

Social control as supply-side harm reduction strategy. The case of an indigenous coca growing community in Peru

Jaqueline GARCIA-YI
Department of Agricultural
and Food Economics
Technical University of Munich
(Germany)
jaqueline.garcia-yi@tum.de

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Abstract

Traditional coca uses have taken place in Peru and Bolivia for at least the past three thousand years. International organizations have been unsuccessful in urging the implementation of «zero-coca growing» policies in those countries. Supply-side harm reduction strategies are currently being implemented in Bolivia, which rely on social control to limit, although not totally abolish, coca growing. In this article, the different motivations for coca growing for traditional uses are reviewed, and the data from a survey conducted with 496 farmers in an indigenous community are examined, to provide an overview of the coca-growing problem and explore if social control could potentially influence the scale of coca growing in Peru. The results suggest that social control variables, such as attachment, involvement, and beliefs, limit the size of coca-growing areas. Those factors have been largely overlooked and may offer an opportunity to reduce coca areas if explicitly considered in drug-control policy design.

Keywords: coca, cocaine, traditional coca uses, supply-side harm reduction, drug-control policy, Peru.

Resumen

Los usos tradicionales de la coca han tenido lugar en Perú y Bolivia durante, al menos, los últimos tres mil años. Las organizaciones internacionales no han tenido éxito para instar la ejecución de las políticas de «cero crecimiento de coca» en esos países. Las estrategias de reducción de daños de la oferta, que se basan en el control social para limitar, aunque no abolir totalmente el cultivo de coca, están siendo implementadas actualmente en Bolivia. En este artículo, se revisan los usos tradicionales que motivan el cultivo de coca; y se analizan los datos de una encuesta realizada a 496 agricultores en una comunidad indígena para proporcionar una visión general del problema cocalero; y se explora si el control social podría, potencialmente, influir en la escala del cultivo de coca en el Perú. Los resultados sugieren que las variables de control social, como el apego, la participación y las creencias limitan el tamaño de las áreas de cultivo de coca. Estos factores, en gran medida, han sido pasados por alto y que pueden ofrecer una oportunidad para reducir las áreas de cultivo de coca si se consideran de manera explícita en el diseño de políticas de control de drogas.

Palabras clave: coca, cocaína, usos tradicionales de la coca, reducción de daños de la oferta, política de control de drogas, Perú.

1 Introduction

Coca (*Erythroxylum coca*) is a bush native to the Amazon rainforest, the leaves from which cocaine —an addictive alkaloid— is extracted. Coca leaves have been traditionally used for at least 3,000 years by indigenous South American populations (Rivera et al. 2005). 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 share and 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).

However, since the 1970s coca has been largely grown in Colombia, Peru and Bolivia, as the raw material for cocaine extraction (Caulkins et al. 2005). Those three countries supply all the cocaine worldwide (UNODC 2011). Until recently, Colombia was the major supplier of cocaine in the world. Following large scale eradication campaigns and farm-level price declines in Colombia, coca areas have decreased in that country, but have largely increased in Peru and Bolivia.¹ Currently, Peru is the country with the total largest coca areas worldwide (41 % of the world total), followed by Colombia (38 %) and Bolivia (21 %) (UNODC 2011).

In contrast to Colombia, where the number of traditional coca users is about 100 thousand (CLOC 2013), in Peru and Bolivia, the more extensive number of traditional coca users (estimated in 3.5 and 4 million, respectively; *ibid.*) further complicates the design and implementation of coca-growing control policies. International conventions compel those three countries to totally ban coca cultivation since 1961. Nevertheless, prohibitionist or «zero-coca» policies have not been fully implemented in Peru and Bolivia. It has been argued that the Peruvian government so far has not found it appropriate to risk the provocation of millions of traditional users and thousands of coca farmers by implementing zero-coca growing policies (Mayer 1993). Supporters of coca growing for traditional uses largely employ socially oppressed minority-oriented arguments with «elegant anti-imperialist shades», which are easily exploited politically (*ibid.*).

In Bolivia, supply-side harm reduction² strategies have formally been implemented since 2009. This approach reverses «decades of U.S., financed policies focussed almost exclusively on military/police suppression and eradication that resulted in well-documented human rights violations and harassment of the peasant farmers who grow coca leaf, a central component of Andean indigenous culture» (Farthing and Kohl 2012: 489). Coca growing for traditional uses is also allowed by national laws and regulations. In contrast to Peru, where the traditional

- 1 This is a persistent side-effect of drug control policies known as *balloon effect*: coca reduction in one area is offset by increases in other areas (like a balloon that when it is squeezed in one area increases its volume in other area).
- 2 Supply-side harm reduction is a relatively new concept, and has its foundation in «demand-side» harm reduction. «(Demand side) harm reduction refers to policies, programmes and practices that aim to reduce the harms associated with the use of psychoactive drugs in people unable or unwilling to stop. The defining features are the focus on the prevention of harm, rather than on the prevention of drug use itself, and the focus on people who continue to use drugs» (Harm Reduction International 2013). Supply-side harm reduction focuses on prevention/ reduction of harms associated with coca growing, rather than on the enforcement of «zero coca growing» policies. For more information about the supply-side harm reduction as a concept see Greenfield and Paoli (2012).

coca growing rights are provided to individual farmers; coca growing is permitted to farmers located in specific regions of Bolivia. Current supply-side harm reduction strategies limit the individual-level coca growing areas to one *cato* (1600 m² in the Chapare and 2500 m² in the Yungas) by social control means. Coca production rights are given to the communities or local coca growers' associations. If more than one *cato* of coca area is found per individual farmer, the rights are taken away for the whole community or association. According to supporters of this policy, the establishment of a *cato* —a maximum individual-level coca production area—, helps to guarantee a minimum source of income for many impoverished small-holder farmers (Farthing and Kohl 2012). In this context, supply-side harm reduction can be characterized as drug-control policy that aims primarily to reduce the potential adverse socio-economic consequences of the production coca.

Based on the fact that total illicit crop eradication seems to be an unrealistic aim, Trace (2012) argues that the application of broader and explicit supply-side harm reduction approaches is needed, especially in countries with long tradition of coca uses, such as Peru and Bolivia. According to Jelsma (2012), the acceptance of harm reduction programs has grown worldwide in the recent years. However, its effectiveness is still the subject of intense debate due to difficulties in selecting appropriate indicators and objectively measuring their outcomes (Farthing and Kohl 2012). Another related problem is the lack of relevant data (EU 2009). In this article, the effects of social control in coca growing are evaluated to explore their possibilities as supply-side harm reduction strategies in Peru. To this end, I examine a unique data set that I collected from an indigenous community located in one coca growing region in Peru.

The objectives of this paper are: first, to provide a review of literature related to coca growing for traditional uses, including historic perspectives and alleged motivations for traditional coca use. This information helps us to understand why prohibitionist policies may never be successfully implemented in countries with extensive traditional coca uses (Peru and Bolivia). Secondly, to evaluate if supply-side harm reduction —a subject which is still under intense debate— could help to limit coca growing production using an indigenous community in Peru as case study. The paper is organized as follows: section 2 presents the history of coca growing from pre-colonial time to present; section 3 describes the current incentives for traditional coca uses; section 4 indicates the national and international regulations applicable to coca growing and the available coca commercialization channels in Peru; section 5 presents the main types of drug-control policies and the assessment of their main effects in supply countries; section 6 examines the potentiality of social control as supply-side harm reduction strategies in Peru; and section 7 corresponds to the summary and conclusions.

