I. INTRODUCTION

This general introduction indicates the problem statement, the research objectives, and provides the thesis outline by chapters.

1.1 Problem Statement

Coca (*Erythroxylum coca*) is a native bush from the Amazon rainforest from the leaves of which cocaine, an addictive alkaloid is extracted. Coca cultivation is a recurrent problem in Peru. Peru was the main coca - leaf producing country from the 1970s until the mid-1990s after coca areas dropped dramatically due to a combined effect of eradication efforts and lower coca – leaf yields from the natural dissemination of a fungus (*Fusarium oxysporum*). This shifted most of the coca cultivation to Colombia (Cabieses, 2001). Currently, Colombia's coca areas represent 43%, Peru's 38%, and Bolivia's 19% of the total extension of land under cultivation of this crop worldwide. Following successful eradication campaigns in Colombia, coca cultivation is decreasing in that country, but increasing in both Peru and Bolivia. It has been estimated that if this trend continues, Peru could overtake soon Colombia and again become the world's leading coca producer (UNODC, 2010a). This could increase socio-economic tension in this otherwise emerging country with a calculated GDP growth of 6.25% for 2010, the highest in Latin America (IMF, 2010).

Coca cultivation is associated with local violence, national-level corruption, and political and social instability in supply countries. In the case of Colombia this instability mainly comes from guerrillas who finance their activities with coca money. In a similar way, a remnant of Shining Path, a terrorist group in Peru, is at present funding their activities with income from narcotrafficking (US Department of State, 2009). In Bolivia, coca-grower associations, although not comparable with guerrillas or terrorist groups, have held protests and small-scale insurrections to protest eradication actions. Also, there is evidence of increased ecological deterioration in coca growing regions and rising consumption of cocaine-based drugs within urban areas inside Andean supply countries (Office of Technology Assessment, 1993; INCB, 2009).

Coca-related problems extend to cocaine transit countries which have experienced growing levels of violence and social instability as well. In Central America, a transit region for cocaine-related drugs to United States, street gangs (*maras*) continue to be associated with

international drug trafficking networks. Currently, around 5,000 gangs operate in El Salvador, Guatemala, Honduras, and Mexico, many of which are involved in criminal operations related to Mexican drug trafficking organizations (INCB, 2009). There has also been a marked increase in the smuggling of cocaine from South America to Europe through West African countries in recent years. Currently, around 27% of the cocaine arriving to Europe is smuggled through that region. There is serious concern that drug trafficking will undermine the fragile political, economic, and social structures in West African countries (*ibid*).

Another important aspect is that coca can be cultivated in other ecosystems in the world with similar characteristics to the Amazon rainforest. During the late 19th century, coca was introduced and successfully grown in Asia, specifically on Java (Indonesia) and Formosa (currently Taiwan) islands. Coca from Java had high cocaine content and almost eliminated coca exports from South America (Musto, 1998). Later, with international treaties prohibiting coca cultivation for non-medical uses, coca growing was stopped in those islands. At present, there is evidence that strong eradication efforts in supply countries shift drug production to other countries. Afghanistan became a major opium producer as opium poppy cultivation in surrounding countries was suppressed (Morris, 2009). Therefore, there is an eventual risk that other countries could start growing coca. This risk could be more eminent in neighboring Andean countries and other countries currently located in transit regions, such as Central American and West African countries.

This thesis focuses on the study of the farmers' motivations for coca cultivation on the basis of a case study of an indigenous community in Peru. Coca cultivation is not participated in by all the farmers located in coca growing regions in this country. Some farmers decide to grow coca while others do not, even though all seem to face similar economic and social incentives. The specific reasons why this divergence exists are still not clearly identified. There is a lack of information on farmers' motivations due to the absence of household - level data. For obvious reasons, data collection in coca growing regions could be a challenging endeavor. Most research to date has used aggregated data and concentrated on defining the factors that influence coca growing at macro (community, regional or national) level. It is expected that a greater understanding of the specific functions that coca production has at the individual level could assist in designing more effective anti-drug policies that help to reduce coca cultivation areas in Andean supply countries, and at the same time potentially avoid its expansion to other countries.

