Factors Influencing Coca Reduction Initiatives

2

The Andean region is complex in its geology, ecology, and cultural history. This complexity precludes simple or broadly applicable coca substitution strategies. Successful, cooperative, counternarcotics efforts among the United States and Andean countries require careful consideration of all of these factors. This chapter examines the biophysical, cultural, socio-political, and economic conditions that may affect the success of efforts to reduce coca cultivation in Bolivia, Peru, and Colombia.

GEOECOLOGY OF THE NORTHERN AND CENTRAL ANDES

Clear understanding of the biological and physical environments in the Andean region is critical for appropriate design of projects to eradicate or offer alternatives to coca. The natural environmental diversity of Bolivia, Peru, and Colombia results largely from the abrupt altitude changes in the Andes mountain system (2). There is a vertical succession of ecozones, ranging from rainforest and desert at the lowest levels to mountain tundra, snow, and ice at the highest (104). The enormous latitudinal span (approximately from 10 degrees north to 40 degrees south along the western edge of South America) and longitudinal breadth (approximately between 80 degrees west and 60 degrees west) also make for considerable variations in climate, soil, vegetation, and land-use (104). Thus, the local and regional diversity of biophysical environments requires that any project be site-specific (2).

Andean Geography and Geology

The Andean *cordillera* (mountain range) divides the South American continent into Atlantic and Pacific drainage systems and is part of a great band of active crustal uplift that circles the Pacific Ocean. The Andes are among the youngest mountains on Earth, and consequently, soils are generally shallow, stony, and undifferentiated (104). Extensive volcanic and earthquake activity has characterized the region's geologic history, and this activity continues today (84). Any technologies dependent on the land's surficial characteristics---g. g., road-building or soil identification and use-must deal with the geologic variability, as well as the instability of the area due to ongoing mountain-building (2).

The Andean *cordillera* is made up of many interwoven ranges, which include high intermontane plateaus, basins, and valleys. Colombia, Peru, and Bolivia are located within the Northern and Central Andean ranges (figure 2-l).

The Northern Andes extend from coastal Venezuela and Colombia to northern Peru and contain several broad ecosystems falling into four altitudinal belts, the highest and coldest of which rises to 4,500 meters above sea level (masl). The Northern Andes subregion is distinguished from the rest of the region by higher relative humidity and greater climatic symmetry between the eastern and western flanks of the range (2).

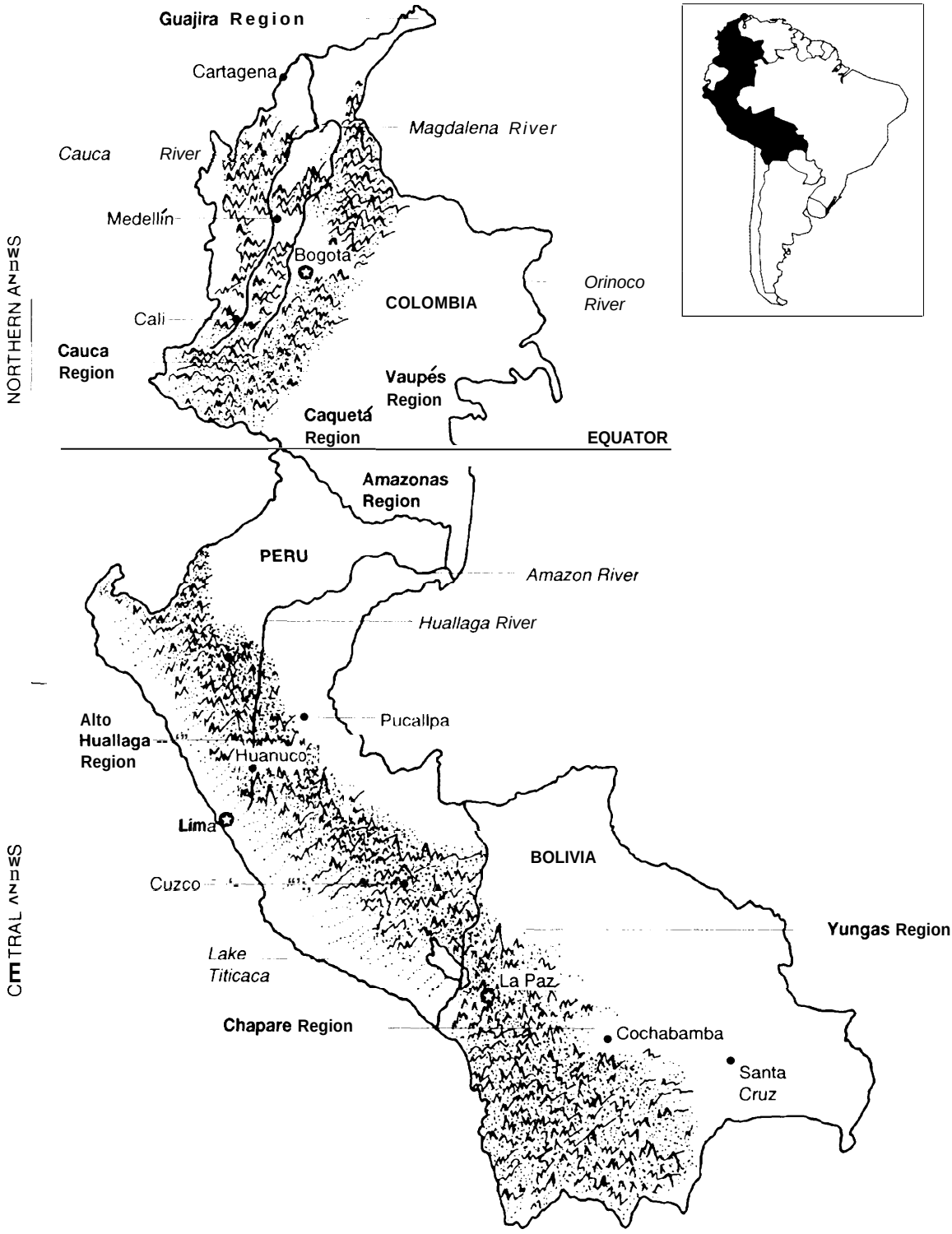
The three main warm ecosystems of the Northern subregion are the upper *montaña* (mountain) slopes, the intermediate-level coffee belt, and the foothills. The upper *montaña* slopes, with their vast, dense forests, have experienced little adverse human impact. However, in some areas, deforestation may have contributed to increased stream flow and erosion. Precipitation is heavy, averaging 4,000 mm per year, and physical and chemical weathering and erosion can be intense. The coffee belt, immediately below the upper *montaña*, has been profoundly modified by coffee plantation agriculture. The best coffee soils are developed on volcanic ash, which is sensitive to erosion. The low Andean foothills are relatively humid with annual rainfall of at least 2,000 mm and a mean annual temperature of at least 24 degrees C. Low-productivity, lateritic soil covers much of the area, particularly in cleared fields where maize, manioc *(yuca),* plantain, and cocoa are cultivated.

The Central Andes extend from northern Peru to the Antofagasta Province in Chile and Catamarca Province in Argentina. They are characterized by a succession of agricultural zones with varied climatic conditions along the mountains' flanks and by large, high-altitude plateaus above 3,500 masl, which do not occur in the Northern Andes. Variously called *puna* or *altiplano,* these plateaus, separated and surrounded by higher mountains, were the heartland of the pre-Columbian Andean empire (2).

The soil fertility of the northern *altiplano* generally is good (147). The western Central Andean ranges are relatively arid with desert-like soils, whereas the eastern ranges are more humid and have more diverse soils (26). The eastern slopes of the Central Andes in many ways are similar to the wet forests of the Northern Andes. Unlike the Northern Andes, however, these slopes have a dry season (2).

The *altiplano* and *páramo* (heathland) are broken by river valleys. Cutting deep into the lofty plateaus, these valleys descend 2,000 to 3,000 meters, often in a few tens of kilometers, and create areas of highly distinctive relief, climate, habitat, and agricultural uses. The upper ends of the valleys merge with the high plateaus. Their middle slopes and alluvial plains are temperate, referred to as *kichwa* by indigenous Andean peoples. Lower parts of the valleys, the

Figure 2-l-Generalized Geographic Map of Andean Coca-Producing Countries



SOURCE: Office of Technology Assessment, 1993.

yungas, can be wet or hot and dry as a result of rain-shadow.[1]

Unlike regions of gentle topography (e.g., the central United States or Amazon basin), where regional climatic variation can be determined from a few widely spaced measurements, regions with extreme topographic and climatic features (e.g., the Andean *cordillera)* make regional projections difficult (2). For example, while air temperature generally decreases with increasing altitude, variability of mountain topography can produce much lower-than-expected air temperatures at any altitude.

Some general climatic patterns, however, are discernible in the Andes. For example, with increasing distance south of the equator the seasonality of precipitation increases, whereas the total annual amount generally decreases. Humidity commonly increases with increasing altitude, but only to some intermediate altitude (e.g., approximately 1,000 masl on the eastern slope of the Ecuadoran Andes at the equator) above which it declines (92). The variability of mountain terrain also affects precipitation, such that conditions of extreme wetness and aridity may exist in close proximity. Annual temperatures in upper reaches of many Andean valleys may average 8 degrees C with frequent nocturnal frosts, whereas lower levels may average as high as 24 degrees C, with no frost. Related to this temperature gradient is a pattern of greater rainfall at the valley heads, and less rain at lower altitudes, resulting in part from mountain rain-shadow effect (2).

The weather patterns of the Andean *cordillera* and Amazon basin in general reflect movements of high and low-pressure "cells' associated with the Intertropical Convergence Zone, a low-pressure trough that moves further north and south on a seasonal basis. Precipitation is high throughout the year in the highlands and on the coast in the Northern Andes. South of central Ecuador, at about the latitude of Guayaquil, coastal aridity increases, culminating in the Atacama desert of northern Chile. In the Central Andes, highland precipitation is seasonal, and amounts are approximately one-half those measured in the northern Andes. The aridity of the Central Andean coastal zone is the result of the drying effect of the cold Pacific Humboldt current, and the southern Pacific high-pressure cell (59). Much of the southern portion of the Central Andes in Bolivia is also arid. The dry season causes soil moisture deficits and diminished stream flow for a part of each year.

Andean Agroecosystems[2]

At the regional or macroscale level, vegetation patterns in the Northern and Central Andes tend to reflect climatic zones determined by latitude and altitude. At the local or mesoscale level, however, this correspondence becomes less precise, as local variations in soil type, slope, drainage, climate, and human intervention come into play.

Most of the Northern Andes can support lush vegetation because of the high humidity and relatively high temperatures. Tropical rainforests and other types of evergreen and deciduous forests dominate this subregion, with considerable symmetry of vegetation types on the eastern and western flanks of the mountains. The lowest slopes support agriculture year-round, producing, for example, bananas, *yuca,* and cocoa.