2 Historical Evolution of Coca Uses

This section explains the evolution of coca cultivation from the pre-colonial to the republican period. Traditional uses have occurred in all periods, but their social status has changed along those periods. In particular, this historical background is relevant because the dispute between proponents of «zero-coca growing» or prohibitionist policies, and supporters of the continuation of coca traditional uses is partially based on the interpretation of the historical records related to this crop.

2.1. Pre-Colonial Period

Coca bushes are naturally distributed from Peru and 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 took place about 3,000 years ago (Rivera et al. 2005). 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 for the noble and religious classes, and its use was forbidden for 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: 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 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.

2.2. Colonial Period

After the Spaniards seized most of the available gold, silver, and precious stones, they began the exploitation of mines, mainly in the Andes mountain range. Indigenous mine workers were provided daily portions of coca leaves. Coca use was accepted and easily spread among the mine workers and the indigenous population in general, probably due to its status as the Inca's elite crop. Spaniards reaped large economic benefits from this crop. Coca had an immediate exchange value for the Spaniards because it only grows in the (Upper) Amazon rainforest (Naranjo 1981, Llorens 2004).

Coca soon became the centre of a controversy, which endured in varying degrees of intensity for about 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 population. Coca chewing 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 growing» policies is partially based on the fact that coca chewing was apparently extended during the colonial period as a mean of 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.

2.3. 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 a panacea for a large variety of complaints. They were included in prescription drugs, patent medicines, wine («Vin Mariani»), and a soda drink («Coca Cola»). When the addictive properties became apparent, cocaine lost its status within one or two generations. So, cocaine went from high praise by kings, popes, and doctors as the most beneficial stimulant tonic to a vigorous condemnation as a 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 US 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 this period, Mexico and Colombia were the main suppliers of marijuana to US. Between the 1980s and mid-1990s there was a shift in demand in US from marijuana towards cocaine and its derivatives. This caused a coca growing boom, first in countries with relatively large coca growing for traditional uses such as Peru and Bolivia, and later in Colombia (Dietz et al. 2001). At present, the value of the global cocaine market is estimated at around US\$88 billion. The US is the largest consumer of cocaine with a US\$37 billion market (UNODC 2010). 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 the EU with a US\$34 billion market (UNODC 2010).

3 Current Incentives for Traditional Coca Uses

In Peru, traditional coca users account for around 20 % of the population above the age of 12 years. They consume around 6,550 metric tons of dried coca leaves per year. Coca chewers and coca tea drinkers constitute 64 % and 31 % of the total traditional consumers, respectively. Other coca uses such as medicinal, religious, and divination account for the remaining 5 % (Rospigliosi 2004) (See table 1).

Motivations for the traditional consumptive uses such as chewing coca or drinking coca tea are related to their alleged health and physiological benefits such as: increased physical resistance and heat retention (Favier et al. 1996a, 1996b, 1997); appetite suppression and nutrition (Burchard 1992, Bedford et al. 1980, 1981a; Burczynski et al. 1986, Vee et al. 1983, Duke et al. 1975, Castro and Zavaleta 2006, Garcia-Giesmann 1950, Collazos et al. 1965, Ramos-Aliaga et al. 2004, Cordero 2002); and altitude sickness alleviation (Hanna 1974, Favier et al. 1996a, Brutsaert et al. 1995).

Traditional use	Number of people*		Kg of coca consumed		Kilograms per person per year
	Total	Percentage	Total	Percentage	
Coca chewing	2019574	64.0	6362341	97.1	3.15
Coca tea	964776	30.6	165020	2.5	0.17
Other uses	169538	5.4	23654	0.4	0.14

* Older than 12 years.

Source: Rospigliosi (2004). Own elaboration.

Table 1

Main Traditional Coca Uses in Peru

The concentration of cocaine in dried coca leaves is relatively low: from 0.13 to 0.86 % (Holmstedt et al. 1977), and many research efforts have reported no evidence of euphoric effects or addictive symptoms based on traditional consumption methods (Hanna 1974, Bolton 1976, South 1977, Weil 1981). Converse to the potential health and physiological effects, the *Instituto Indigenista Interamericano* (1989: 21) claims that traditional coca consumption is not related to the satisfaction of a metabolic necessity, but with deep cultural considerations, and therefore the act of coca chewing has important cultural connotations for indigenous populations.

Coca facilitates social interaction and it is ubiquitous in ritual contexts (Bolton 1976). Coca is a «lubricant» in any social event; it is the central element in all ceremonies. The presence of coca is a symbol of great gratification. It is used to celebrate all the stages of the life cycle (birth, baptism, marriage, and death) and social events (*ayni* or reciprocal work, parties, trips, visits). Its use according to the established social etiquette embodies the Andean cultural character (Instituto Indigenista Interamericano 1989).

Indeed, the traditional handling, sharing, and consumption of coca leaves are governed by clearly defined rules of etiquette. As this etiquette is prescribed by indigenous cultural tradition, adherence to it implies the presentation of oneself as a participant in this tradition. The act of chewing coca leaves is an unequivocal statement of cultural loyalties. Coca chewing identifies one as an indigenous person (Allen 1981). In Peru, where social stratification and upward mobility exist; coca chewing, indigenous ethnicity, and Quechua or Aymara mono-linguism are viewed as attributes of low social standing (Negrete 1978). According to Mayer (2004), given that chewing coca is a stigma, indigenous people use it in defiance of discrimination. In this way, they recognize the solidarity among indigenous populations. Coca use is a symbol of cultural identity clearly showing who is indigenous.

The opponents of zero-coca growing policies argue that forced elimination of traditional use would constitute an attempt to undermine the basis of Andean cultures and solidarity of an oppressed social group

(Mayer 2004). For some traditional coca use advocates, prohibitionist policies would display a serious disregard for cultural values on par with hypothetical attempts to outlaw beer in Germany, coffee in the Middle East, or tea drinking in Japan (Martin 1970, Instituto Indigenista Interamericano 1989).

4 International and Peruvian legislation, and commercialization channels in Peru

4.1. International and Peruvian legislation

The international conventions on narcotic drugs ratified by Peru and the Peruvian national legislation are blurred and contradictory. In 1961, the United Nations (UN) Single Convention on Narcotic Drugs placed coca leaf as well as cocaine derivatives on Schedule I. Coca is therefore subject to the highest level of control. The member states of the Convention, including Peru and Bolivia, prohibited *inter alia* the cultivation, processing, and consumption of coca for non-medicinal purposes. The Convention also states that «coca leaf chewing must be abolished within twenty-five years from the coming into force of this Convention».³ At the time when this Convention was elaborated, phasing out coca cultivation was perceived as beneficial to traditional consumers, and a way to eliminate or reduce the illicit production and trafficking of cocaine at the international level (INCB 2009).

In 1988, the UN Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances specified that the measures adopted by each government to prevent illicit cultivation and eradicate coca production should respect fundamental human rights and take due account of traditional licit uses where there is historic evidence of such use. The Convention does not state what those traditional uses are, and it is open to innumerable interpretations (Thoumi 2004). However, Thoumi (2004: 302) suggests that the international conventions have implicitly accepted that indigenous communities have to be banned from traditional use for their own good. «Otherwise the 1988 Convention would have recognized explicitly that the 1961 Single Convention provision to ban coca chewing had been a mistake and that coca chewing is a legitimate coca use instead of having a vague reference to traditional uses».