1.2 Research Questions

The research questions are:

a. Why do some farmers decide to grow coca and others do not, given that they face similar social and economic incentives?

b. Which specific factors influence the number of coca bushes that farmers cultivate?

c. Does organic coffee certification, an activity promoted as anti-drug policy in Peru, influence the number of coca bushes cultivated by farmers, and to what extent?

1.3 Thesis Outline

The introduction is presented in Chapter I. Chapter II comprises the literature review, which focuses on the explanation of traditional and narcotraffic channels in Peru, and includes background information about the history of coca cultivation, international and national coca related legislation, and the effects of main anti-drug policies implemented in the Andean region. Chapter III describes the indigenous coffee co-operative used as the present case study and the data collection procedure of this research. Chapter IV identifies the household–level determinants of coca cultivation and the characteristics that influence the extension of coca areas for different types of coca growers based on unknown sample separation under a latent class model specification. Chapter V analyzes the specific effects of organic coffee certification on the extension of coca cultivation areas using different methods to evaluate robustness. Chapter VI classifies farmers according to their coca areas by using fixed threshold separations, and assesses the determinants of coca cultivation and the characteristics that influence the extension of coca areas by random parameter specifications. Finally, Chapter VII draws conclusions and discusses the implications for policy recommendations and future research.

II. TRADITIONAL COCA USES AND NARCOTRAFFIC: EVOLUTION, INCENTIVES, AND RELEVANCE FOR ANTI-DRUG POLICY

Coca cultivation for traditional uses is legally permitted in Peru and Bolivia. This chapter focuses on coca cultivation evolution from pre–colonial times to the present where traditional uses and a narcotraffic co-exist, evaluates the persistence of traditional use, and assesses incentives for traditional uses. The chapter also summaries national and international coca-related legislation framework and discusses the effects of current anti-drug policies implemented in the Andean countries.

2.1 Introduction

Coca leaves have been traditionally used for at least 3,000 years (Rivera *et al.*, 2005) by indigenous populations in Peru and Bolivia. Traditional uses include coca chewing as a stimulant to overcome fatigue, hunger and thirst; coca tea drinking to combat altitude sickness; and coca-leaf offerings during religious ceremonies (Rospigliosi, 2004). Moreover, indigenous people exchange coca leaves as a social expression of caring and respect (Allen, 1981). Coca is therefore a facilitator of social cohesion and an important part of indigenous cultural heritage (Bolton, 1976; Instituto Indigenista Interamericano, 1989).

On the other hand, since the 1970s coca has largely grown in South America, as raw material for cocaine extraction (Caulkins *et al.*, 2005). Cocaine is an addictive alkaloid produced primarily in the leaves of the plant, the possession and distribution of which is illegal in most countries. Growing coca for narcotrafficking is a profitable activity (see Torrico *et al.*, 2005; Davalos *et al.*, 2008). Following successful eradication campaigns in Colombia, coca areas have decreased by 58% in that country, but have largely increased in Peru and Bolivia during the last decade. In 2009, 55% more coca bushes were grown in Peru than a decade ago. If this trend continues, Peru could overtake soon Colombia as the world's largest coca producer - an infamous status that Peru has not occupied since the mid-1990s (UNODC, 2010a).

In contrast to Colombia where only narcotraffic exists, the coca market of Peru is divided between traditional uses and narcotraffic. The traditional market is further divided between regulated and informal sub-markets. The regulated sub-market is composed by coca growers who were registered in the General Census of 1978 and sell their coca leaves to ENACO (*Empresa Nacional de la Coca*), a public company with unique authorization to

commercialize coca leaves in Peru. All the coca for traditional uses that is commercialized outside ENACO channels is part of the informal sub-market. This informal sub-market has been largely tolerated, and informal traders are rarely persecuted by the government (Durand, 2005a).