Aridity reduces vegetation growth and agricultural options in some areas of the Central Andes. The Atacama desert region of the coastal plain, for example, is one of the driest places on Earth. However, the lower valley floors of the Central Andean western ranges, and the lands at the foot

[1] Rain-shadow occurs when moist easterly winds lose their moisture as they pass over the high, cool peaks and plateaus. As the air descends from the *puna* or *páramo, the* temperature rises and its moisture-bearing capacity increases, resulting in a desert condition below 1,500 masl in most interior valleys of the Andes (2).

[2] *Agroecosystem is* a term used to describe natural ecosystems modified by human agricultural activities (2).

of the mountain slopes, along the coast, are densely populated and support intensive, high-yield cultivation of cash crops including maize, rice, cotton, tobacco, garden vegetables, peppers, sugar cane, and fruit trees. Irrigation water is provided by the numerous streams that drain the western slopes. The eastern slopes of the central Andes have vegetation types similar to that of the northern Andes (2).

A significant portion of the Andean population lives within the Central Andes' eastern valley systems and *altiplano*. Settlements and farming are concentrated toward the upper end of the inter-Andean valleys for several reasons: the primary subsistence crops are acclimatized to these altitudes; drought and frost are less common than in the lower and upper aptitudinal extremes; and access to the grazing lands of the *puna* and *páramo* is relatively easy (31).

ANDEAN AGRICULTURAL PRODUCTION

Humans first altered the Andean landscape some 12,000 to 15,000 years ago as hunters and gatherers (146). By 3,000 to 4,000 years ago, the original nomadic, hunting and gathering way of life had been supplanted by a village-based agro-pastoral economy (95). Pre-Columbian agricultural productivity was achieved largely through specialized adaptation of food crops to the myriad of local microenvironment. Indigenous farmers planted numerous varieties of each crop in a single field, or in neighboring fields, so that if one variety performed poorly, several others might provide an adequate yield (42). Virtually all productive land was used for crop production. These two strategies led to a sufficiency of food supplies throughout the Andean highlands.

From the onset of human occupation, the varied Andean environments led to vertical arrangements of settlements, production regimes, migrations, and political organizations. Patterns of verticality derive from the classiffication of different agricultural zones, based on their climatic conditions (31,32,107,145). For example, the inhabitants of the Uchucmarca valley in Northern Peru recognize seven agro-climatic units that are distinguished according to altitude, moisture, temperature, vegetation, land tenure, crop assemblages, and agricultural technologies (31,32).

The Spanish conquest of the Andean region produced severe dislocations in the indigenous pattern of resource exploitation. The arriving Spanish found a highland Andean agricultural complex that focused on the intensive hoe cultivation of maize, squash, beans, and hot peppers (chiles). Fiber was secured from the *cabuya*, cultivated on the drier leeward sides of the mountain valleys, and from American cotton, cultivated in the lowlands, along with coca and sweet manioc (21). The principal root crop was the small Andean potato.

The Spanish developed urban centers and introduced exotic plants and animals in the Northern and Central Andes. Forced clustering of the semi-dispersed indigenous settlement patterns, exploitation of the large resident labor force, and establishment of the Iberian grazing ethic also followed. Large landed estates *(haciendas)* were developed in the *altiplano* belt for animal husbandry. In the hot, humid *yungas*, land clearing was facilitated by the introduction of iron tools, and maize, sugar-cane, and pigs were raised for urban markets (2).

Displacement of indigenous people to marginal lands that began in the colonial period continued under subsequent regimes. Invariably, the best lands of the region (e.g., flat, fertile valley bottomlands) were claimed by the existent rulers, and often were designated pasture for livestock. Many indigenous people who had lived on these lands were forced to move to remote, inhospitable, forested slopes. Others were reduced to landless laborers, or *colonas*, on the *haciendas*. Thus, throughout the Northern Andes, the logical spatial relationships of agricultural production were reversed. The broad, level bottom lands so suitable to the cultivation of staple foodstuffs were given over to pasture and meat production,

or commercial crops such as sugar cane destined for foreign markets. Highland plots, more suitable as pasture or forest, were cultivated, with consequential damage to the natural vegetation. Harvests were meager and had to be transported, on the back of either man or beast, to distant urban markets (43).

Competition for land between *haciendas* and peasant communities became a common and sometimes violent feature of rural society in the Central Andes. The concentration of land ownership, uneven population distribution and land-use, feudal subjugation of many peasants, and rise of a large pool of displaced, landless peasants created a legacy of inequality that still prevails in the region (19,61,141). The dichotomy between the urban dweller, or civil servant of Spanish descent, and the rural Indian peasant-between the lowland centers of power and the powerless inhabitants of the eastern Andean slopes—persists, with significant implications for any attempts to alter agricultural practices in coca-producing regions (2).

In more recent times, the so-called "green revolution" has had mixed blessings. For instance, production of some crops (e.g., banana, rice, and maize) and of poultry has increased dramatically in the Andean region (16,78,82). However, this increased agricultural production occurred among the large landowners of the region, with few benefits accruing to the impoverished subsistence sector (43).

A significant modern-era land-use change has been the opening of eastern lowland regions in the Northern Andes for agricultural use. For centuries, fear of disease and reluctance to leave the secure highland social structure deterred highlander settlement of lowlands. With their worsening economic plight in modern times, however, an ever-increasing number of highland Indians are moving eastward along every major river valley (46). In spite of endemic shortages of good roads, legally recognized land titles, credit, education, electricity, and modern health and sanitation services, highlander colonization of the Orinoco and Amazon basins serves the interests of the individuals and nations involved and can be expected to continue (43).

Today, the basic pattern of Pre-Columbian land use and agricultural practices, as modified by the Spanish, remains more or less intact in the Central Andes. Commercial agriculture tends to be concentrated in flat, lowland areas, at least in part due to high transportation costs and difficulties applying mechanization to farming on valley and mountain slopes. This mitigates in favor of mountain crops that are hand-cultivated, easily harvested, and easily transported with low spoilage, one example being coca.

COCA-PRODUCING ECOSYSTEMS

Potentially, 10 to 20 percent of the Andes mountain range (7,250 kilometers in length) is suitable for coca production, and these areas are concentrated in an aptitudinal belt from sea level to about 2,000 mad, extending from Colombia to Bolivia. Coca grows best at temperatures averaging above 15 degrees C, with high precipitation, but does not require evenly distributed rainfall. Coca can be grown in a wide variety of soils, but is sensitive to poor drainage and intolerant of frost or drought. In addition, a wide range of soil pH levels can be tolerated by coca (i.e., *E.coca var. coca, the* most important source of cocaine, will tolerate pH levels as low as 4.3 and as high as 8.0 (54)).

Coca cultivation is concentrated in and along deep valleys that cut into the eastern slopes of the Northern and Central Andes, and coca is the most important agricultural product of the hot, often dry lower reaches of the *yungas* (31). Other warm ecosystems with a potential for coca growth are found between sea level and 2,200 masl in the northern Andes, which are characterized by a sub-Andean or tropical *montaña* at higher limits and wet forest at lower levels. These regions are heavily populated, particularly in the "coffee belt" (2).

Coca bushes are stripped of their leaves up to six times a year, and the leaves are then dried and

transported to the highlands by porters, pack animals, or trucks. Some highland communities control territory in the coca-producing valleys, and may establish satellite communities there. Several times each year, they journey to these fields to tend their coca, or to work as laborers in the fields of relatives and fellow villagers (107).

Much of the land involved in coca production is sloping, and its suitability for other agricultural uses will depend on factors such as slope steepness, soil type, and water availability. Water quality problems now exist in some Andean watersheds, largely as a result of discharges associated with mining and agricultural activities, and high rates of natural erosion from the region's ***geologic Instability*** and ***climatic variability*** (102,114). The extent to which new agricultural practices may contribute to these water quality problems can only be determined by basin-specific monitoring programs in the affected watersheds (2).

KEVIN HEALY, INTERAMERICAN FOUNDATION

Terracing is a traditional, more environmentally benign means of growing coca still practiced most notably in the Bolivian Yungas.

Environmental Impacts of Coca Cultivation and Processing

The adverse environmental consequences of coca cultivation and processing often are cited as a problem in the Andean nations (14,53). Because most data are anecdotal, and on-site research is problematic, the degree of environmental damage that directly or indirectly can be attributed to coca cultivation and cocaine processing remains undetermined. However, the few available information sources point to significant differences between damage from coca cultivation and cocaine processing.

COCA CULTIVATION

Little is known about the role of coca in the ecology of the Andean rainforest, or about the environmental impacts of coca cultivation. Impacts are likely to differ from one growing area to another, given variations in ecology, culture, and cultivation practices. Today, no formal comparative study exists of even the most notable coca-growing regions (i.e., the Alto Huallaga of Peru and the Chapare of Bolivia). Despite this lack of information, three factors seem key to determining g coca cultivation's environmental impact: geographic area, types of external inputs and frequency and intensity of their use, and cultivation practices.

Experts argue that deforestation is the most visible damage caused by coca cultivation. Some older coca production regions (e.g., the Yungas, Bolivia) continue to produce coca along well-constructed terraces that reduce soil erosion potential. However, these practices are not employed in the newer coca-growing regions. In many areas coca is grown on unterraced plots with no barrier to soil loss from heavy rains. Migrants to these regions may use slash-and-burn practices to clear forested areas. Between the early 1970s and the late 1980s, an estimated 700,000 hectares (about 2,700 square miles) of Amazon rainforest were deforested as a director indirect result of coca cultivation (53).

The potential consequences of deforestation associated with coca cultivation are numerous. Habitat loss and decreased species diversity are often a direct result of destruction of tropical

forest. In addition, the rise in soil temperatures and decrease in organic matter and soil nutrients, resulting from slash-and-burn practices, can make the area hostile to revegetation. In the Alto Huallaga in Peru, tropical forest burning causes extensive air pollution, and smoke layers have been observed covering the valley in August and September (14).

The most devastating effect of deforestation in the Andean region maybe extensive soil erosion. Clearing tropical forest areas for agricultural expansion without investing in soil conservation can severely disrupt biological productivity and start a self-reinforcing cycle of degradation. For example, soil erosion reduces soil fertility, which in turn can reduce growth of cover plants, leading to more soil erosion and to rapid depletion of diversity as the site becomes suitable for fewer species.

The cultivation practices, tillage and weed control, can increase the potential for soil erosion. Tillage loosens the soil and leads easily to erosion. Whether coca seeds or seedlings are planted, the soil remains largely unprotected from heavy rains. Furthermore, the soil around the coca plants is weeded regularly to reduce competition for the minimal nutrients available. These practices leave the soil in coca plots almost continually bare during the production years, and the results are increased soil temperatures, reduced development of soil microbial populations, and long-term exposure of the soil to wind and rain erosion. Finally, the leaves of the coca plant are stripped periodically (e.g., three to six times per year), thereby removing whatever protection the canopy might offer.

As a result of soil erosion, sediment-laden runoff may flood lowlands, overcome the nutrient trapping capability of wetlands, and damage associated aquatic systems by smothering bottom communities and decreasing oxygen availability to other organisms. Floods, avalanches, and landslides have been attributed to the increased soil erosion found in the coca-growing areas of the Andean foothills. Exceptionally heavy rainfall in November 1987 caused devastating landslides killing animals and people as well as ruining roads, villages, and productive land throughout coca-growing regions (14).