In relation to the Peruvian national legislation, the General Drug Law of 1978 (Decree Law 22095) still constitutes the main instrument for drug-control (Jones and Amler 1997). ENACO («Empresa Nacional de la Coca» or National Coca Company), a state-owned company with exclusive

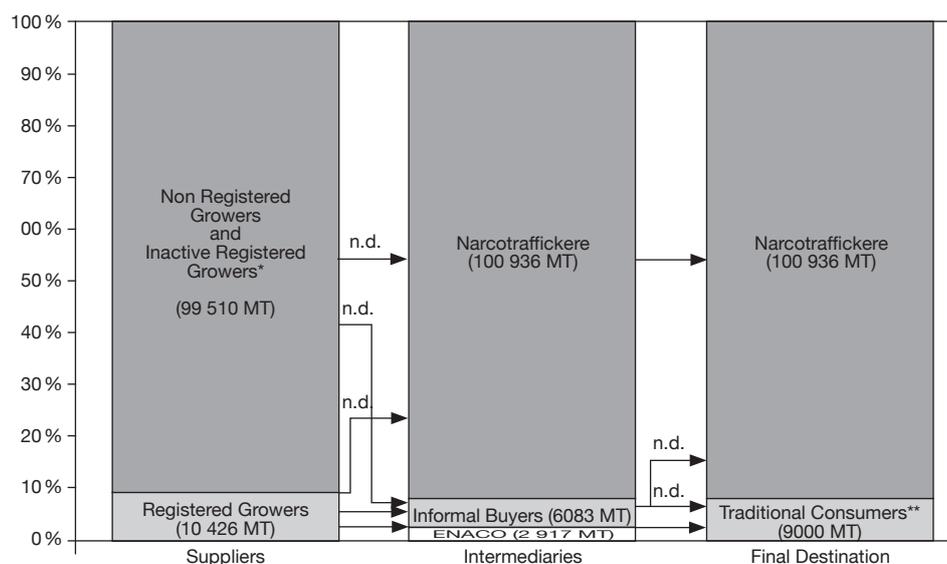
3 Nevertheless, Bolivia indicated the following reservation to the 1961 Convention (UN 1975: 1): «The Plurinational State of Bolivia reserves the right to allow in its territory: traditional coca leaf chewing; the consumption and use of the coca leaf in its natural state for cultural and medicinal purposes, such as its use in infusions; and also the cultivation, trade and possession of the coca leaf to the extent necessary for these licit purposes». In 2009, Bolivia formulated a reservation requesting that the articles referring to the prohibition of coca growing (for traditional uses) and traditional coca use should be eliminated from the 1961 Convention; otherwise, «large part of Bolivia's population could be considered criminals and punished as such; such an interpretation is therefore inapplicable» (UN Economic and Social Council 2009: 5). In 2011, Bolivia presented a formal notification of denunciation of 1961 Convention to the UN. Bolivia indicated it will then accede to the Convention again with a reservation on the coca leaf and its traditional uses.

rights to the commercialization of coca for traditional uses and cocaine for the small legal market of medical and scientific uses, was created under the scope of this law. This law indicates that coca could only be supplied to ENACO by farmers registered in the General Register of Coca-Leaf Producers (Padrón General de Productores de Hoja de Coca), and prohibited the cultivation of coca and seedlings in new areas within the national territory. This reference to «cultivation» includes the grafting and renovation of existing coca bushes. Therefore, the spirit of the law was to ban coca cultivation in the medium or long term. In that year, 22,925 coca farmers were included in the General Register of Coca-Leaf Producers, and a total of 25,159 licences were delivered to those farmers, one per agricultural plot. At present there are 31,886 registered coca farmers as the General Register of Coca-Leaf Producers was extended during 1988-1989. The law does not specify if the rights to sell coca belonged to the farmers or to their corresponding agricultural plots at the time they registered. In practice, the latter case was assumed as valid, and coca growing rights have been subsequently transferred or inherited, along with the agricultural plots, to the family members of those originally registered farmers (Glave and Rosemberg 2005).

Currently, coca growers non-registered in ENACO supply most of the coca cultivated in Peru (about 91 % of the total coca production, see figure 1). The legislation articles that stated the specific punishments for farmers who cultivate coca (e. g., time in prison and similar) were derogated from the Criminal Code in 1991. In order to understand this fact, it is important to recognize the social context during the late 1980s and early 1990s. The US, the major drug-control donor, had a strictly military approach to the coca growing problem. In Peru, however, the primary focus was upon «pacifying» the country and bringing the violence of terrorist groups under control. Shining Path, the largest terrorist group in the country, moved into the coca producing region of Huallaga in 1984 and found that farmers considered the police and government officials as enemies engaged in trying to destroy their coca fields. It was an easy task for Shining Path to find allies among the coca farmers. Despite the fact that Shining Path financed itself through narcotic-related activities, the government perceived that it was more important not to pursue policies that would increase support for the terrorist group in that huge region of the Amazon rainforest. The Peruvian government developed a counterproposal to the US's strictly military strategy that became known as the «Fujimori Doctrine». Underlying the Peruvian proposal was the idea that coca cultivation was not criminal in nature, but a result of poverty, and the proposed solution was alternative development (AD). The Fujimori Doctrine decriminalized coca cultivation, diminishing farmers need for protection from terrorists and making it easier to fight violent groups (Obando 2006).

4.2. Coca commercialization channels

In general, almost all the coca from registered and non-registered coca farmers supplies cocaine traffic. The distribution of Peruvian coca production in 2004 reveals that the total dried coca-leaf production was 109,936 metric tons, of which 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). So, the remaining national coca production (91.6 %) is allegedly supplying cocaine traffic (figure 1).



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).

Figure 1

Coca-Leaf Commercialization Channels.

The traditional market represents a small share of the total coca market (8.2 %), and it is further divided into informal and formal sub-markets. Coca from registered farmers commercialized through ENACO constitutes the traditional formal market (32 % of the total traditional market). Coca from registered or non registered farmers commercialized outside ENACO channels, comprises the traditional informal market (the remaining 68 % of the total traditional market). Farmers who do not want to supply cocaine traffic have to decide to commercialize their production between the informal market and ENACO. Most farmers prefer selling coca on the informal sub-market where the prices are higher and often their product is also collected directly from their plots, which allow them saving transportation costs. Moreover, the informal 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 (Glave and Rosenberg 2005). The informal traditional market has been largely tolerated, and informal traders are also rarely prosecuted by the government (Durand 2005).

5 Current Drug-Control Policy Implementation and Evaluation

Current drug-control efforts have tried to eliminate coca cultivation through different strategies. Two general types of drug-control policies are implemented in Peru: eradication and AD. The former treats coca cultivation as an international conventions enforcement issue and calls for direct eradication, with immediate results; the latter treats coca cultivation as a poverty issue and prioritizes poverty reduction, with long-term results (Commission on Narcotic Drugs 2005).

5.1. Eradication Policies

There are two types of eradication programs: a) manual eradication; and b) chemical control that involves spraying a herbicide — glyphosate — from low-flying aircraft over coca cultivation fields (Veillette and Navarrete-Frías 2005). The Peruvian law: Prohibition on the Eradication Using Pesticides of 2000 (Supreme Decree No. 004-2000-AG) prohibits the use of pesticides or related substances to eradicate coca plantations, in response to objections to chemical control from farmers. The government justified the prohibition of aerielly administered herbicides based on environmental and public health criteria (*ibid.*).

Thus, only manual eradication is permitted in Peru. Manual eradication employs agricultural workers to physically uproot individual coca bushes; 30 men can eradicate 1-2 hectares of coca per day. Obando (2006) indicates that at this rate it would require 69 years to eradicate the 200,000 hectares of coca that existed during the 1980s, provided not one more hectare was planted in Peru. In addition, it was reported that some coca plantations eradicated manually were cut down and not uprooted, and exhibited invigorated growth afterwards (Office of Technology Assessment 1993).