Prohibitionist movements have promoted zero–coca policies because the current market situation seems to facilitate narcotrafficking by supplying coca cultivated under the guise of traditional uses (INCB, 2009; Durand, 2005b). Accordingly, Glave and Rosemberg (2005) argue that registered coca growers seem to sell only a small fraction of their coca production to ENACO, and most of their coca to the traditional informal sub-market or to narcotraffickers. Garcia and Antezana (2009) suggest that some farmers might be selling coca to allegedly informal traditional traders, who are actually narcotraffickers who process coca leaves in different places, such as small towns at the border with Bolivia.

This literature review provides an overlook of farmers' motivations for growing coca for traditional uses and evaluates the additional complexity for anti-drug policy design associated with the coexistence of traditional market and narcotraffic in Peru. Sub-chapter 2.2 explains the historic evolution of coca cultivation from pre-colonial times to date, the market structure for traditional uses and narcotraffic, and the incentives for coca growing for traditional use. Sub-chapter 2.3 describes the international and national regulatory framework, presents main anti-drug policies and discusses their effects. Sub-chapter 2.4 provides a summary and conclusions.

2.2 Evolution of Coca Cultivation, Market Structure and Incentives

This sub-chapter starts with an explanation of the evolution of coca cultivation from traditional uses to the current situation where both traditional market and narcotraffic co-exist. This historical background is relevant because the debate between proponents of zero-coca policies and supporters of coca traditional uses is partially based on the interpretation of the history of this crop in the Andean region. Current traditional market and narcotraffic commercialization are described. Finally, different traditional use motivations for growing coca are discussed.

2.2.1 Historical Background of Coca Cultivation

The historical background of coca cultivation is divided into three periods: pre-colonial, colonial and republican. Traditional uses have occurred in all periods, but their social status has changed among periods.

a) Pre-Colonial Period

Coca bushes are naturally distributed from Peru or Bolivia throughout the Eastern Andes from Ecuador South to Argentina (Plowman, 1981). The exact date of coca domestication is unknown. Hair and nail samples from mummies indicate that coca chewing and/or coca tea drinking was taking place as early as 3,000 B.C. (Rivera *et al.*, 2005), but probably it began much earlier. Evolutionary studies of the pre-historic use of coca are difficult to conduct because remains of coca are rarely uncovered by archaeologists or positively identified by botanists due to their fragile nature (Hastorf, 1987). Thus, archaeological ceramic pieces are commonly used as a proof of the use of coca by pre-Columbian cultures. Those ceramic pieces give indications of coca's possible social function: the "coquero" (person chewing coca) was always sitting on a ceremonial chair, supposed to be reserved for a chief, a priest or "shaman" (witch-doctor). On some ceramics the "coquero" wears a necklace or a band across the torso which is symbol of high social status (Naranjo, 1981) indicating coca chewing by the nobility but it is unknown if coca use was common throughout the population during the pre-colonial period.

From the Incan period, there are historical reports of coca uses and functions from the records of early Spanish conquerors. Chronicler Huaman Poma reported that coca chewing was reserved to the noble and religious classes and its use was forbidden to the majority of the population. Consequently, it is commonly believed that the Inca Empire restricted coca use to the nobility (Llorens, 2004). On the other hand, Mayer (2004) interprets that common citizens had access to coca leaves through community chiefs as a state-mediated reward: that coca leaves were given to any citizen as a quasi-divine present from the Inca emperor regardless of his or her social position. The Instituto Indigenista Interamericano (1989) maintains that Incas used coca to compensate its army and allies. Therefore, support exists for the interpretation that coca chewing was not exclusively a privilege of the few.

