTA)

1 Alfombra, mármol, parqué o madera pulida
2 Baldosa, vinilo, tableta, ladrillo
3 Cemento, gravilla
4 Madera burda, tabla, tablón, otro vegetal
5 Tierra, arena

11. ¿Cuál es el material predominante en las paredes? (ÚNICA RESPUESTA)

1 Bloque, ladrillo, piedra, madera pulida
2 Tapia pisada, adobe, bahareque
3 Madera burda, tabla, tablón
4 Material prefabricado
5 Guadua, cania, esterilla, otros vegetales
6 Zinc, tela, cartón, latas, desechos, plásticos
7 Sin paredes

12. ¿Cuántos cuartos tiene la vivienda? (sin incluir baño y cocina)

_____ (Número de cuartos)

13. ¿En cuántos de esos cuartos duermen las personas del hogar?

_____ (Número de cuartos)

14. ¿Con qué tipo de servicio sanitario cuenta el hogar?

1 Inodoro conectado a alcantarillado
2 Inodoro conectado a pozo séptico
3 Inodoro sin conexión
4 Letrina
5 No tiene

15. Su vivienda cuenta con:

		Si(1)	No(0)
1	Acueducto		
2	Energía		
3	Gas Domiciliario		
4	Alcantarillado		
5	Recolección de basuras		

16. El agua para preparar los alimentos, la obtienen principalmente de: (ÚNICA RESPUESTA)

1 Acueducto público
2 Acueducto comunal o veredal
3 Pozo con bomba
4 Pozo sin bomba, jagüey
5 Agua lluvia
6 Rio, quebrada, manantial o nacimiento
7 Pila pública
8 Carro tanque
9 Aguatero
10 Agua embotellada o en bolsa

17. En este hogar, ¿han recibido ayuda del gobierno a través de algún programa?

		Si(1)	No(0)
1	Familias en acción		
2	Adulto mayor		
3	ICBF		
4	Desplazado		
5	Otro ¿cuál?		

18. ¿Usted tiene hijos?

1 Sí
- 1.1 ¿Cuántos? _____
- 1.2 ¿A qué edad tuvo su primer hijo? _____
- 1.3 ¿Quisiera tener más hijos? 1 Sí 0 No

0 No → 2.1 ¿Planea o desea tener hijos en el futuro?

1 Sí 0 No

1

Appendix B.

Preguntas entrevista

Alejandro Valencia (Lund University)

Objetivo: Recoger información relacionada con el estado de avance de lo convenido en el Acuerdo Final para la Terminación del Conflicto, específicamente en los puntos 1) Reforma Rular Integral y 4.1) Sustitución de Cultivos Ilícitos.

*English: The objective is to explore the perceptions of local stakeholders, government representatives and civil society regarding the implementation of the Comprehensive Rural Reform and the Substitution of Illegal Substances within the framework of Colombia´s Peace Accord.

Preguntas

1. ¿Cuál es su posición frente a las políticas que están consignadas en el aparte de Reforma Agraria Integral del Acuerdo Final para la Terminación del Conflicto? ¿Qué está proponiendo para su implementación o modificación?
    a. ¿Cuáles condiciones serían necesarias para promover una política pública de redistribución de tierras donde se garantice que la propiedad continuara en las manos de quienes las reciban?
    b. ¿Piensa usted que el PND que actualmente se está discutiendo toma en consideración elementos que permitan la rápida titulación y garantías que los legítimos tenedores conservaran su propiedad?

2. ¿Cuál es su posición frente a las políticas que están consignadas en el aparte de Sustitución de cultivos ilícitos del Acuerdo Final para la Terminación del Conflicto? ¿Qué está proponiendo para su implementación o modificación?

    a. ¿En el caso puntual del Pacífico Colombiano, en particular su departamento del Cauca, como interpreta la proliferación de cultivos ilícitos y la aparición de los nuevos modelos de negocio como los relacionados con el uso legal de Cannabis?
    b. ¿Cuáles condiciones cree usted que llevan a una persona a tomar la decisión de continuar con los cultivos ilícitos?

3. ¿Cree usted que las dos políticas (previamente mencionadas) y su implementación conducen a un desarrollo sostenible?

4. ¿Cuáles son los retos políticos que se deben enfrentar para continuar?

5. ¿Cuál es su opinión del Acuerdo Final para la Terminación del Conflicto?