The eradication activities in Peru are believed to be associated with political pressure from the US, which for example, provides 95 % of Peru's AD funds, but disallows their use «unlinked» to eradication. The Peruvian government is required to implement eradication activities to access AD resources. European donors place no such restrictions on development funds (Commission on Narcotic Drugs 2005).

5.2. AD Policies

There is no universally accepted definition of AD. The UN defines AD as the «process to prevent and eliminate the illicit cultivation of crops through rural development measures within the context of sustained national economic growth». The ultimate goal of AD is «to help shape a set of conditions which, given sufficient time and growth of the licit economy, could lead to permanent behavioral change in drug producing areas. AD aims at creating conditions for those who give up growing illicit drug crops to participate in licit economic activities and hence permanently give up growing drugs» (UNODC 2005: viii).

AD has evolved as various approaches to supply reduction have been attempted. The evolution of AD strategic reasoning can be described as follows (UNODC, 2001, 2005 and 2009):

a) *Crop substitution phase*: At the beginning of the 1970s, the international community supported crop substitution projects. The idea behind those projects was to directly replace illicit crops with alternative legal crops. After many failures it became clear that the economics of crop substitution required additional measures to tackle the underlying economic, environmental, and social problems that support an illicit economy and motivate farmers to continue to cultivate illicit drug crops. Those problems vary according to the specific source area and potential solutions include infrastructure development, education, technical assistance, enabling social mobility and empowerment, and other development efforts.

b) *Income substitution phase*: «crop substitution» was subsequently replaced by «income substitution», as a broader and more realistic approach, which tended to seek alternative ways of providing a livelihood for farmers without assuming that legal crops can replace illegal crop profits. This approach includes a combined implementation of different alternatives such as promoting non-agricultural opportunities and enhancing alternative crop profits with certification schemes, among others.

c) *Integrated rural development (IRD) phase*: the IRD approach was adopted in the 1980s. IRD simultaneously addressed a broad range of local social, economic, and environmental problems. The approach is expensive, generally requiring large international staff and a large complement of local counterparts.

d) *Mainstream development phase*: It is considered «a more cost-cognizant approach» to AD. The best alternatives from a list of possible interventions obtained from a holistic evaluation of the local situation are chosen in order to limit funding requirements and to use available skills most effectively. This approach also seeks to embed anti-drug activities within regional and national level development programs. UNODC has nominally endorsed this approach for its alternative development

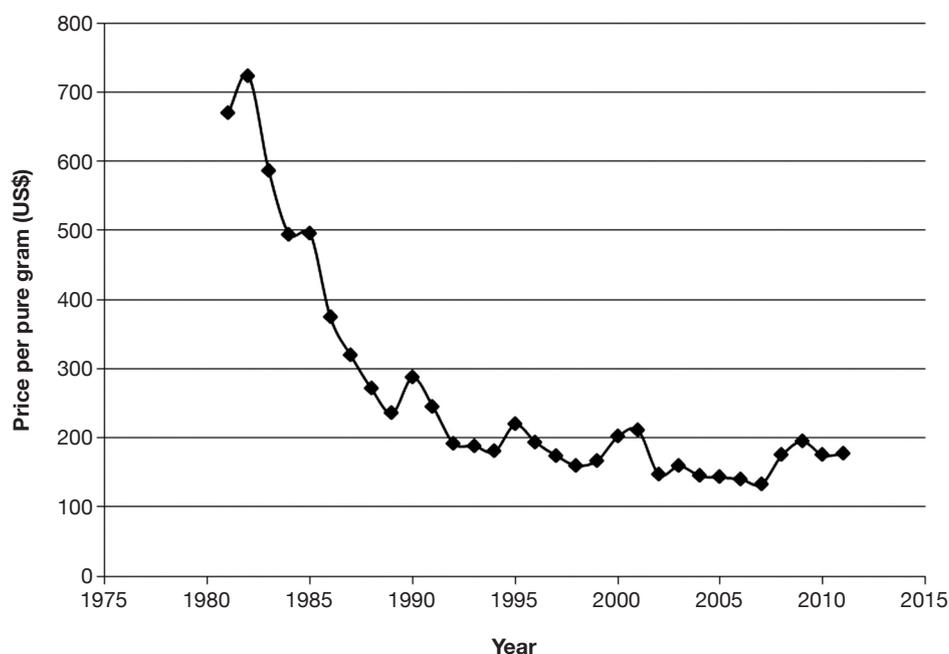
interventions, but in practice their efforts continue to resemble the earlier IRD approach.

In Peru, efforts to deal with the drug problem centered on eradication and interdiction until about 1990, when focus shifted to AD. On a global basis, farmers receiving AD assistance have been relatively few due to budget constraints. AD projects have worked with only 23 % and 5 % of the families in coca and poppy cultivation areas, respectively (Commission on Narcotic Drugs 2005, INCB 2009).

Experts emphasize the importance of combined eradication and AD strategies. Eradication only works in reducing coca areas when preceded by comprehensive development programs to promote alternative, licit livelihoods. Where such alternatives exist, farmers who persist with coca cultivation can be pushed by eradication towards legal livelihoods. Where alternatives do not exist, eradication can fuel violence and insecurity, hostility to national authorities, displace cultivation to less accessible locations, and ultimately undermine long-term efforts to change the conditions that promote drug crop cultivation (Mansfield 2006).

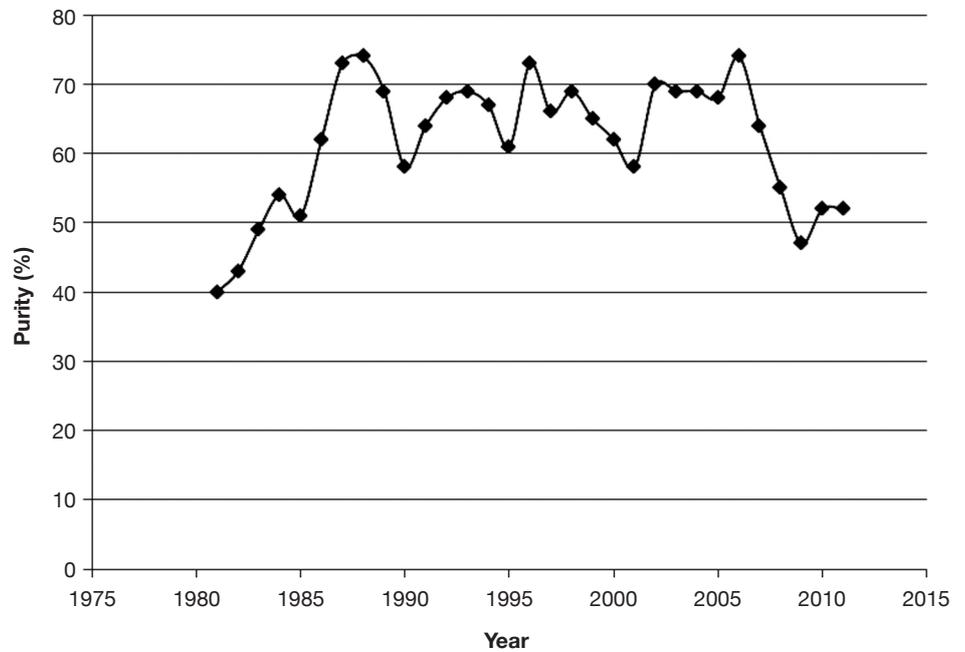
5.3. Are current drug-control policies effective?

From the point of view of international donors, the objective of eradication policies is to reduce drug availability. If farmers eliminate their coca crops, the supply of cocaine should become limited and cocaine prices would rise in demand countries. According to economic theory, the direct consequence of prices going up would be a reduction in cocaine demand (Walsh 2009).