Parkeson's (1983) evaluation of early Spaniards chronicles[1] related to the Inca land tenure system shows that individual farmers and communities were permitted to cultivate coca for their own uses, although he noted that this situation was not universal throughout Incan territory. Thus, there is no consensus about coca use among the common citizens of the Incan Empire. Even if it was allowed, it seems that access to coca leaves was restricted during that period. Historical evidence suggests that coca chewing became widespread among indigenous people in Peru and Bolivia during the colonial period.

b) Colonial Period

After the Spaniards took the available gold, silver, and precious stones, they began the exploitation of mines. Indigenous mine workers were provided daily portions of coca leaves. Coca use was accepted and easily spread among the indigenous population probably due to its status as Inca's elite crop. Spaniards reaped large economic benefits from this crop. Coca was one of the products that indigenous people needed to buy because it cannot be cultivated throughout the country. So the coca provided to indigenous mine workers resulted in a continuous demand that fed the profits of the Spaniards. Some Spaniards profited from mining revenues while others from the production and commerce of coca (Naranjo, 1981; Llorens, 2004).

Coca soon became the centre of a controversy, which endured in varying degrees of intensity for around a century. Religious missionaries began to oppose coca use as part of their efforts to dissociate indigenous people from any vestige of their pagan past due to the use of coca leaves in various rituals. Supporters of coca use had economic interests and argued that without coca, the indigenous population would rebel and refuse to work in the mines. There were great economic interests in both the mining and coca-leaf selling revenues; and the coca debate ended in failure for the opponents of the leaf (Gagliano, 1963).

Thus, the status of coca changed from elite usage in the pre-colonial period to common usage during the colonial period among the indigenous, which in the case of Peru had a low social status connotation. Spaniards did not chew coca and many even found the habit disgusting (Llorens, 2004). The current position of supporters of zero-coca policies is partially based on the fact that coca chewing was apparently extended during the colonial period as a mean of

[1] The author refers to "Visita de Songo, Challana y Chacapa (1567-1569)", AGI, Justicia, N. 651; and Espinoza Soriano, "La Guaranga y la Reduccion de Huancayo", 20-23, 65-66.

intensifying the exploitation of indigenous people. If it is the case, they argue that it does not seem proper that traditional uses such as coca chewing should continue to be regarded as a constructive symbol of indigenous cultural identity in Peru and Bolivia.

c) Republican Period

The coca chewing habit and status did not change much during the Republican period, but during this period cocaine was first extracted from coca leaves. Nineteenth century foreign travelers reported on the medicinal powers of coca leaves, but coca did not become popular in Europe until cocaine was isolated by Niemann in Göttingen, Germany in 1860 (Grinspoon and Bakalar, 1981). Later, the discovery of cocaine's analgesic properties by Dr. Carl Koller in 1884 led to world-wide recognition of coca leaves and their derivatives (Martin, 1970). Coca leaf extract and cocaine stimulant properties were used in medicine and considered as panacea for a large variety of complaints. They were included in prescription drugs, patent medicines, wine ("Vin Mariani"), and a soda drink. When the addictive properties became apparent, coca lost its status within one or two generations. So, coca went from high praise by kings, popes, and doctors as the most beneficial stimulant tonic to a vigorous condemnation as dangerous addictive narcotic. Cocaine was then legally banned except for limited medicinal uses (Martin, 1970; Grinspoon and Bakalar, 1981).

According to Caulkins *et al.* (2005), the consumption of illegal drugs surged during the 1960s and 1970s in the U.S.A. when the popularity of psychoactive drug use was stimulated by anti-establishment attitudes among young adults, some of whom faced the prospect of being drafted to fight an unpopular conflict in Vietnam. During the 1960s and 1970s, Mexico and Colombia were the main suppliers of marijuana to the U.S.A. Between 1980s and mid-1990s there was a shift in demand in the U.S.A. from marijuana towards cocaine and its derivatives. This caused a coca growing boom in Peru and Bolivia, and eventually in Colombia (Dietz *et al*., 2001). At present, the value of the global cocaine market is estimated at around US$88 billion. The U.S.A. is the largest consumer of cocaine with a US$37 billion market (UNODC, 2010a). In this country, illegal drugs are consumed by at least 16 million people, representing 7% of the population over the age of 12 (Caulkins *et al.*, 2005). The second largest consumer of cocaine is EU with a US$34 billion market (UNODC, 2010a).