Table 2-1—Pesticides Commonly Used in Coca Production

Common name	Trade name	Percent used
Carbaryl	Sevin	70%
Metamidophos	Monitor	15
Decamitrina	Decls	10
Monocrotophos	Azodrin	5

SOURCE: J. Antognini, Research Leader, Tropical science and Research Lab, U.S. Department of Agriculture, "Remarks," U.S. Library of Congress, Congressional Research Service, Cocaine Pruduction, *Eradication and the Environment: Policy,* Impact and Options Hearing, February 14,1990 (Washington, DC: U.S. Government Printing Office, 1990), p. 3.

Table 2-2—Dimensions of Pollution from Coca Processing in the Alto Huallaga Valley[a]

Material	Quantity (in millions)
Acetone	6.4 l
Carbide	3.2 kg
Kerosene	57 l
Quicklime	16 kg
Sulphuric Add	32 1
Toilet paper	16 kg
Toluene	6.4 l

a Based on estimated quantities of these substances in Alto Huallaga Valley rivers and streams in 1986.

SOURCE: M. Buenaventura, "Victims of the Drug Trade," U.S. Library of Congress, Congressional Research Service (CRS), *Cocaine Production, Eradication, and the Environment: Policy, Impact, and Options,* February 14, 1990 (Washington, DC: U.S. Government Printing Office, 1990), pp. 143-146.

Pesticides and fertilizers used in coca cultivation may cause environmental and health problems as well. Synthetic pyrethroids, carbaryl, and paraquat area few of the pesticides used to control insects and weeds in coca fields (135) (table 2-l). Some of these chemicals are known to be mobile in soils, thus increasing the potential for contamination of groundwater resources. Pesticides adsorbed on soil particles may be carried to nearby aquatic systems during heavy rains common in many production regions. Similarly, nitrate from fertilizers is highly mobile in the soil and that not

Table 2-3--Cocaine Processing Chemicals and Potential Environmental Effects

Chemicals	Characteristics
Carbide compounds	• Highly toxic to organic tissue, can raise water's pH to toxic levels.
Kerosene	• Oily liquid, pungent odor. • Only moderately toxic to living organisms, but if present in surface water for a long time can produce chronic adverse effects in amphibians and fish. • Problems may arise from inhalation or ingestion. • Reduces dissolved oxygen levels in the water.
Sulphuric acid (H_2SO_4)	• Highly corrosive, toxic, oily liquid. • Extremely harmful to organic tissue. • Dissolves easily in water. • Fish and plants may suffer from acute sulfuric acid poisoning.
Toluene (C_7H_8)	• Highly soluble in water and very toxic. • Harmful to fish and amphibians.

SOURCE: M. Buenaventura, "Victims of the Drug Trade," U.S. Library of Congress, Congressional Research Service, Cocaine Production, *Eradication, and the Environment: Policy, Impact,* and Options *Hearing,* Feb. 14, 1990 (Washington, DC: U.S. Government Printing Office, 1990), pp. 143-148.

taken up by vegetation may leach to groundwater or be transported to nearby surface waters much the same as pesticides. Agrichemical contamination of water resources can lead to adverse effects on human, plant, and animal health (136).

Evidence suggests that coca production can lead to serious erosion problems and reduce land productivity. However, data comparing the environmental impacts of coca production with those of other crops are lacking. The environments in which coca is produced may be just as easily damaged, or perhaps more so, from legitimate agricultural activities that are as likely to involve deforestation, heavy tillage, and extensive agrichemical inputs (135). Coca is a perennial shrub and once planted can provide some soil stabilization during its productive life (10 to 18 years), annual grains on the other hand would result in tillage and harvest once a year. In this comparison, coca may be more conserving of resources.

COCA PROCESSING

Although little concrete data exist illustrating the damage caused by coca processing, it is clear that the chemicals used to process coca leaves into coca paste and, later, cocaine can have considerable adverse impacts on the Andean environment. Data gathering alone poses some problem because some of the items used in processing also have legitimate uses (e.g., kerosene, toilet paper, lime) (table 2-2). Estimates may be based on overall consumption under the assumption that the items are purchased for illegal purposes although clearly for some items this may not be the case. In any case, coca and cocaine processing methods employ a variety of toxic chemicals (e.g., toluene, sulfuric acid) that, if released in sufficient quantities, could harm the immediate surroundings and ecosystems far removed from the processing site (table 2-3).

In the first phase of coca processing, the dried leaves are soaked in a solution of sulfuric acid and water. The resulting acid fluid, which now contains the alkaloids (one of which is cocaine) from the leaves, is decanted and mixed with a chemical base (e.g., lime or sodium carbonate) to neutralize the acid, and finally with an organic solvent (kerosene). The mixing is repeated, as needed, until the solutions have yielded an expected amount of coca paste. In the process, thousands of gallons of polluted water may be dumped onto the land or into nearby rivers and streams (105). Thus, primary processing chemicals may contaminate soil and ground- and surface water supplies (53). Such contamination also has taken place in the course of enforcement

Table 2-4--Inputs Required to Prepare a Kilogram of Coca Paste

Material	Quantity	Price ($U.S.)
Coca leaves	150-170 kg	$100.00
Kerosene	26.5 l	7.00
Lime	8 kg	1.50
Sodium carbonate	1 kg	4.00
Sulfuric acid	5 kg	10.00
Water	1,300 l	—
Total cost		122.50

SOURCE: R. Henkel, "The Cocaine problem," Bolivia *After Hyper Inflation: The Restructuring of the Bolivian Economy* (Tempe, AZ: Arizona State University, Center for Latin American Studies, 1990). *Author's note:* Data provided by informants familiar with the cocaine industry in the Chapare region, August 1989.

efforts, when coca processing chemicals sometimes have been dumped on the ground and into nearby waterways.

Although there is no accurate account of the amount of dumping, estimates have been made based on the amount of chemicals needed to process a kilogram of coca paste (table 2-4). Further estimates have been made for the amount of chemicals used throughout the processing chain to transform coca leaf into cocaine hydrochloride (table 2-5). While these figures are not likely to illustrate the degree of the problem adequately, they help to identify areas of concern.

CONCLUSION

Although little documentation of environmental degradation caused by coca cultivation and processing exists, it is clear that these activities have significant potential to damage the Andean environment. Deforestation and soil erosion are two of the most notable effects of coca cultivation, whereas chemical contamination of soils and surface and groundwater seem likely results of coca-processing. Human and wildlife populations in coca growing and processing areas may suffer the consequences of these environmental impacts.

Concrete data on the degree of contamination from processing activities is needed to determine the level of risk to human and wildlife populations. A comprehensive assessment of the environmental damage caused by coca cultivation and processing in the Andean countries could identify the relative environmental risks from both activities. Although recent efforts in Bolivia have sought to identify the impacts of processing activities on terrestrial resources (largely soils), additional effort is needed to quantify overall ecological impacts. National support for coca reduction might increase if coca cultivation and processing-related activities are shown to be adversely affecting the Andean resources and thus reducing alternative development options.

When compared with the destructive practices of some other agricultural and nonagricultural industries in the Andes, however, the potential quantity of land degradation and pollution attributable cocaine industry becomes somewhat less striking. The destructive land-use practices observed among coca growers could occur in the case of any other "booming" export crop, and likely stem more so from the social and economic marginalization of coca growers than the illegal status of their livelihood (108).

TRADITIONAL ROLES AND USES OF COCA LEAF

Ritual importance of coca leaf in traditional religious and social activities, and traditional and mainstream medical and therapeutic applications are concerns of some sectors of the Andean population. Chewing unprocessed coca leaves has long been a pervasive Andean cultural tradition. Generally, a dry leaf of cultivated coca contains less than one percent of the alkaloid cocaine.[3] Thus, although related, cocaine hydrochloride and raw coca leaf are unique substances whose pharmacological and cultural uses differ significantly.

[3] **Amazonian** coca contains less than **0.5** percent of the alkaloid cocaine; chemical analysis showed the cocaine **content** in **"Huánaco"** or "Bolivian" **coca,** the principle source of the world's cocaine, to vary from 0.23 to 0.93 percent (1 12).

Table 2-5-Estimated Quantity of Chemicals Used to Process Coca Leaf Into Cocaine Hydrochloride in 1990

Processing stage	Inputs (in millions)	Low/High			
		Regionwide	Bolivia	Colombia	Peru
Coca leaf to coca paste	Kerosene (*l*)	567/776	108/31 7	--/45.8	—/41 3
	Sodium bicarbonate *(kg)*	1.2/1 .64	0.23/0.67	-/0.1 o	—/0.87
	Ammonia (*l*)	5.56/7.62	1 ,06/3.12	-/0.45	—/4.05
Coca paste to coca base	Sulfuric acid (*l*)	9.94/13.6	1 .90/5 .57	-/0.80	—/7.24
	Potassium permanganate *(kg)*	*0.24/0.32*	*0.05/0/13*	-/0.02	—/0.1 7
Coca base to cocaine HCI	Ethyl ether (*l*)	15.8/21 .7	1.06/3.1 2	13.6/1 7.4	—/1 .16
	Acetone *(l)*	7.89/10,8	0.53/1 .56	6.78/8.69	—/0.01

SOURCE: U.S. Department of State, Bureau of International Narcotics Matters, Narcotics: The *Environmental Consequences* (Washington, DC: Department of State, 1991).

Many indigenous Andeans chew coca on a daily basis as a mild stimulant to allay fatigue and hunger, and coca leaves are used by indigenous and non-indigenous people for medicinal purposes. Coca leaves are also an important part of offerings made in cultural and religious rituals and are a critical element of traditional Andean patterns of production and exchange between highlands and lowlands. Community and political solidarity were long maintained through these exchanges.

> The desire for products of the *montaña*, particularly coca, is a longstanding, basic part of Andean culture, and so the commercial ties survived the fall of empires (1 15).

History of Coca Leaf in Andean Society

The earliest archaeological evidence of coca use, found in southwestern Ecuador, dates from about 2100 BC (uncorrected radiocarbon dating) (112). Different coca leaf varieties and associate chewing paraphernalia from succeeding centuries have been excavated in such widely spread areas as Northern Chile and Costa Rica (112). Prior to European settlement, major areas in Peru, from the north coastal subtropical desert zone to the southern coca-producing areas of Sonqo, were coca production zones for the Inca state (30, 107). In Inca times, coca was a sacred plant. The Inca symbolically associated coca with the color green, itself evocative of the rainy season, spirits of the dead, love amulets, and in general, with supernatural forces (151). This symbolic context of fertility, outside forces, and the divine realm continues to have significance in contemporary ritual coca use (116).