Source: U.S. Office of National Drug Control Policy (2012). Own elaboration.

Figure 2
Price per Pure Gram of Cocaine at Retail Level in the U.S. (1981-2011).



Source: U.S. Office of National Drug Control Policy (2012). Own elaboration.

Figure 3

Purity of Cocaine at Retail Level in the U.S. (1981-2011).

Following Caulkins et al. (2005), one evaluation method of drug-control policies would be to analyze the trends in cocaine prices in demand countries. A reduction in cocaine availability could be inferred from large increases in retail prices. In the case of the US, analysis of prices over a 27-year period (1981-2007) indicates that despite aggressive and costly activities aimed at reducing cocaine supply; the cocaine prices have decreased and the quality (purity) has remained relatively stable (see figures 2 and 3).

In addition, the highly skewed cocaine equivalent prices in the distribution system (see table 2) creates a situation in which consumer prices might increase only 0.5% (from US\$120,000 to US\$120,650 per pure kilogram equivalent) even if eradication activities were successful and farm-gate prices were doubled (from US\$650 to 1300 per pure kilogram equivalent) (*ibid.*). Therefore, Kennedy et al. (1994: xii) indicate that the justification for U.S. funded eradication efforts «... has to be found in claims other than (to) reduce U.S. cocaine consumption in the long run».

Eradication policies seem to affect neither the quantities of cocaine demanded nor in the quantities supplied overall. As indicated before, eradication interventions seem to only be affecting where drugs are produced by shifting the location of coca cultivation within the Andean region (EU 2009). Rouse and Arce (2005) assessed the empirical effects of U.S. military assistance on coca cultivation in the Andes region, while controlling for other explanatory variables that influence coca cultivation. Using data from 1980-2001 for Colombia, Bolivia, and Peru, they

Stage	Price (US\$)	Place
Farm-gate	650	Leaf in Colombia
Export	1 000	Colombia
Import	15 000-20 000	Miami
Wholesale (Kilogram)	33 000	Chicago
Retail (100 mg pure)	120 000	Chicago

Source: Adapted from EU (2009).

Table 2

Prices of Cocaine through the Distribution System (per pure kg equivalent)

performed a pooled cross-sectional time-series analysis. Eradication operations were only relatively successful in «squeezing out» coca production in Bolivia and Peru, but the drug industry gravitated towards Colombia. Continued eradication pressure may succeed in shifting production to other countries, such as Ecuador, Venezuela and/or Brazil. Concerning this issue, coordinating drug-control policies with other governments may help to prevent the further expansion of coca production to other countries (Álvarez 1995).

On the contrary to eradication policies, (well-implemented) AD seems to have contributed to the reduction and containment of coca cultivation in supply countries (Commission on Narcotic Drugs 2005). Importantly, in contrast to eradication policies, AD projects have also achieved socio-economic improvements in specific coca-growing areas where conventional development agencies are often inactive, despite the prevailing levels of poverty (Mansfield 2006). Tabares and Rosales (2005) studied the effects of AD and eradication simultaneously, using municipal data for the period of 1998-2002 in Colombia. The results show that the investment in AD has a small effect, although statistically significant in the reduction of coca areas. According to their calculations, an increase of US\$1,000 in AD project funding reduces coca cultivation areas by 0.169 hectares of coca. In contrast, an increase of US\$ 1,000 in the funding of eradication efforts reduces coca cultivation areas by 0.128 hectares. This later result was no statistically significant.

6 Traditional uses and social control as supply-side harm reduction strategies

There is a growing recognition that current drug-control policies; in particular, eradication based supply-side strategies aimed at eliminating coca production have failed (Commission on Narcotics Drugs, 2005). So, innovative approaches, such as supply-side harm reduction, may help to curbe the coca cultivation problem. Farthing and Kohl (2012) argue that

this type of strategy has been implemented in Bolivia, and focuses on prioritizing the reduction of police and military-driven violence, ensuring a subsistence income for coca growers, while maintaining a high price for coca leaf. Therefore, it also seeks to limit coca cultivation indirectly by reducing the quantity of coca that ends up as cocaine. The scheme incorporates AD policies. However, the reduction of cocaine traffic is supposed to be achieved based on a community social control. Under this context, «social control refers to the types and sources of societal pressure that compel people to conform to established and generally accepted norms» (Farthing and Kohl 2012: 490). Nevertheless, the authors argue that the program's impact on coca cultivation is difficult to measure. In the Yungas, coca cultivation has declined by 2 %, while in the Chapare region, coca cultivation has increased by 4 %. It is difficult to attribute causality to the implementation of supply-side harm reduction strategies to those changes because specific external factors could have also influenced the final outcome (e. g., local changes in coca prices, trade and distribution systems).

According to Hirschi (1969), social control is based on four elements: attachment, commitment, involvement, and belief. As such, *attachment* can be translated to the emotional connection among members of the community (e. g., Aymara identity, chewing coca leaves, and sharing coca with other members of the community); *commitment* to the loss of social esteem connected to nonconformity (e. g., participation or not in «Minka» or mandatory communal activities); *involvement* to participation to a conventional and legitimate activity (e. g., being catholic or being coffee farmer); and *belief* to the conventional belief in societal norms (e. g., considering that coca growing is harmful for the community or society). This theory has achieved popularity as an explanation for delinquency (Kempf and Decker 1994). Nevertheless, there are few data studies related to the effects of social control on the scale of cultivation of illegal crops. One exception is Hammersvik et al. (2012), who conducted qualitative interviews with Cannabis growers. They found that social control aspects, such as the association of low-scale growing with anti-commercialism, anti-violence, and ecological and community values, are major factors that limit low scale growers to become large scale growers in Norway.

To date, supply-side harm reduction strategies based on social control have neither been explicitly evaluated nor applied in Peru. Moreover, there is an emerging momentum and enthusiasm towards the reform of drug-control policies influenced by evidence as opposed to philosophical ideals (Nosyk and Wood 2012). As such, any proposed supply-side harm reduction strategies need to be supported by evidence. Nevertheless, even the UN, which administers the international drug-control regime, has difficulties by finding evidence of drug-control policy achievements (Greenfield and Paoli 2012). In this paper, a unique data set from an indigenous community is analyzed in order to evaluate if supply-side harm reduction based on social control strategies could be effective in countries such as Peru. The data were collected from San Pedro de Putina Punco (SPPP), located in the upper Tambopata river basin in the

department of Puno at Bolivian border, one of the most remote and inaccessible rainforest areas in Amazonian Peru (UNODC Office in Peru 1999). Coca produced in the upper Tambopata river basin supplies cross-border cocaine trafficking associations between Peru and Bolivia. Bolivia is a significant transportation route for cocaine of Peruvian origin (US Department of State, 2009). From Bolivia the cocaine is dispatched to Brazil and Europe (Garcia and Antezana 2009).

To collect these data, a feasibility study was first conducted to test if farmers would answer coca-related questions. Then a final survey⁴ took place from June to August 2008. This final survey consisted of a structured questionnaire, which focused on agricultural production and social capital. The questionnaire included the following topics: general information about farmers, agricultural plot characteristics, additional off-farm economic activities, cognitive social capital and identity, personal aspirations and risk attitudes, structural social capital, human capital, coca cultivation and coca use traditions, and other questions.