The current coca-leaf market includes commercialization channels for traditional uses and narcotraffic, which situation is reported below.

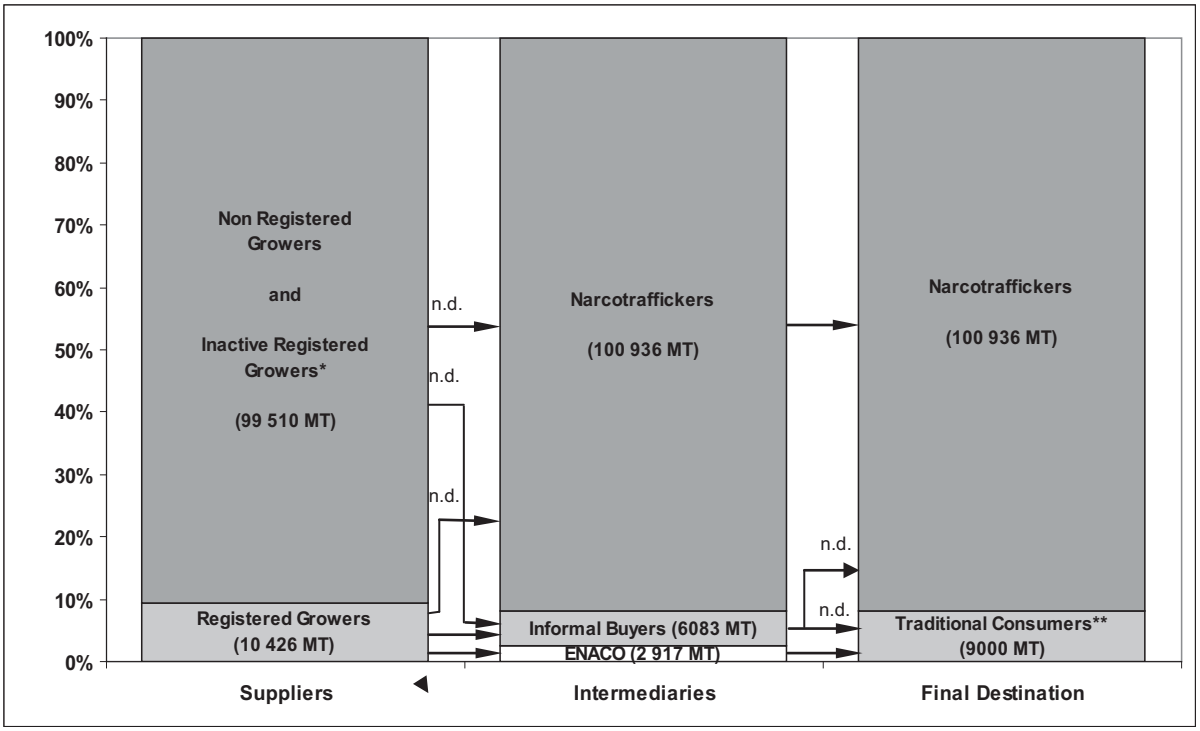
2.2.2 Market Structure for Traditional Uses and Narcotraffic

The General Drug Law of 1978 (Decree Law 22095) remains the main instrument for drug control in Peru (Jones and Amler, 1997). The law created ENACO (*Empresa Nacional de la Coca*): a state-owned company with exclusive rights to the commercialization of coca for traditional uses. It also states that coca could only be supplied by farmers registered in the General Census of Coca Producers (*Padrón General de Productores de Hoja de Coca*). This law is still in force and at present only farmers who were registered in the General Census of 1978 can sell coca for traditional uses through ENACO.