Although initially opposed by colonial clergy, coca chewing in the indigenous population spread even further during the first years of Spanish occupation (125,126). Wherever coca production brought significant revenue, as in Bolivia and Peru, attempts at suppression gradually were abandoned (22). Evidence suggests coca consumption was encouraged by mining interests to help miners withstand harsh working conditions in high-altitude silver and tin mines (101, 116). The transformation of coca into a commodity during the colonial period represented a clear break with the indigenous pattern, and has parallels with the current crisis (116).

Ritual and Medicinal Uses

Traditional coca chewing is not an isolated or relic phenomenon (table 2-6). Coca is the focal element in all traditional religious rituals surrounding interaction between humans and supernatural forces, such as supplication and divination. It is employed for religious purposes by the Quechua-speaking peoples of the Peruvian Andes and the Aymara of Bolivia, as well as the

Table 2-6—Traditional Coca Use in the Andean (A) and Tropical Forest (TF) Regions[a]

	Coca users															
	Colombia				Peru					Bolivia						
	Chibchan (Paéz)	Tukanoan	Tupian (Witoto)	Macro-Chibchan (Kogi)	Quechua	Aymara	Non-Indian Peruvians	Arawaken	Tupian (Witoto)	Quechua	Aymara	Miners (Indian and Non-Indian)	Non-Indian Bolivians	Tacanan (Aroana)	Guarini (Chiriguan)
	Regions														
	A	TF	TF	TF	A	A	A	TF	TF	A	A	A	A	TF	TF
Means of obtaining coca															
Cultivation		X	X	X				X	X					X	
Trade												X			X
Cultivation and trade	+				X	X	X			X	X		X		
Frequency of use															
Daily, by men and women	X				X	X				X	X				
Daily, by men only		X	X	X				X	X			X			
Form or method of use															
"Chewed"	X				X	X		X		X	X	X		X	X
Powdered		X	X						X						
Smoked with tobacco	X	X	X	X				X	X						
Purpose of use															
Social rituals		X		X	X	X				X	X	X			
Ritual healing	X				X	X		X		X	X				
Divination	X						+	X		X			+		
Medicinal					X	X	X			X	X	X	X		
Labor exchange or wages					X	X				X	X				

[a] This table is illustrative, not exhaustive.

KEY: X= present. += occasional or possible.

SOURCE: M.E. Reeve, "Traditional Roles and Uses of Coca Leaf in Andean Society," contractor report prepared for the Office of Technology Assessment, July 1991.

Traditional coca use by Andean miners has persisted since colonial times. Here, a Bolivian miner chews coca, indicated by the bulge in her cheek, while working,

Tukanoans of the Colombian Amazon, who inhabit the Vaupés, Caquetá, and Paraná river regions (1 16). Even those who do not chew coca on a daily basis use it periodically in rituals. For instance, most native Andeans believe that certain activities, such as sowing and harvesting, require ritual offerings of coca be made to those lending their labor (122).

Apart from its religious significance, coca is almost universally regarded by indigenous peoples as a food, and native explanations of the coca's value are grounded in physiological rather than cultural factors (97). The persistence of the coca habit can be understood if it has been critical for the adaptation and survival of native Andeans under high altitude conditions (29). When Western scientists began studying coca at the turn of the century, they focused on cocaine hydrochloride. The applicability of unprocessed coca leaf as a modern pharmaceutical product was not pursued and, following the abolition of cocaine, coca leaf was not available for scientific investigation in the United States and Europe (112). Nevertheless, the utility of traditional coca consumption for Andean populations cannot be ignored. Three physiological benefits of coca use (for relief from altitude sickness, as a remedy to vitamin deficiencies, and in conserving body heat), are specifically appropriate to Andeans who must endure the stresses of high-altitude labor and a low-protein diet (29,64,101). Evidence does not support claims that long-term traditional use is harmful (86). Rather, the multiple advantages of coca use indicate that it has a strong positive role in Andean health (box 6-A) (1 12,116).

A much higher percentage of the Bolivian population regularly consumes the unprocessed coca leaf for daily sustenance than is involved in the illegal production, transport, marketing, processing, and trafficking of the coca leaf and its derivatives. Coca leaf is used by eighty-seven percent of the inhabitants in the small towns and rural communities of Bolivia for some 40 different health remedies (76). Between *11/2* and *2* rnillion people chew coca in Bolivia alone (34,76). Similar, or greater figures also apply to Peru.[4]

Traditional Patterns of Coca Leaf Production and Distribution

In traditional Andean society, coca is critical to the smooth functioning of daily interaction and ritual affirmation of kin group exchanges. Most coca chewing takes place within the daily routine and is carried out according to a specific ritual pattern (3,125). A coca exchange will seal a social contract, whether it be an agreement to share labor *(anyi),* a marriage contract, or acceptance of a political office (3,22). Coca also is used as wages or payment for services outside of *anyi in* place of less stable Andean currencies (23,35).

Production of coca is intricately linked to the wider pattern of Andean agricultural subsistence that depends on interregional trade networks that

[4]There is comparatively less available information on the extent of contemporary **use of coca leaf among Andean peoples of Colombia** and the Amazonian regions (1 16).

Box 2-A–Traditional Use of Coca Leaf

Ritual Religious and Medicinal Importance

- ***Divination***: As part of the complex of beliefs surrounding its power to see and communicate with the supernatural, and its association with the realms of ancestral and spiritual forces, coca is used by diviners to bring divine knowledge to the communities they serve. Throughout the Andes today, coca continues to be a major medium for divination, sought by indigens and non-indigens.
- ***Supplication***: Coca is used asanofferingtopropitiate supernatural forces, and to ensure agricultural and animal fertility and personal well-being; it is also ritually offered during marriage negotiations, and to the dead at burial.
- ***Traditional medicine***: *Coca* use is integral to practices of traditional healers and herbalists throughout the Artdean and Amazonian regions. Though they practice nonconventional (non-Western) medicine, traditional healers and herbalists do not operate within the indigenous sphere alone.

Widespread Therapeutic Importance

- ***Anesthetic/antiseptic***: Indigens and non-indigens apply coca topically as a local anesthetic; coca also has antiseptic qualities. The cocaine alkaloid has been shown to exert a powerful bactericidal action on gram-negative and coccus organisms.
- ***Curative/preventative remedy***: *Coca* tea, consumed by indigenous and non-indigenous Andean people, alleviates the symptoms of altitude sickness; combats the effects of hypoglycemia; and helps prevent various lung ailments (an attribute of particular significance to the mining population). For example, chewing coca leaves is believed to limit inhalation of silicates that cause silicosis.
- ***Dietary supplement***: *Coca leaves* contain vitamin A and significant amounts of B1, B2, and C; they also contain calcium, iron, and phosphorus, in either the leaves or the calcium carbonate customarily taken with the leaves. Leaf chewing helps alleviate nutritional deficiencies of a diet consisting principally of potatoes.
- ***Stimulant Coca gives*** energy for work, reduces physical discomfort and fatigue, alleviates hunger, sharpens mental processes, and, at high altitudes, helps the chewer keep warm.

SOURCE: Adapted from M.E. Reeve, "Traditional Roles and Uses of Coca Leaf in Andean Society," contractor report prepared for the Office of Technology Assessment, July 1991.

move food and coca between distinct ecological zones. Exploitation of distinct zones, called "verticality," is a critical concept symbolically and in terms of subsistence strategies (107). From prehistoric times, coca has been the major crop grown by Andean peoples in the lowest of the principle ecological zones, and trade of coca for highland goods has bound communities and kin groups across the zones. Studies of modem Andean subsistence strategies demonstrate that this pattern has been preserved.

The exchange of coca and food is an ancient strategy and coca traders were a nexus of the regional integration promoted by this lowland/highland exchange (35,38). Even prior to the cocaine boom, coca was the largest trade item involved inmost of the Peruvian market economy (125). Peoples participated in this market if for no other reason than for the coca needed to obtain agricultural labor. Additionally, outside of the markets, an active trade in coca has traditionally been part of the household activity of temporary migrants to the lowlands. Highland Quechua and Aymara households each year traveled to the lowlands with their products (meat, livestock, cereals, and produce) and traded them for coca and other tropical products. The informal market sector traditionally has been of significance in terms of promoting regional integration and in stimulating small-scale production of an agricultural surplus (72,99).

However, operation within this traditional pattern is now a risky business largely because of the emergence of a black market for coca leaves, with which traditional users must compete (3). In Peru, for instance, coca transported in greater quantity than is necessary for immediate personal use is subject to confiscation. As the number of traditional commercial traders has Dimininished, subsistence agriculturalists have increased their trips, perhaps to move smaller quantities of coca leaves at a time or to take advantage of the opportunities for wage labor (105). Other traditional users find they must make do with fewer supplies of coca leaf, and use substitutes, making proper performance of ritual obligations more difficult (1 16).

Cultural Ramifications of Illegal Coca Trade

The persistence of coca chewing in Andean Bolivia and Peru is linked most closely to cultural continuity, and follows the linguistic patterns of Quechua and Aymara (30). However, as economic pressures have provoked increased fragmentation of land holdings, temporary or permanent migration to coastal and tropical forest areas, and delocalization of food production and distribution, individuals are cut off from the traditional work and life patterns of their natal community *(ayllu)* and face a "crisis of the traditional ideology" (116). While poverty and migration likely will continue to disrupt rural, indigenous Andean communities, the international cocaine industry has been instrumental in corrupting the traditional role of coca.

In the cocaine trade, wage laborers are paid more often in *pasta básica* (coca paste) than money or unprocessed leaf. *Pasta básica* is an intermediate, unrefined coca derivative that is highly addictive. It contains numerous chemical impurities accumulated during cultivation and processing (e.g., pesticides, kerosene, sulphuric acid), and is presumed to have serious health effects (75). The practice of smoking *pitillos,*

U.S. DEPARTMENT OF STATE, INM

More than just impure cocaine, pasta básica de cocaína *is cheap, widely available, and highly addictive, attributes which underscore its potential to be a significant public health problem in coca-producing countries,*

coca paste mixed into tobacco cigarettes, has spread among urban and rural youth, and across economic boundaries (85,86,94). Another health risk of the cocaine trade, which has affected poor, teenage male peasants in particular, is caused by the process of *making pasta básica.* Thousands of unemployed youth seek work as *pisadores, those* who stomp the coca leaves in a chemical soup. Exposure to *pasta básica processing* chemicals over the numerous hours required for paste-making causes damage *to pisadores'* feet and may pose other, as yet unknown, health risks (75).

Cultural and Economic Implications for Coca Reduction

A recent study in Bolivia found that among traditional agriculturalists and miners, 13 percent said their productivity would decrease without coca, and 16 percent said they would fall ill (39). Laboratory testing of the effect of coca chewing on individuals indicate that there is no significant difference in actual work efficiency, but that it may slightly increase endurance in work performance, acting much like caffeine and amphetamines to produce central body stimulation (72). Still, further restrictions on the availability of coca leaf for traditional use could, at the very least, increase the difficulty of traditional Andean

cultures to fulfill ritual religious and social activities. Furthermore, 40 percent of the Bolivians studied believed that "people would rebel in some way or another" (39).