All the farmers in this region were coffee growers, and some of them also cultivated coca as a secondary crop. Farmers had to be a member of one of a co-operative to be able to sell their coffee, because restrictions to coffee intermediaries were in place at the time of the survey conduction. A total of 496 valid questionnaires were collected. The total number of coffee co-operative members was 3265 in 2008. Therefore, the percentage of co-operative member interviewed was 15 %. A convenience sampling method was applied, but at the end of the survey, the farmers were requested to report their cooperative registration number. The co-operative registration number provided by the farmers was written on separate piece of paper and was not attached to the respondent's questionnaire. A comparison between our sample and a simulated random sample without replacement indicated that the sample was equivalent to a simple random sample and therefore representative of the population under study. The survey response rate was about 90 %.

Coca growers constituted 64 % of the sample. They reported cultivating an average of 3093 coca bushes, which would be the equivalent of 0.1 hectares, given a conventional coca growing density of around 35,000 bushes per hectare (UNODC 2001). This average coca area is within the range found in VRAE (*Valle del Río Apurímac y Ene*), one of the main coca growing regions in Peru, where most of the farmers self-reported that coca areas are between 0.1 to 0.5 hectares (Rodríguez 2003). SPPP is a relatively new coca growing area for narcotic traffic (UNODC Office in Peru, 1999), and it is expected that some farmers are only growing coca for traditional self-consumption.

Basic comparative information between coca and non-coca growers using data from the survey is presented in table 3. There were no statistically significant differences with respect to general socio-economic characteristics (age, sex, ethnic group, number of children and years of education) between coca and non-coca growers at the 0.05 significance level. Therefore the two groups are similar in relation to those characteristics.

4 The survey conduction and descriptive statistics are detailed in Garcia-Yi and Grote (2012). Only a summary of the survey conduction is provided in this paper.

	Coca growers	Non-coca growers
Age	42.5 (12.7)	41.7 (12.5)
Male (%)	93.9	94.9
Aymara (%)	81.4	82.5
Number of children	3.0 (2.0)	2.9 (2.1)
Years of education	8.2 (3.3)	8.7 (3.3)
Total areas (Ha)	7.9 (8.4)	8.0 (7.8)
Number of coca bushes	3093 (6710)	-

Standard deviations are in parentheses for continuous variables.

Source: Garcia-Yi and Grote (2012).

Table 3

Comparative description between coca and non-coca growers.

The specific relationship between coca growing decisions and social control variables are explored in two stages: as tetrachoric correlation between the decision to grow coca or not and social control variables (two dichotomous variables), and as point biserial correlation between the scale of coca cultivation and social control variables (one dichotomous and one continuous variable). Table 4 shows the results of the (tetrachoric) correlation coefficients between the decision to grow coca or not, and social control variables.

	Percentage of the total farmers	Decision to grow coca (tetrachoric correlation coefficients)
Attachment		
Aymara identity	0.82	-0.0266 (0.0848)
Chewing coca leaves	0.68	0.3735*** (0.0673)
Sharing coca with other members of the community	0.78	0.4569*** (0.0678)
Commitment		
Participation in communal activities	0.89	0.2322** (0.0923)
Involvement		
Being Catholic	0.58	0.0352 (0.0731)
Proud of being coffee farmer	0.66	0.1033 (0.0745)
Beliefs		
Considering that coca growing is harmful for the community	0.48	-0.2212*** (0.0701)
Considering that coca growing is harmful for the overall society	0.51	-0.2743*** (0.0700)

Standard errors in parentheses. *** Significant at 0.01.

Table 4

Relationship between the decision to grow coca and social control variables.

As expected, there is a significant positive correlation between some *attachment* variables related to traditional coca uses with the decision to cultivate coca. Those variables include coca chewing and sharing coca leaves with other members of the community. *Commitment*, measured as participation in communal activities, is also statistically significantly correlated with the decision to grow coca. On the other hand, *beliefs* such as considering that coca growing is harmful for the community and overall society are negatively correlated with the decision to grow coca.

Table 5 presents the results of the (point biserial) correlation coefficients between the scale of coca cultivation and social control variables, conditional on growing coca. This means that only the sub-set of farmers who grow coca are used in this analysis.

		Average number of coca bushes	Sample size	Correlation point biserial coefficients
Attachment				
Aymara identity	Yes	2472	253	-0.1960*** (3.5117)
	No	5851	58	
Chewing coca leaves	Yes	3094	237	0.0002 (-0.0088)
	No	3087	75	
Sharing coca with other members of the community	Yes	2869	270	-0.0846* (1.4952)
	No	4532	42	
Commitment				
Participation in communal activities	Yes	3193	287	0.0510 (-0.8917)
	No	1943	25	
Involvement				
Being Catholic	Yes	2485	185	-0.1093** (1.9365)
	No	3978	127	
Proud of being coffee farmer	Yes	2612	210	-0.1054** (1.8631)
	No	4124	102	
Beliefs				
Considering that coca growing is harmful for the community	Yes	2055	130	-0.1366** (2.4118)
	No	3920	178	
Considering that coca growing is harmful for the overall society	Yes	2120	169	-0.1276** (2.2285)
	No	3856	133	

t-values in parentheses. Significant at: *0.1, **0.05, *** 0.01.

Table 5

Relationship between the scale of coca growing and social control variables, conditional on growing coca

Almost all of the social control variables show a statistically significant negative correlation with the scale of coca growing. Those variables include *Attachment* factors, such as Aymara identity and sharing coca leaves with other members of the community; *Involvement* factors, such as being Catholic and proud of being a coffee farmer; and *Beliefs*, such as considering that coca growing is harmful for the community and the overall society.

Summary and conclusions

The analysis of the information indicates that: 1) traditional uses of coca are widespread in Peru; 2) the validity of coca chewing as a constructive symbol of indigenous population, based on historical evidence, has been challenged; 3) international conventions ratified by Peru ban coca cultivation, although they are still vague with respect to traditional uses; 4) coca cultivation is banned according to the national legislation, nevertheless, a void in the law gives rise to the interpretation that some farmers have inherited the rights to continue cultivating coca for traditional use; 5) coca growing is not punishable under the Criminal Code in Peru; 6) coca commercialization outside ENACO channels is indeed forbidden by law; however, the government does not persecute informal traditional use traders; 7) eradication policies alone are largely ineffective in reducing coca growing areas; and 8) innovative drug-control policies and legislative reforms are necessary Peru, although they have not taken place to date.

Possible innovative drug-control policies that could be considered as one of the foundations of a legislative reform are supply-side harm reduction strategies. Those strategies, based on social control, have been implemented in Bolivia, although their effects on coca growing are still unclear. This paper explores the possible effects of social control variables (attachment, commitment, involvement, and beliefs) on coca growing decisions in Peru. The evaluation is based on correlations, given that the direction of causality between those variables cannot be clearly determined in some cases *a priori* (for example, farmers may have decided to grow coca because they actually chew coca; or farmers who already have coca may have decided to start chewing coca because it is now easily available —although the latter case is less likely—). Nevertheless, the data seem to provide evidence that even though some social control variables (e.g. sharing coca with other members of the community) and the decision to grow coca are positively associated; social control could counteract this effect by favoring the even more important effect of limiting the scale of coca cultivation. So, the available evidence does not seem to support the fear from international organizations that e. g. traditional uses could positively influence the scale of coca cultivation, although the results need to be considered with caution, and more research is needed to clarify this effect (e.g. by correcting for potential selectivity bias in future studies).

Finally, it is important to mention that supply-side harm reduction strategies, based on social control, should not be seen as a «magic bullet» that can solve all coca-growing related problems. However, they could ideally help to reduce exclusion, polarization, and violence in coca growing areas. Those strategies should be evaluated in different coca growing regions individually, given that coca growers are heterogeneous,

and important differences could be associated to those farmers' specific backgrounds and geographical locations. Furthermore, there are limits to what supply countries such as Peru can actually do to combat cocaine traffic, if there is continued demand. Supply and demand countries, e. g., North America and Europe, need to cooperate in comprehensive but coherent measures, including conjoint drug-control policies that are also framed according to the realities of countries with millenarian traditional coca uses.