Coca that are commercialized outside ENACO channels, which account for the majority (68%) of the coca derived to traditional uses, constitutes the informal sub-market (FONANPE, 2005). It is believed that farmers prefer to sell coca to narcotraffickers or the informal sub-market rather to ENACO because they get higher prices. The informal sub-market has a differentiated price policy during the year, with much higher prices during the season when coca production is low. In contrast, ENACO pays a fixed low price all year round. In addition, many informal buyers collect coca directly from production areas which save farmers significant time and transportation costs. Farmers who sell to ENACO must deliver product to ENACO's collection centers which can be located far away from their individual production areas (Durand, 2005b). Thoumi (2004) indicates that ENACO has high operating costs which are due to the maintenance of coca collection centers in locations with low transaction levels, the detailed accounting of small purchases, and the costs of coca storing.

The distribution of Peruvian coca production in 2004 is shown in Figure 2.1. That year the total dried coca–leaf production was 109,936 metric tons. Of that total, FONANPE (2005) estimated that the traditional use demand was 8,990 metric tons (8.2% of the total coca production). In addition, around 200 metric tons of coca (0.2% of the total coca production) was attributed to industrial uses (e.g. coca tea bags and similar). The remaining national coca production (91.6%) supplied narcotraffic.

Figure 2.1: Coca-Leaf Commercialization Channels



n.d.: non determined
* Inactive registered coca growers are the coca – leaf producers who did not sell coca leaf to ENACO during the period 2001-2004.
** It includes 200 MT derived to industrial uses.
Source: Adapted from FONANPE (2005)