Indeed, coca leaf has become an important focal symbol in the indigenous struggle for self-determination, a significant political movement already active in Bolivia. The ongoing effort for cultural equity by indigenous Bolivians often includes support for or approval of traditional use of coca leaf; concurrently, the Bolivian peasantry have used what political power and organization they have as a means of fighting coca eradication efforts and bans on coca cultivation (76).

In addition to cultural factors, economic and political factors need to be carefully considered in evaluation of any action which would alter the current situation. Unless illegal demand is removed, regulation of legal coca cultivation and trade likely will be too great a challenge for the Andean countries. Restrictions on all coca-related activity then will likely continue, to the detriment of traditional users (116).

SOCIAL, ECONOMIC, AND POLITICAL ASPECTS OF COCA CULTIVATION

Bolivia and Peru share the distinction of being the world's leading producers of coca leaf, a condition spurred in both countries by long-term social inequality, and political and economic unrest. Over time, the appeal of coca leaf cultivation was heightened by national agricultural policies that promoted agricultural production for often unstable international markets while discouraging production for domestic markets. Small farmers in Bolivia and Peru, who grow the bulk of nationally consumed food products, were particularly hurt by agricultural and rural development policies.

In contrast, Colombia's involvement in the cocaine industry mostly has been confined to cocaine processing and international trafficking. Numerous aspects of Colombia's history contributed to creating an enormous advantage for enterprising Colombian criminals in these activities, and Colombia's narcotics traffickers remain the industry's chief beneficiaries.

How all these problems are linked might best be understood by briefly examining some of the social, political, and economic developments in Bolivia, Peru, and Colombia that have motivated involvement in the cocaine industry most directly. For Bolivia and Peru these developments will be discussed mainly in the context of settlement in the Chapare and the Alto Huallaga regions.

Bolivia

The development of coca activity is very much within the framework of the political and economic history of Bolivia (5). Stagnation of Cochabamba's upland valley agricultural economy is a development problem and periodic source of crisis that dates from Bolivia's colonial period.

Within the colonial economy, agricultural areas supplied mining and administrative centers with food and fiber (109). Then, as now, smallholding farmers frequently undercut large estates, because they did not attach a value to their own labor, and could sell their produce at prices the large estates could not match profitably. In fact, large estates could only count on making money in drought years, when smallholders were obliged to consume most of what they grew. Because their landholdings were small and located in the least favorable areas for agriculture, many smallholders could not support themselves from farming, despite the fact that they dominated the markets for agricultural products in most years. As a result, smallholding farmers became heavily dependent on off-farm sources of income early in Bolivian history (91).

This social context effectively discouraged investment in agriculture and contributed to worsening imbalance between the agricultural

and mining sectors of the economy.[5] For large landowners, their estates were essentially collateral for investment in other economic activities. For smallholders, revenues not immediately consumed were also invested in off-farm activities. Economic opportunities were not plentiful, however, and worried government officials constantly sought ways to bring new life to the agricultural economy through development schemes.

The imbalance between the agricultural and mining sectors was exacerbated by several events during the 20th century. With completion of the railroad linking Cochabamba with ports on the Pacific coast in 1917, centers of craft production could no longer compete with manufactured imports, and many had to seek employment in the mines. Large estates contracted labor on behalf of mines, frequently obliging part of their resident peasant population to work there. The relationship with the mines was strongly influenced by international ore prices. During periods of high ore prices, the agricultural areas of central Bolivia exported large numbers of people to the mining centers, and then reabsorbed many of them when ore prices declined (48,73).

NATIONAL AGRICULTURAL POLICY AFTER 1952

The problems faced by agricultural areas deepened in 1953 when the *Movimiento Nacionalista Revolucionario* government enacted agrarian reforms that substantially redistributed land in the upland areas and released peasants from the political domination of large estates. The reforms did not address productivity of peasant labor; in fact, although more rural people had land, the conditions for earning a living on that land were as unfavorable as before, owing to the absence of government policies to assist smallholders.

Conversely, land concentration reoccurred as a consequence of economic growth in the new export agricultural sector (140). Larger land holders in the eastern lowland areas of Bolivia, such as the Santa Cruz department, were encouraged and financed to expand and modernize a commercial and largely export agriculture industry. Bolivia was the world's largest recipient of U.S. foreign assistance under the Point Four program during the 1950s (77). Economic development policy focused on expanding the export enclave and landowners in lowland areas were provided with large amounts of foreign assistance for transforming their estates into modern commercial agricultural enterprises. Much of the economic growth experienced in the lowlands following the agrarian reform was based on the availability of migrant labor from upland areas (109).

The impact of the growing commercial agricultural export sector on rural smallholders in areas such as the Cochabamba department was to recreate the economic imbalance that had characterized their relationship with the mining industry. Agrarian reform and the growth of the commercial agricultural export sector did little to improve livelihoods for small farmers and resulted in large numbers of people migrating to seek employment in cities. This movement continues to swell Bolivia's urban population (87,1 11).

CAUSES OF EXPANDING COCA PRODUCTION IN BOLIVIA

By the mid-1970s, but before the rapid expansion of coca production, at least 90 percent of rural families in areas of central and southern Bolivia earned at least half of their income from off-farm sources (120). Peasant families, from their bases in rural upland areas, maintained contacts in multiple migratory destinations, and rapidly changed their migration patterns in response to changing opportunities and risks (87,109).

---

5 This discussion refers generically to *the mining* economy or the *mining sector*. From the beginning of the colonial period through most of the 19th century the mining industry revolved around silver, but beginning in the last quarter of the 19th century, tin grew in importance and became Bolivia's major mineral export. Tin dominated the mining industry until 1985, with the crash in international tin prices and the bankruptcy of the London Metal Exchange (1 10).

In 1974, international cotton prices collapsed, and cotton producers, who had received substantial national and international assistance in preceding years, found themselves overcommitted to a failing venture. Some continued to be recipients of national support for alternate crops, and some apparently became involved in coca leaf production (20). International financial connections, physical infrastructure, and access to national and international agricultural development assistance facilitated involvement in narcotics by some members of the agricultural elite at this time (76). Following investment by members of the national entrepreneurial classes, coca leaf production increased exponentially, with most of the growth taking place in the Chapare area of the Cochabamba department (109).

When a series of natural and economic disasters dramatically worsened the conditions of rural life during the 1980s, and coca-leaf production rose in response to increasing international demand for cocaine, the nearby Chapare area was incorporated into the migratory strategies of many rural families (table 2-7). Three factors brought about a dramatic deterioration in the living conditions of rural families during the 1980s:

- A severe drought began in 1983 and continued through the 1980s in much of central and southern Bolivia, pushing thousands of smallholders "over the edge" in terms of their ability to earn a living through agriculture. Thousands of families left their homes permanently, and thousands more have either begun to migrate seasonally or have had to increase the amount of time they must spend away from home to provide for family needs. Impoverished rural people in the semiarid upland valleys of the Cochabamba department migrated to the nearby Chapare region and became involved in coca growing.
- International tin prices collapsed in 1985 when the London Metal Exchange stopped trading. Some 27,000 mine workers lost their jobs between August 1985 and August 1986. The *Banco Central de Bolivia* estimated the unemployment rate to be 20 percent by the end of 1985, largely because of the layoff of mine workers. According to the *Central Obrera Boliviana, the* national trade union movement, the figure approached 30 percent by the end of 1986 (45). The impact of the mining collapse on families not directly employed by the mining industry but dependent on it has not been measured. Many families migrated to urban areas, particularly Cochabamba and La Paz. From Cochabamba, many, unable to find work in the city, went to the Chapare.
- Finally, this was a time of general financial collapse. Since the 1970s, different government administrations had relied on external loans and expanding export production, to finance domestic budget deficits and unproductive government spending (134,149). Ultimately, Bolivia was unable to make payments on its substantial foreign debt. In addition, in 1983, the government unlinked the exchange rate of the Bolivian peso from the U.S. dollar. The effects of this *dezdolarización* on the already weakened Bolivian economy were disastrous; the annual inflation rate exceeded 14,000 percent at its peak in 1984. Since only those with access to U.S.

Table 2-7—Reasons for Migration Cited by Chapare Farmers

Reason cited	Number of respondents	Percent of total
Lack of land	74	42%
Seeking employment	39	22
Increase income	33	19
Traveled with family	17	10
Other reasons	13	7
Total	176	100

SOURCE: M. Painter and E. Badoya, *Socioeconomic Issues in Agricultural Settlement andf Production in* Bolivia's *Chapare Region, Working* Paper No. 70 (Binghamton, NY: Institute for Development Anthropology, 1991 b).

dollars enjoyed any financial protection, many people turned to producing or processing coca leaf as a way to earn hard currency (109).

Official estimates of coca leaf production show a gradual increase from 1963, when production was approximately 4,800 metric tons, and 1975, when it reached 11,800 metric tons. By 1988, coca leaf production was officially estimated at 147,608.3 metric tons (51).

CURRENT MACROECONOMIC TRENDS

Bolivia has a primary export-oriented economy that currently is following a fairly coherent set of economic rules (5). The severe political and economic instability experienced by Bolivia from 1978 to 1985 led to rethinking of the overall economic strategy (44). A drastic stabilization program, implemented by the newly inaugurated Paz Estensoro administration in August of 1985, reduced inflation to 60 percent, limited public spending, increased tax revenues, and brought the fiscal deficit under control (134,149).

Gross domestic product (GDP) growth remained slow throughout the 1980s vis-a-vis population growth, with negative GDP rates occurring between 1980 and 1986, and very slow growth to date. Inflation averaged about 18 percent from 1987 to 1990 (144,149). Furthermore, increasing absolute poverty and sluggish private investment growth continue to plague the economy, although the Bolivian Government has taken some recent policy steps to promote foreign investment (5).

Bolivia has been negotiating its debt since 1986, and had managed to reduce its level of outstanding debt to about 79 percent of GDP (or $3,504 million) by the end of 1990 (149). It has managed to retire most of its commercial debt, and newly contracted debt is being held by bilateral and multilateral official creditors under concessionary terms. Thus, the maturity profile of Bolivia's external debt has improved significantly (149). Despite these considerable improvements, Bolivia's debt burden remains high relative to GDP and exports, and the country has almost no prospects of becoming credit worthy for commercial bank lending for some time to come (5).

CURRENT SOCIOPOLITICAL CLIMATE

Despite severe economic problems, Bolivians have enjoyed uninterrupted, democratic, civilian government rule for the last 10 years. Amongst stronger political candidates, a trend toward coalition building and negotiations has emerged in response to the repeated need for run-offs in past elections. Thus, Bolivia is governed most recently, by a coalition government comprising the centrist and conservative parties *(Movimiento de la Izquierda Revolucionaria* and *Acción Democratica Nacional,* respectively) through an arrangement called the ''Acuerdo *Patriotic" (74).*

Nevertheless, Bolivia holds the world record for most government turnovers via coup d'etat (76). The recent transition to democratically elected civilian rule was slow, and remains tenuous in spite of the smooth succession of elections in the 1980s. Prolonged economic instability has weakened government institutions like the judiciary and law enforcement agencies, opening the way for corruption by narcotics interests. Moreover, there have been disturbing signs of decay. At least half of the eligible electorate is turning away from participation at the ballot box, perhaps due to disillusionment with the regressive impact of public policies. Some 80 percent of the population is below the poverty line (74). And, although Bolivia has had a relatively strong human rights record since 1982, there have been moments when the system seems to revert back to military repression (143).