References

- ALLEN C (1981). To Be Quechua: The Symbolism of Coca Chewing in Highland Peru. *American Ethnologist* 8(1):157-171
- ÁLVAREZ E (1995). Economic Development, Restructuring and the Illicit Drug Sector in Bolivia and Peru. *Journal of Interamerican Studies and World Affairs* 37(3):125-149
- BEDFORD J, LOVELL K, TURNER C, ELISOHLY M, WILSON M (1980). The Anorexic and Actometric Effects of Cocaine and Two Coca Extracts. *Pharmacology Biochemistry and Behavior* 13:403-408
- BEDFORD J, NAIL G, ELISOHLY H, WILSON M, TURNER C (1981b). Comparative Stimulus Properties of Two Fractions of the Coca Leaf (E. coca). *Pharmacology Biochemistry and Behavior* 15:907-909
- BEDFORD J, WILSON M, ELISOHLY H, ELLIOT C, COTTAM G, TURNER C (1981a). The Effects of Cocaine Free Extracts of the Coca Leaf on Food Consumption and Locomotor Activity. *Pharmacology Biochemistry and Behavior* 14:725-728
- BOLTON R (1976). Andean Coca Chewing: A Metabolic Perspective. *American Anthropologist* 78(3):630-634
- BRUTSAERT T, MILOTICH M, FRISANCHO R, SPIELVOGEL H (1995). Coca Chewing among High Altitude Natives: Work and Muscular Efficiencies of Nonhabitual Chewers. *American Journal of Human Biology* 7:607-616.
- BURCHARD R (1992). Coca Chewing and Diet. *Current Anthropology* 33(1):1-24.
- BURCZYNSKI F, BONI R, ERICKSON J, VITTI T (1986). Effect of Erythroxylum coca, Cocaine and Ecgonine Methyl Ester as Dietary Supplements on Energy Metabolism in the Rat. *Journal of Ethnopharmacology* 16:153-166
- CABIESES H (2005). Coca: en situación límite. (Interview). Lima: CEPES
- CASTRO R, ZAVALETA A (2006). La Hoja de Coca en la Alimentación. Cedro, Lima
- CAULKINS J, REUTER P, IGUCHI M, CHIESA J (2005). How goes the War on Drugs? An Assessment of U.S. Drug Problems and Policy. RAND Drug Policy Research Center, US
- CLOC (Coordinadora Latinoamericana de Organizaciones de Campo) (2013). La Coca. Resolución sobre el tema de la Coca. <http://www.cloc-viacampesina.net/congresos/i-congreso/210-la-coca>>. Accessed: August 20, 2013
- COLLAZOS C, URQUIETA R, ALVISTUR E (1965). Nutrición y coqueo. Simposium sobre nutrición. *Revista del Viernes Médico* 16:36-44
- COMMISSION ON NARCOTIC DRUGS (2005). Alternative Development: A Global Thematic Evaluation. Final Synthesis Report. Forty-Eight Session. E/CN.7/2005/CRP.3. CND, Vienna
- CORDERO T (2002). Evaluación Nutricional de la Proteína de la Hoja de Coca (Erythroxylum coca Lamark var.coca). Undergraduate Thesis. Chemical Department. UNM-SM, Peru
- DIETZ E, LESSMANN R, KOTOWSKI-ZISS J, BERG C (2001). Drugs and Development in Latin America. Strategies. Experiences and Project Examples from the Work of GTZ. GTZ, Germany
- DUKE J, AUKLIK D, PLOWMAN T (1975). Nutritional Value of Coca. *Botanical Museum Leaflets. Harvard University* 24(6): 113-119

- DURAND F (2005). El Comercio Informal de la Coca para Uso Tradicional. DESCO, Lima
- EUROPEAN UNION [EU] (2009). A Report on Global Illicit Drug Markets 1998-2007. The Netherlands: European Commission Responsible of General Justice, Freedom and Security
- FARTHING L, KOHL B (2012). Supply-side harm reduction strategies: Bolivia's experiment with social control. *International Journal of Drug Policy* 23:488-494
- FAVIER R, CÁCERES E, GUILLÓN L, SEMPORE B, SAUVAIN M, KOUBI H, SPIELVOGEL H (1996b). Coca Chewing for Exercise: Hormonal and Metabolic Responses of Non-habitual Chewers. *Journal of Applied Physiology* 81:1901-1907
- FAVIER R, CÁCERES E, KOUBI B, SEMPORE B, SAUVAIN, SPIELVOGEL H (1996a). Effects of Coca Chewing on Hormonal and Metabolic Responses During Prolonged Submaximal Exercise. *Journal of Applied Physiology* 80:650-655
- FAVIER R, CÁCERES E, SEMPORE B, COTTET-EMARD J, GAUQUELIN G, GHARIB C, SPIELVOGEL H (1997). Fluid Regulatory Hormone Response to Exercise After Coca-Induced Body Fluid Shifts. *Journal of Applied Physiology* 83:376-382
- FONANPE. Fondo Nacional de Financiamiento de la Actividad Empresarial del Estado (2005). Perú: Oferta de Hoja de Coca. Estadística Básica (2001-2004). FONANPE, Lima
- GAGLIANO J. (1963). The Coca Debate in Colonial Peru. *The Americas* 20(1):43-63
- GARCÍA J, ANTEZANA J (2009). Diagnóstico de la Situación del Desvío de IQ al Narcotráfico. ConsultAndes and DEVIDA, Lima
- GARCÍA-GIESMANN J (1950). Estudio Histopatológico del Hígado de Ratas Tratadas con Polvos de Coca. *Revista de Farmacología y Medicina Experimental* 3:93-96
- GARCÍA-YI J, GROTE U (2012). Data collection: experiences and lessons learned by asking sensitive questions in a remote coca growing region in Peru. *Survey Methodology* 28(2):131-141
- GLAVE M, ROSEMBERG C (2005). La Comercialización de Hoja de Coca en el Perú: Análisis del Comercio Formal. GRADE, Lima
- GREENFIELD V, PAOLI L (2012). If supply-oriented drug policy is broken, can harm reduction help fix it? Melding disciplines to advance international drug policy. *International Journal of Drug Policy* 23:6-15
- GRINSPOON L, BAKALAR J (1981). Coca and Cocaine as Medicines: An Historical Review. *Journal of Ethnopharmacology* 3:149-159
- HAMMERSVIK E, SANDBERG S, PEDERSEN W (2012). Why small-scale cannabis growers stay small: Five mechanisms that prevent small-scale growers from going large scales. *International Journal of Drug Policy* 23:458-464
- HANNA J (1974). Coca Leaf Use in Southern Peru: Some Biosocial Aspects. *American Anthropologist* 76(2):281-296
- HARM REDUCTION INTERNATIONAL (2013). What is harm reduction? Available at: <http://www.ihra.net/what-is-harm-reduction>. Accessed on: October 29, 2013
- HASTORF C (1987). Archaeological Evidence of Coca (*Erythroxylum coca*, *Erythroxylaceae*) in the Upper Mantaro Valley, Peru. *Economic Botany* 41(2):292-301
- HIRSCHI T (1969). A control theory of delinquency. In: *Causes of Delinquency*. University of California Press, 309
- HOLMSTEDT B, JAATMAA E, LEANDER K, PLOWMAN T (1977). Determination of Cocaine in Some South American Species of *Erythroxylum* using Mass Fragmentography. *Phytochemistry* 16:1753-1755
- INCB. International Narcotics Control Board (2009). Report on the International Narcotics Control Board for 2008. United Nations, New York
- INSTITUTO INDIGENISTA INTERAMERICANO (1989). La Coca..., tradición, rito, identidad. IIA, México
- JELSMA M (2012). Harm reduction for the supply-side: Its time has come. *International Journal of Drug Policy* 23:20-21
- JONES J, AMLER B (1997). Report on Thematic Evaluation of Alternative Development in Peru. United Nations Drug Control Programme, Austria
- KEMPF K, DECKER S (1994). The theory of social control: does it apply to the very young? *Journal of Criminal Justice* 22(2):89-105
- KENNEDY M, REUTER P, RILEY K (1994). A Simple Economic Model of Cocaine Production. RAND's National Defense Research Institute, U.S