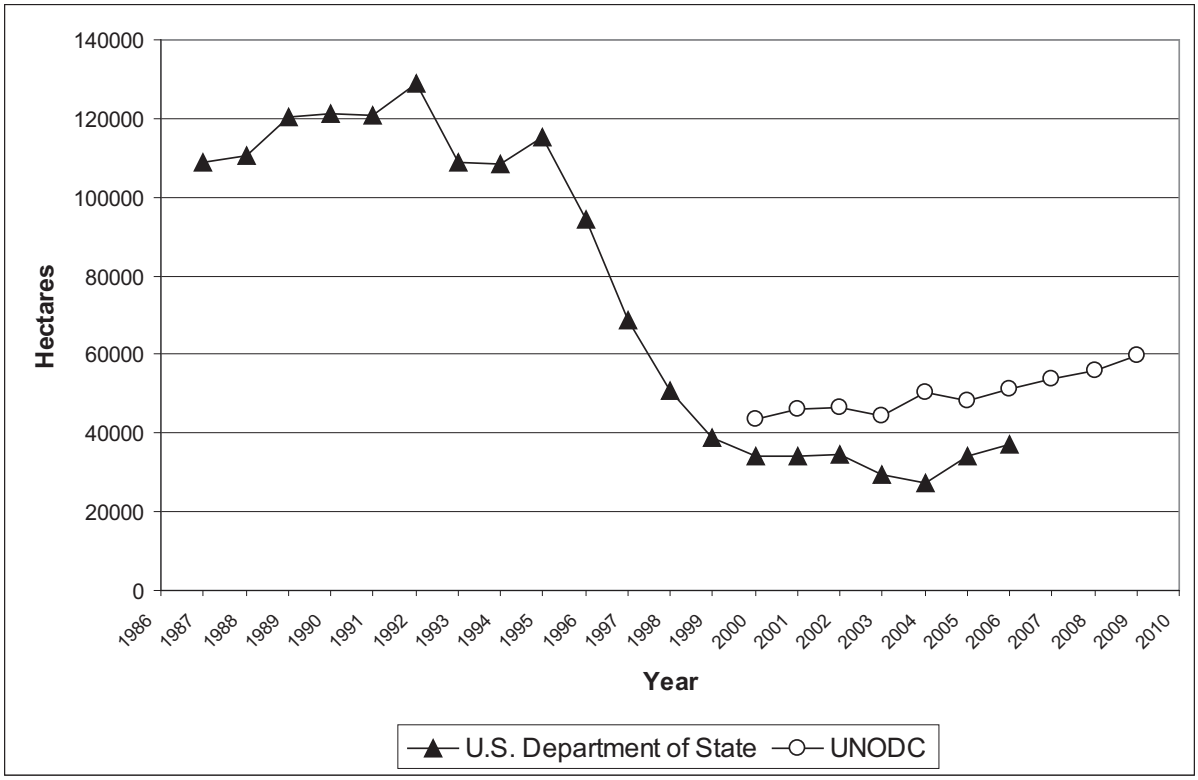
2.2.3 Coca Cultivation Trend in Peru

In Peru, coca cultivation occurs in the lower and upper Amazon rainforest. Coca is present in 16 watersheds, which are aggregated in 12 regions. The main coca cultivation regions are: Alto Huallaga, Apurimac-Ene, and La Convencion y Lares. Those three regions supply 85% of the total coca production in the country. The remaining 15% is supplied by Inambari-Tambopata, Palcazu-Pichis-Pachitea, Aguaytia, Marañon, Putumayo, Rio Amazonas (Caballococha), San Gaban, Alto Chicama, and lately by Kcosñipata (UNODC, 2009). In Peru, the determination of the overall extension of coca cultivation areas is based on analyses of satellite images by UNODC and the U.S. Department of State.

There are many problems related to the use of satellite images that limit the accuracy of results (UNODC, 2009): (a) the permanent presence of clouds in particular regions obscures surface images; (b) coca bushes are intercropped making their detection difficult; (c) steep slopes distort images and must be corrected for; and (d) it is complicated to measure coca bushes that have not reached their maximum foliar expression (60 to 80% of leaf coverage).

These problems result in estimates of coca production areas that are approximations of the actual ones. UNODC and the U.S. Department of State generally obtain diverging results which differed between 55 and 79% during the years 1999 and 2006 (comparison of data from UNODC, 2009; and U.S. Office of National Drug Control Policy, 2009). The coca cultivation trends reported by those two entities for Peru are shown in Figure 2.2.

Figure 2.2: Coca Cultivation Trend in Peru (1987-2010)