Even under democratic rule, the military continues to wield influence and protect its relative privileges. One legacy of the most recent era of military rule, lasting from 1964 to 1977, is the often drug-related corruption and fraud found throughout the armed forces. Repressive state

behavior, coupled with the military's record of political intervention, suggests the potential for subverting democracy via the 'militarization' of U.S. counternarcotics policy in the Andes (74).

Some argue that the Bolivian political system lacks the institutional ability to develop effective links between public and private sectors, and that party activists and government officials divert scarce resources and benefits to themselves, friends, and associates (96). In addition, social class and ethnic discrimination place serious constraints on possibilities for broad-based socioeconomic development (74,87).

Close to 50 percent of Bolivia's population continues to reside in rural areas, and to derive significant income and food from agriculture (87,1 13). The peasant sector is responsible for 70 percent of Bolivia's national agricultural production, despite adverse and discriminatory public policies for marketing, credit, investment, transport, export, and rural education (87,103). In exchange for providing cheap food, tax revenues, and a significant part of the labor for lowland commercial agriculture, construction, trade, and commerce, peasant families receive poor housing, negligible health services, meager educational opportunities, rustic transport infrastructure, and almost no effective state assistance for improving their farm operations. Indigenous leader Victor Hugo Cardenas called this structural inequality "internal colonialism" (74).

The social and political inequities in Bolivia create inherent difficulties for state-led rural development. For example, elite groups whose influence often extends to banks, public officials, political parties, foreign aid support, and the media, may monopolize public and private resources earmarked for agricultural production (60). Thus, in the inter-class competition between rural large- and smallholders for resources, the rural elite tend to have the advantage irrespective of the apparent orientation of the national political regime (74).

An elite minority has also benefited disproportionately from public investments in rural infrastructure, agroindustry, technological improvements, and farm price subsidies (150). Figures for the 1970s show that only 5 percent of the subsistence peasant population had access to formal agricultural credit (63). A 1990 Ministry of Agriculture and Peasant Affairs report implied the peasantry had access to only 4 percent of the formal institutional credit available for agricultural production (103).

BOLIVIA'S RURAL SINDICATOS

The rural peasant labor unions, or *sindicatos* have waged the only serious challenge against the prevailing policy environment and entrenched national and regional power structure. The *sindicatos* were organized after the takeover and transfer of lands following the 1952 agrarian reforms (1,49). Subsequently, they have functioned as community development organizations with local, sub-regional *(centrales),* regional *(federaciones),* and national levels with offices and elected leaders (74).

The peasant *sindicato* movement has obliged the government and international interests to take coca-leaf growers concerns into account. Because they have been represented through the union movement, coca growers in Bolivia have repeatedly rejected efforts to organize insurgences in the Chapare. This situation contrasts sharply with that of Peru's Alto Huallaga coca-growing region, where violence is much more prevalent (74,109).

The implication of the contrast between Peru and Bolivia in this regard is, whether motivated by neo-liberal economic ideology or concerns about the political orientation of the *sindicato* movement, efforts to repress the unions or find ways around their participation in development planning and implementation are badly misplaced. They have been shown to be attuned to the needs of coca producers and, indeed, they have proposed alternative development programs (74).

It is misleading, however, to assume that *sindicatos are* a completely sufficient substitute for true political empowerment. Without locally elected, controlled, and accountable central gov-

Bolivian sindicatos help organize rural communities and voice peasants' political and economic concerns at local, regional, and national levels. This banner from a Cochabarnba peasant federation depicts a farmer chained to a coca bush.

ernment institutions, the Bolivian peasant population will continue to be dependent on grassroot and nongoverment organizations for their political voice, and will remain locked out of the central government power structure (87). Opportunities exist for including grassroots social and political organizations in development projects (109). Such involvement likely would strengthen the political and institutional influence of rural dwellers and would further their efforts to secure the political and social justice, equality, and stability they need to overcome the historic, economic roots of involvement in the narcotics industry.

Peru

Recent migration to the Alto Huallaga is only a chapter in a long history of economically induced migrations by Peru's rural peasants. Colonization of the Peruvian Amazon basin began in the 19th century, spumed by increasing rubber exploitation (105). Air transportation to jungle cities, and inland road construction were major contributing factors in the 20th century. Meanwhile, expansion of the *hacienda* system concentrated land ownership, consigning peasants to more marginal lands (9). The upper jungle areas of the Peruvian Andes, such as the Alto Huallaga, were almost exclusively the property of descendants of Spanish settlers, and not until late in the 20th century would social and demographic transformations push the peasant population into these areas (105).

MIGRATION AND ALTO HUALLAGA SETTLEMENT

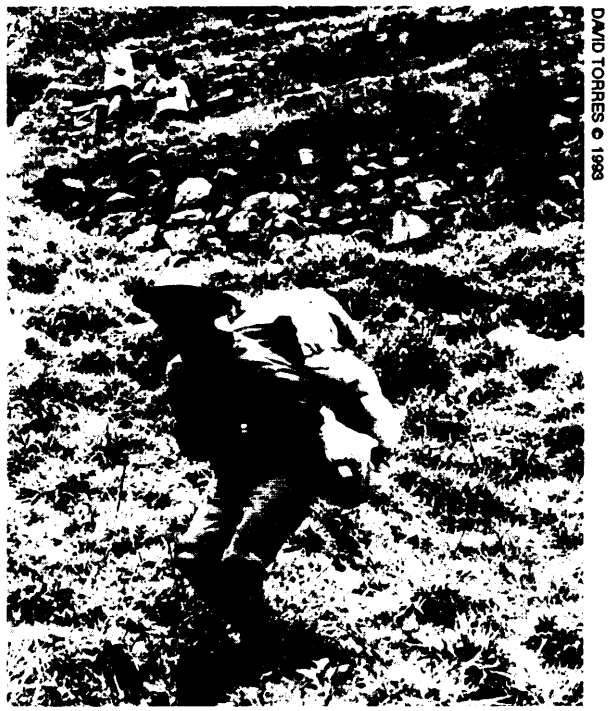
The economic need to migrate was caused primarily by rapid population growth beginning in the 1940s. When a road through Huánuco, Tingo María, and Pucallpa was opened the same decade, migration increased from the central highlands to the Huallaga area (109). Some commercial estates, including large tea and coffee plantations, were established in the Alto Huallaga, and the central highland departments of Huánuco and Junín became regular suppliers of cheap, seasonal wage labor. Labor-force size depended on foreign exchange earnings: when international prices rose, plantation managers contracted a large number of wage earners; when prices fell, they did not (24). In spite of these early developments, however, most rainforest areas on the Andes' eastern slopes would remain only sparsely populated until the 1970s (105).

The combined effects of high population growth rates throughout Peru, and long-standing political and economic marginalization of the highlands, also led to surges in urban migration. In the 1960s and 1970s, the highland population increased by 20 percent (from 5 to 6 million) and

the coastal population increased by 120 percent (from 3,859,000 to 8,513,000). Peruvian peasant farmers, often dependent on outside income for subsistence needs, migrated to the coast to supplement income between growing and harvest seasons. It was in response to the unprecedented burden on coastal city resources that the Peruvian Government introduced policies to redirect migration to the less populous Eastern Andean range (105).

The military regime that took power in 1968 (1968-75) restructured property ownership in most economic and social sectors (100). It also launched radical agrarian reforms, including planned settlement campaigns (25,37,98) and agricultural production cooperatives, some involving the country's most productive land. Nevertheless, reform did not increase most of the rural population's standard of living substantially and, in not incorporating producers outside the boundaries of project areas, it excluded many migrants (25). In the end, even more landless rural residents migrated to urban areas, and by 1972,45 percent of Lima's population consisted of migrants (105).

A 1973 study of agriculturalists settled in Alto Huallaga from upland areas in the Tingo Maria, Tocache, and Campanilla regions found that 42 percent had migrated because of acute shortages of land at home, whereas another 26 percent had moved because of the lack of work. Thus, 68 percent of migrants to the region relocated because they could not earn a living at home (40). However, expectations that frontier colonization could solve urban economic and social problems were dashed by the lack of long-term funding, management and guidance, and rampant resource destruction (105). Funds were spent primarily on nonagricultural development, such as urbanization and service sector activity. Most migrants were unfamiliar with the local ecology, appropriate crops, and farming methods, and were left to depend on advice of equally inexperienced authorities (105). Finally, little money went into addressing key agricultural problems such as market expansion, or irrigation and farming techniques improvement.



The shortage of transport infrastructure in most rural Andean and tropical forest regions mitigates in favor of low-tech, low-weight, high-value crops like coca, Local transport of goods still is largely by porters or beasts of burden.

Settlers were economically debilitated by underdevelopment and underproduction. The Alto Huallaga continued to be characterized by low productivity of food crops and minimal use of modern inputs such as fertilizers (109). This placed farmers at a disadvantage relative to those from other tropical valleys. New roads were needed, not to export a bounty of new agricultural products to the rest of the country, but to import food (105).

The profitability of legal crops declined throughout Peru in the 1970s. Agricultural trade was increasingly unfavorable, in part due to international lending policies (e.g., removal of subsidies allowing markets to reflect real demand and supply)(7). Most significantly, production input

costs for agricultural crops severely outweighed their market value. Government-instituted cooperatives in the Alto Huallaga, such as the tea and coffee plantations, began disbanding as participants took up coca cultivation. The resulting labor shortage for legitimate agriculture further debilitated the cooperatives and their regions, assuring their demise (109).

The democratic era succeeding the military regimes was based on a new constitution drafted by a constituent assembly popularly elected in 1978. Illiterates (about 40 percent of the population in 1960) were granted voting rights for the first time in 1980. Unfortunately, the 1980s were also marked by the inability of Peru's leaders to cope with the international debt crisis, resulting in the nation's economy spiraling downward.

Under the democratic administration, frontier settlement and tropical forest agricultural production continued to receive the most attention, to the neglect of resource distribution and agrarian development in other regions of the country.[6] A conservative alliance in the Peruvian Congress blocked all reformist measures for the rural highlands proposed in the legislative chamber (109). Longstanding economic policies that did not favor small farmers (e.g., subsidized food imports, maintaining low urban food prices) continued, while the economic crises of 1981 and 1983 increased disparities between agricultural prices and input costs (127). Agricultural policies in the last decade were oriented toward supplying urban areas and have led to deteriorating terms of trade (6). For example, overall production costs increased 2.7 times more than agricultural prices in the Alto Huallaga (10). It was also a period of increasing indebtedness.