- LLORENS J (2004). Uso Tradicional de la Coca en el Perú: Síntesis Histórica. In: Rospigliosi F (2004). El Consumo Tradicional de la Hoja de Coca en el Perú. Instituto de Estudios Peruanos, Lima
- MANSFIELD D (2006). Development in a Drugs Environment: A Strategic Approach to Alternative Development. Discussion Paper. Development Oriented Drug Control Program. GTZ, Germany
- MARTIN R (1970). The Role of Coca in the History, Religion, and Medicine of South American Indians. *Economic Botany* 24(4):422-438
- MAYER E (1993). Factores Sociales en la Revaloración de la Hoja de Coca. *Debate Agrario: Análisis y Alternativas*. 17. Lima, Perú
- MAYER E (2004). Casa, Chacra y Dinero. *Economías Domésticas y Ecología en Los Andes*. Series: Estudio de la Sociedad Rural 28. Instituto de Estudios Peruanos, Lima
- NARANJO P (1981). Social Function of Coca in Pre-Columbian America. *Journal of Ethnopharmacology* 3:161-172
- NEGRETE J (1978). Coca leaf chewing: a public health assessment. *British Journal of Addiction* 73:283-290
- NOSYK B, WOOD E (2012). Evidence-based drug policy: It starts with good evidence and ends with policy reform. *International Journal of Drug Policy* 23:423-425
- OBANDO E (2006). U.S. Policy toward Peru: At Odds for Twenty Years. In: Loveman B, *Addicted to Failure. U.S. Security Policy in Latin America and the Andean Region*. Rowman and Littlefield Publishers Inc., U.S
- OFFICE OF TECHNOLOGY ASSESSMENT (1993). *Alternative Coca Reduction Strategies in the Andean Region*. Washington. Congress, U.S
- PARKESON P (1983). The Inca Coca Monopoly: Fact or Legal Fiction? *Proceedings of the American Philosophical Society* 127(2):107-123
- PLOWMAN T (1981). Amazonian Coca. *Journal of Ethnopharmacology* 3:195-225
- RAMOS-ALIAGA R, SAN ROMÁN K, SOLANO D (2004). Valor Proteico de la Hoja de Coca Libre de Alcaloides y Pigmentos. *Revista de la Sociedad Química del Perú* 70(2):67-75
- RIVERA M, AUFDERHEIDE A, CARTMELL L, TORRES C, LANGSJOEN O (2005). Antiquity of Coca-Leaf Chewing in the South Central Andes: A 3000 Year Archaeological Record of Coca-Leaf Chewing from Northern Chile. *Journal of Psychoactive Drugs* 37(4):455-458
- RODRÍGUEZ A (2003). La Economía de la Coca (*Erythroxylum coca*) en el Valle del Río Apurímac. Escuela de Post Grado. Magister Scientiae Thesis. Specialization in Agricultural Economics. Universidad Nacional Agraria La Molina. Lima, Perú
- ROSPIGLIOSI F (2004). Análisis de la Encuesta DEVIDA-INEI. In: Rospigliosi F (2004). *El Consumo Tradicional de la Hoja de Coca en el Perú*. Instituto de Estudios Peruanos, Lima
- ROUSE S, ARCE M (2006). The Drug-Laden Balloon: U.S. Military Assistance and Coca Production in the Central Andes. *Social Science Quarterly* 87(3):540-557
- SOUTH R (1977). Coca in Bolivia. *Geographical Review* 67(1):22-33
- TABARES E, ROSALES R (2005). Políticas de Control de Oferta de Coca: la Zanahoria y el Garrote. *Desarrollo y Sociedad*, 55
- THOUMI F (2004). A Modest Proposal to Clarify the Status of Coca in the United Nations Conventions. *Journal Crime, Law and Social Change* 42:297-307
- TRACE M (2012). Measuring drug law enforcement. From process to outcomes. *International Journal of Drug Policy* 23:17-18
- UN. Economic and Social Council (2009). Proposal of amendments by Bolivia to article 49, paragraphs 1 (c) and 2 (e)
- UNODC (2001). *Alternative Development in the Andean Area. The UNDCP Experience. Revised Edition*. ODCCP Studies on Drugs and Crime. New York, U.S
- UNODC (2005). *Thematic Evaluation of UNODC Alternative Development Initiatives*. Independent Evaluation Unit. UNODC, Vienna
- UNODC (2009). *Political Declaration and Plan of Action on International Cooperation towards an Integrated and Balanced Strategy to Counter the World Drug Problem*. UNODC, Vienna
- UNODC (2010). *World Drug Report 2010*. UNODC, New York
- UNODC (2011). *Perú. Monitoreo de Cultivos de Coca 2010*. UN, Lima

- UNODC OFFICE IN PERU (1999). Desarrollo Alternativo del Inambari y Tambopata. Documento de Proyecto AD/PER/99/D96. Availability: <http://www.onudd.org.pe/web/Html/Templates/proyectos.htm>. (accessed on June 15, 2009)
- U.S. Department Of State (2012). International Narcotics Control Strategy Report. Volume I: Drug and Chemical Control. U.S.: Bureau for International Narcotics and Law Enforcement Affairs
- U.S. OFFICE OF NATIONAL DRUG CONTROL POLICY (2012). National Drug Control Strategy. Data Supplement. U.S.: ONDCP
- VARGAS R (2011). Desarrollo Alternativo en Colombia y Participación Social. Propuestas hacia un cambio de estrategia. DIAL, Colombia
- VEE G, FINK G, CONSTANTINE G (1983). Anorexic Activity of Cocaine and Coca Extract in Naive and Cocaine Tolerant Rats. *Pharmacology Biochemistry and Behavior* 18:515-517
- VEILLETE C, NAVARRETE-FRÍAS (2005). Drug Crop Eradication and Alternative Development in the Andes. Report RL33163. Congressional Research Service, U.S
- WALSH J (2009). Lowering Expectations. Supply Control and the Resilient Cocaine Market. Washington Office on Latin America (WOLA), U.S
- WEIL A (1981). The Therapeutic Value of Coca in Contemporary Medicine. *Journal of Ethnopharmacology* 3:367-376

Acknowledgments

The research was funded by BMZ (the Federal Ministry for Economic Cooperation and Development, Germany) through the DAAD (German Academic Exchange Service), and by LACEEP (Latin American and Caribbean Environmental Economics Program). I am also indebted to two anonymous reviewers for their helpful and constructive comments.

FIGURES

Figure 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).

Figure 2: Price per Pure Gram of Cocaine at Retail Level in the U.S. (1981-2011)

Source: U.S. Office of National Drug Control Policy (2012). Own elaboration.

Figure 3: Purity of Cocaine at Retail Level in the U.S. (1981-2011)

Source: U.S. Office of National Drug Control Policy (2012). Own elaboration.