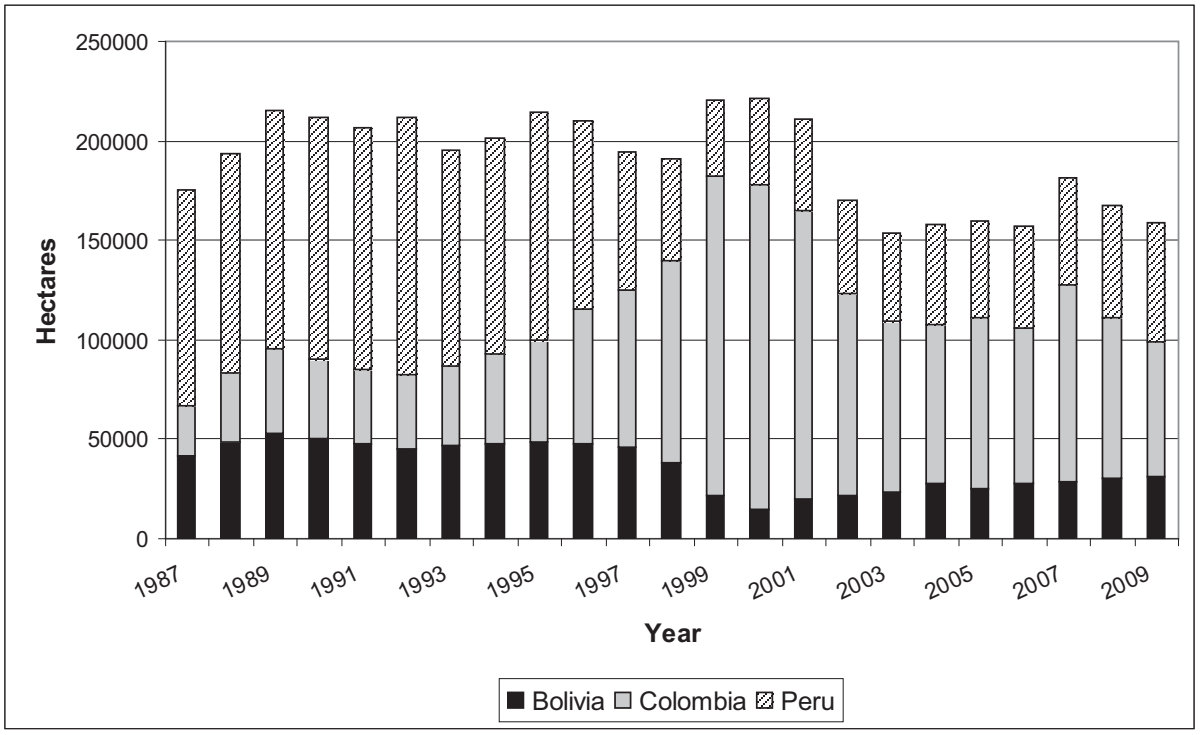


Source: U.S. Office of National Drug Control Policy (2009) and UNODC (2009 and 2010b). Own elaboration.

Figure 2.2 shows that the extension of coca cultivation dropped heavily during the mid-1990s and remained stable until recent increases in Peru. Unfortunately, the mid-1990s plunge did not correspond to the reduction in coca supply worldwide. Until 1996, Peru was the leading coca-leaf supplier in South America, ahead of Colombia and Bolivia. At that time the coca market was mostly composed of Peruvian and Bolivian farmers who sold their coca leaf to Colombian narcotraffickers who processed it and smuggled cocaine to the U.S.A. At the start of the 1990s, there was a restructuring of the coca market following strong eradication and interdiction efforts in Peru and Bolivia. Colombians increasingly cultivated their own coca crops to avoid dependency on those two countries. By mid-decade, Colombian coca production had risen considerably. The reduction of coca areas in Peru was also linked to the soil fungus *Fusarium oxysporum* which affected approximately 4,800 hectares of coca, and to

a steep drop price related to increased supply from Colombia; leading many farmers to voluntary abandon their coca production areas (Rojas, 2005). Figure 2.3 shows trends in the comparative areas of coca cultivation in Bolivia, Colombia and Peru from 1987 to 2009.

Figure 2.3: Comparison of Coca Cultivation Trends in Bolivia, Colombia and Peru (1987-2009)



Source: UNODC (2009 and 2010b) and U.S. Office of National Drug Control Policy (2009). Own elaboration.

Thus, coca growing areas have varied substantially over time. Between 2000 and 2009, coca areas in Colombia decreased by 58%, mainly due to eradication, but increased by 38% in Peru and more than doubled in Bolivia (up to 112%), while traffickers in both countries increased their own capacity to produce cocaine (UNODC, 2010a). In addition, coca yields have increased due to technological advances, leading to a reduction of the total area required to produce similar harvests. Currently, with continuous demand in the U.S.A. and increasing demand in the E.U. for cocaine and derivates (*ibid*), the controversies regarding coca production and use have resumed. There is pressure by international organizations to totally eradicate coca cultivation and traditional use (see e.g. INCB, 2009). An explanation of the persistence of traditional coca cultivation and use in Peru may be revealed by individual farmers' motivations to cultivate this crop.