Loans from the World Bank, InterAmerican Development Bank, and the U.S. Agency for International Development (AID) financed roads and provided credit for tenant farmers. However, while the government *sought a* road system that would open the maximum amount of land to settlement (27,109), road construction was not accompanied by economic measures or agricultural policies favoring small producers (142). Economic constraints continue to pose fundamental obstacles to Peru's agricultural development. Long-term economic investments in Peru remain extremely rare, and most come in the form of high interest loans. Without adequate and accessible markets, legal agricultural production is poorly rewarded, particularly in a coca-industry inflated economy. Local banks impose high interest rates that can easily place farmers in debt, forcing them to sell their land and join the migrant labor and squatter populations. Inability to invest in production improvement (e.g., agrichemicals, irrigation) feeds the cycle of economic decline for most farmers of legal crops, further aggravating their debtor status (105).

Economic Developments of the Late-1980s

Peru's GDP per capita declined throughout the 1980s, with an increasing number of Peruvians living in absolute poverty. An unconventional economic strategy was undertaken by the Peruvian Government, between 1985 and 1990, to redistribute income to poorer segments of the population. The Garcia Administration attempted to implement recovery by expanding aggregate demand, instituting price controls, increasing the budget deficit, and deferring external debt service. Domestic supply was expected to expand, while consumption would be fueled by increasing real wages, direct subsidy programs, temporary employment-generating public works in marginal areas, and transfer of disposable income from the public to the private sector. The latter was expected to be accomplished through tax reduc-

[6] Resettlement of poor peasants in remote tropical areas of Third World countries often seems to be politically preferable to redistribution of existing agricultural lands. This is because such colonization programs do not threaten politically powerful landowners or other rural elites. It gives the false impression of a "positive sum game. " To the extent, nevertheless, that the cleared tropical land ultimately cannot sustain the colonist population this positive "sum" is a political illusion (93).

tion and freezing public sector prices and tariffs, and deferring external debt payments. Use of slack capacity would be guaranteed by closing the domestic market to imported competing goods (88).

The experiment resulted in the most severe economic crisis ever experienced in Peruvian history (5). Peru began to accumulate debt arrears with multilateral financial institutions, and in 1989 its total external debt was about 104 percent of GDP (or $19,156 million) (88,90). The accrued interest obligations on public foreign debt represented about 8 percent of GDP, which was more than tax revenues in 1989 (5.2 percent) (90).

Coca production expanded considerably amid worsening economic conditions in the 1980s. In fact, the coca economy softened the most profound economic and employment crisis in the nation's republican history (109). Coca dollars provide hard currency to finance desperately needed imports and as foreign exchange reserves have been depleted major banks have adopted a tolerant attitude toward coca dollars. The coca economy continues to increase in direct proportion to the decline of the legal economy (90).

Current Macroeconomic Trends

The Fujimori Administration (1990-) has used various strategies to stabilize the Peruvian economy following the years of hyperinflation, real income declines, and budget deficit increases. New legislation has fostered private investment in different economic sectors and the basic economic agenda of the Fujimori Administration has been a return to orthodox economic management and full participation in the world financial community. A' 'shock treatment' stabilization program and several other policy measures were launched to fulfill these goals, the immediate objective being to stop inflation (5). Although hyperinflation indeed was halted, a second result has been further, severe deterioration of Peruvian standard of living (83). The economic crisis has also taken a heavy social toll on Peru, sharpening perceptions of ethnic and regional discrimination in an already divided nation, and weakening institutional performance.

When President Fujimori took office, at least two-thirds of the foreign debt was in arrears (5). The stabilization programs and the various reforms implemented to reorder the country's financia1 situation allowed Peru to start servicing its debt to the multilateral organizations (83). During most of 1990-91, these payments were in the range of U.S. $40 to $60 million a month (loo).

The Fujimori Administration slashed government expenditures to gain resources for debt payments. For example, large government outlays for subsidies were halted, freeing prices on foods, medicine, and other staples. In early 1991, Fujimori's finance minister launched a wider array of free-market measures. These included privatization plans for about 30 state companies; the application of free-market rules to the reformed sector of Peruvian agriculture; the adoption of a unified, floating exchange rate; the reduction of import tariffs to an average of 17 percent; and the removal of most nontariff trade barriers (100).

Fujimori's stabilization program exacted a heavy toll on the majority of Peru's already struggling citizens, and no major social emergency programs to ameliorate the harmful economic and social consequences were applied. Social costs of "Fujishock," as the program was called, included increases in the already significant numbers of citizens suffering from critical poverty (specified as a per capita income below $15.50/men@ and chronic malnourishment (36).

In light of Peru's historically violent and unstable political situation, private investment in Peru has grown slowly (71,128). A Special Senate Committee report estimated that losses of freed capital and physical infrastructure related to violence during the period 1980-88 totaled about U.S. $45 billion (67). Although investment has not stopped altogether, its focus has changed in ways that are not conducive to strong economic development. Current investment projects con-

centrate on: 1) risk-averse activities, such as real estate investments, which have partly replaced investments in transportation equipment and industrial machinery, and 2) new investments in micro-level enterprises, or in small-scale informal sector operations, where overhead costs are low (68).

In practice, Fujimori's economic policies are still undermined by continuing poverty, political concerns, and an uncertain business environment. Even the most adventurous entrepreneurs have had good reason not to undertake productive investment in Peru. Economic balance and growth simply may not be achievable in the medium term if the country's political situation does not stabilize.

Peru's security forces, like its civilians, are more concerned with chronic political and economic woes than with the drug war. Often poorly paid, security personnel in Peru, Bolivia, and Colombia also are particularly vulnerable to corruption by narcotics dollars.

CURRENT POLITICAL CLIMATE

Much of the Peruvian populace has been skeptical as to the importance of counternarcotics efforts relative to other domestic crises. In giving precedence to domestic concerns other than the coca industry, the Peruvian Government long has abided with the public sentiment. In opinion polls, the economy consistently is cited as the number one problem, and subversion historically has been the second; drugs were cited as a principal problem by no more than 5 percent of a 1990 Lima sample. Most Peruvians do not consider the drug industry politically advantageous for Peru; however, while the majority support the principle of fighting drugs, few believe that Peru should assume major costs in the effort. Those groups that would be affected most by counternarcotics initiatives hold similar beliefs (100).

Peru's peasant coca producers naturally are leery of counternarcotics efforts. Many peasant leaders have criticized the Fujimori government for failing to consult them on past bilateral counternarcotics agreements, and for bypassing Peru's regional governments, institutions in which producer organizations would have official participation (100). The coca producers contend that they have resorted to coca cultivation only because no market exists for other crops, and repeatedly stress that their existence is due to demand for cocaine by consuming countries.

Guerrilla movements have had an especially strong presence in Peru's coca-producing areas, primarily the Alto Huallaga Valley. *Sendero Luminoso* historically has been active in the southern sector of the Valley, while the *Movimiento Revolucionario Túpac Arnuru* (Tupac Amaru Revolutionary Movement, MRTA) has been vigorous to the north. *Sendero* is said to have received an estimated $20 to $100 million annually in fees *(cupos)* levied on peasant coca producers and drug traffickers (69). Both guerrilla organizations remained powerful in these areas during 1991, thus making on-the-ground counternarcotics initiatives extremely hazardous (e.g., in recent years, 10 workers on the AID/Alto Huallaga Development Project have been killed) (100). No coca was eradicated in Peru in 1990 or 1991, and U.S. and Peruvian efforts at alternative development were not initiated in 1991. Despite the recent capture of numerous *Sendero* and MRTA leaders, the extensive war chest and

Box 2-B–The Fujimori Presidency and the April 1992 Coup

Peru's political history is characterized by successions of constitutional and de *facto* regimes (alternating rule about every 5 to 12 years). Historians tell us, however, that the differences among past regimes are nominal; both have been dominated by oligarchical families whose primary concern was exclusion of competitors and disadvantaged sectors from political and economic power. By his actions in April of 1992, Alberto Fujimori seems to have fulfilled a pattern prescribed by history. After more than a decade of democracy, which included his election as president in 1990, Fujimori has instated a government of his own design.

The openness and competitiveness displayed sometimes in Peru's political system were evident in the 1990 election to the presidency of Fujimori, a political unknown until a mere 2 months before balloting. Despite winning the presidency in good part through denouncement of the opposition's proposed economic "shock treatment," Fujimori immediately implemented what many analysts consider an equally draconian economic stabilization program. Fujimori shifted toward a more radical program upon recognizing the need to restore good relations with the international financial community, whom his predecessor had alienated. To open negotiations with the International Monetary Fund (IMF) and the World Bank, Peru had to begin to repay its outstanding debt.

Fujimori's economic reforms ended hyperinflation and renewed prospects for Peru's economic recovery, but also resulted in a severe recession. Given this trade-off, a key concern was the length of time Peruvians would grant Fujimori to achieve economic revival. Critics believe he sought to ensure his government's survival through courting the military, in particular the army, the service that traditionally launches coups in Peru. Upon his inauguration, for example, Fujimori had named an active-duty army general as minister of the interior, and restored army power over the national police. This military alliance was cemented when Fujimori took control of Peru, on April 6,1992, by dissolving the Peruvian Congress and suspending the Constitution. His pledge to reinstate full democracy after the constitutional reforms-to be arrived at some future date-was approved by popular vote.

Democratic leaders in this hemisphere, and elsewhere, decried the act as an *auto golpe* (self coup). Ensuing events received extensive and negative coverage from the international media: arrests of opposition leaders and journalists, resignations of key Cabinet members, censorship of radio and press reports, and placement of troops throughout Lima. The United States, Germany, Spain and, eventually Canada and Japan, suspended most aid to the Peruvian Government, and the Organization of American States (OAS) issued a stern statement of disapproval.

armaments believed to held by the *Sendero Luminoso in* particular, could continue to hamper development efforts in the Huallaga for years to come.

For various reasons, Peru's security forces historically have been unenthusiastic about counternarcotics initiatives. Military officers argue that such initiatives impede their more pressing counterinsurgency demands. Many claim that resentful coca-growers likely would side with insurgents, as would the drug traffickers, thus creating three enemies (100). Finally, in the context of dire fiscal conditions, tolerance of and participation in drug-related corruption have been widespread. Salaries in the Peruvian military often are extremely low and, thus, drug money is tempting. According to some estimates, the majority of drug-trafficking flights depart from official airports. Not only have security forces failed to obstruct traffickers-in some cases they actively have obstructed counternarcotics efforts. Military personnel have shot at helicopters on anti-drug missions, and some believe that government authorities were behind the assassination of Walter Tocas, one of the few coca-growers' leaders to support the May 1991 Anti-Narcotics Agreement (100).

However, from the outset of his takeover, Fujimori argued the necessity. In misaddress to the Peruvian public April 5,1992, he claimed that thus far in his term as President, his efforts to revive the economy and to fight *Sendero Luminoso* and the drug trade had been repeatedly undermined by the courts and Peruvian Congress, and that corruption throughout the judicial and political system was to blame. The poor performance of Fujimori's *Cambio 1990* party in the congressional elections had left him with little party support in the Peruvian legislature. The president was put at odds with the congressional representation from his primary opponents, the APRA and FREDEMO parties, whom he blamed thereafter for policy deadlocks.

Although the future of democracy in Peru remains uncertain, the status of Fujimori'sgovernment has evolved considerably. Initially, Fujimori would not set dates for presentation of political reforms to Peruvian voters, but increasing international pressure prompted him to accelerate his schedule for the reinstitution of democracy. Instead of first holding a vote on public opinion of his rule by decree, he announced that a plebiscite on creation of a constituent assembly would be held. The elected "Democratic Constituent Congress," of which Fujimori's supporters now hold 43 of 80 seats, is tasked with reforming Peru's now-defunct 1979 constitution.

Fujimori's rapid restoration of some democratic processes has been attributed to concerns about the economic consequences of losing international approval. With much of the government's economic assistance initially cut off, Peru's ability to secure future ioans from the World Bank, the IMF, or the Inter-American Development Bank was questionable. Not only would this loss of support jeopardize Peru's present and future programs for debt payment, but would delay indefinitely Peru's economic revival.

At any rate, the capture of *Sendero* leader Abimael Guzman in September 1992, the election of the constituent assembly in November 1992, and continued support from Peru's populace seem to have earned Fujimori tolerance from the international community. Despite concern amongst human rights officials that the leadership of Fujimori's security forces will become abusive in their zeal to root wt *Sendero* corroborators (e.g., since April 1992, disappearances and paramilitary activity have increased), the OAS has reestablished relations with the Fujimori government, as have the United States and other foreign countries.

SOURCES: Adapted from C.J. Doherty, "Lawmakers Support Decision to Halt Funding for Peru," *Congressional Quarterly*, 50(15)961, 1992; "Peru and its Neighbors," The *Economist*, 323(7760):44, 1992; "Getting Away with It," The *Economist*, 323(7755):44, 1992; Federation of American Scientists (FAS), *The Sendero File* (Washington, D.C.: FAS Fund's Project for Peru, 1992); G. Gorriti, "Mouse Trap," *The* New *Republic*, 206(18):14-15, 1992; L. Hockstader, "Peruvian President Takes Case to OAS," *The Washington Post*, May 18, 1992, p. A12; C. McClintock, "Opportunities and Constrainta to Source Reduction of Coca: the Peruvian Sociopolitical Context," contractor report prepared for the Office of Technology Assessment, April 1992; Reuters News Service, "Troops Surround Congress and Lima," *The* New York *Times*, April 7,1992, p. Al; Reuters Newa Service, "Peruvian President Schedules New Vote," The Washington *Post*, July 29, 1992, p. A24; L. Robinson, "No Holds Barred," US. News and *World Report*, 113(12):49-50, 1992.

CONCLUSION

In 1992, Peru experienced tremendous changes in its social and political situation (see box 2-B). In April 1992, President Alberto Fujimori, with support of the army and police, suspended the Peruvian Constitution and disbanded the Congress in a ''psuedo-coup.'' Additionally, on September 12, 1992, Peruvian Police captured the *Sendero Luminoso's* founder and leader Abimael Guzman. With Guzman's imprisonment, Fujimori may succeed in ending what was believed to be an unstoppable campaign for control of Peru. Whether or not the new Fujimori government will respond with similar urgency to the cocaine industry's equally threatening advance, remains to be seen.

■ Colombia

Coca leaf production and consumption in Colombia has not been widespread. Historically, coca use was confined to traditional leaf chewing, mostly by Inca-descended peasants of the southern region, where it was produced legally until 1947 (12). Coca production was banned following lengthy public debate about coca's alleged long-term negative health effects and the role it played in promoting exploitation of Indians by

landlords. Coca production was not a public issue again until the late 1970s, when it reappeared in significant quantities, only after development of a cocaine manufacturing industry based on coca leaf imported from Peru and Bolivia (129).

Now, however, Colombian criminal organizations are involved in virtually every aspect of the narcotics trade, from drug plantations and laboratories in Colombia and other South American countries, to smuggling operations and distribution networks at wholesale and street levels in the United States, Canada, and Europe. The entire spectrum of drug exports (marijuana, cocaine, quaaludes, opium) brings nearly U.S. $2.5 to $3 billion a year in profits to Colombia; drugs now rank along with coffee ($2 to $2.5 billion) as the country's principle foreign exchange earner (18). The Medellin and Cali drug trafficking organizations ("cartels") control the bulk of the Andean region's cocaine traffic. They have used their wealth since the mid-1970s to organize private militias, purchase sophisticated weapons, and bribe, intimidate, and terrorize the Colombian justice and political systems. Their money, firepower, and influence have enabled them to seriously impede the evolution of the Colombian government's counternarcotics program in the last decade.

GROWTH OF THE ILLEGAL DRUG INDUSTRY

Developing appropriate counternarcotics policy in Colombia requires an understanding of why cocaine manufacturing, and the illegal drug industry in general, has developed there. While not a completely sufficient explanation, an important factor behind Colombia's "international advantage" in the illegal narcotics industry is that state presence traditionally has been weak. The Colombian Government at times has been unable to control significant areas of the country or enforce its laws, and has been vulnerable to manipulation by interest groups (129).

Like those of its Andean neighbors, Colombia's history is fraught with social and political inequality and instability. Agrarian reform failed in the early 1970s, largely due to the undermining influence of powerful landed and agro-export interests. Urban reform failed because of the intense opposition of real estate, urban construction, and financial interests. The upper ranks of the educational system remained essentially closed and elitist despite repeated "reforms" during the 1960s and 1970s. As land, capital, and credit became more concentrated, and the gap between the rich and poor grew larger, so did the gap between written laws and socially acceptable behavior (17).

Outward signs of Colombia's weakening state were numerous, evidenced by the growing informal economy, and widespread predatory economic behavior and violence. As its economy grew more complex and segmented, the Colombian state took up an increasing number of functions that it performed less and less effectively. Many laws were disregarded, government bureaucracies became inefficient and increasingly unaccountable and unresponsive to the citizenry, and private and public sector corruption grew. As the underground economy expanded, the legitimacy of the regime declined. Drug-related violence and corruption have further undermined the integrity of already weak institutions such as the court system, the police, the customs service, and the military (129).

CURRENT ECONOMIC CLIMATE

The Colombian Government has maintained a resilient and stable economy despite numerous difficulties. Urbanization and income diversification have increased. Colombia did not borrow heavily during the 1970s and, thus, avoided the debt crises that plagued the rest of Latin America (129). With annual GDP growth averaging 3.3 percent from 1981 to 1991, Colombia was also the only country in the region that did not have a year of declining GDP during the 1980s (148). Inflation climbed to 28 percent in 1988 (up from 20 percent in 1984), but dropped to 26 percent in 1990 (47).

Despite positive growth overall, social indicators point to a continuing problem of poverty and lack of opportunity for a large part of the population (47). Colombia's economy is characterized by a high concentration of income and wealth, associated primarily with political privilege and power, and foreign sector booms. Neither innovative entrepreneurship nor accumulation of savings are associated with most private wealth, and property rights are weak (131).

THE COLOMBIAN COCAINE ECONOMY

Drug money's presence and corrupting influence reverberates through the Colombian economy. To estimate the economic impact of the cocaine industry on Colombia and the possibilities for substitution, it is necessary first to determine the order of magnitude of the industry. This requires estimation of domestic consumption and prices, prices of the imported coca paste and chemical products needed to refine cocaine, wholesale export prices, the amounts of the product which are lost to interdiction, and other related factors. The estimation of the Colombian GDP generated by the industry is even more complex because it requires information about value added, and about the income generated outside the country by the Colombian illegal enterprises. While the data to make these estimates can be found, a consensus exists amongst Andean and U.S. experts that they are often extremely weak and inaccurate (129).

Cocaine Economy Data

Although estimates of the size of the cocaine economy vary widely, some trends are apparent. The U.S. wholesale price of cocaine is declining, and the amount produced is increasing. This trend persisted in spite of interdiction and eradication efforts undertaken during the 1980s. In the early 1980s the price of cocaine was high relative to risks involved in the business, so that the incentives to increase output were strong even as prices declined. In this sense, the cocaine output expansion of the 1980s was demand driven (129).

The estimated value of cocaine exports, range between approximately U.S. $1.2 billion to $5 billion depending on the year or source of the estimate. Since Colombian official non-factor service exports fluctuated between the U.S. $4 to $5 billion range, cocaine exports were obviously "large" relative to legitimate exports. However, this does not necessarily mean that the cocaine revenues are brought back to the Colombian economy, and it does not measure the impact of the cocaine industry on the economy (129). Rather, cocaine revenue commonly is invested outside of Colombia, enters the black market, or is invested in domestic ventures that provide little benefit to the Colombian people (66).

Consequences of Drug Industry Growth

While the cocaine industry's impact on Colombia's formal economy cannot be measured accurately, the cocaine industry has had a negative impact on the country's welfare, as well as on its economic growth (129).[7]

First, the cocaine boom of the 1980s has made it increasingly difficult to maintain macroeconomic stability. The drug industry acted as a catalyst to growth of the underground economy, which has become relatively large and impossible to track (132). As the government loses information about real exports and imports, capital flows, and investment, the planning and implementation of economic policies becomes formidable (129).

Second, Colombia's growth record was sign& cantly better in the pre-cocaine era than it is in the post-cocaine era. Investment has been distorted as narcotics businessmen choose investments that

[7]Colombia may have escaped the debt crisis because of the revenues from cocaine exports. However, the history of the rest of Latin America shows that no relationship exists between a primary resource export boom and the ability to avoid a foreign sector crisis. For instance, all the countries of the region that experienced the oil boom during the 1970s also experienced a debt crisis in the 1980s, in spite of the fact that the oil boom was larger relative to the size of their economies than the illegal drug boom experienced by Colombia during the same period (129).

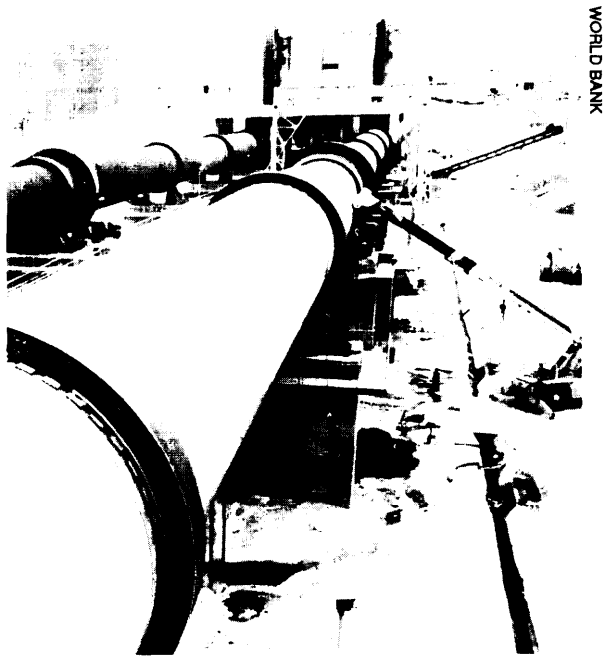
can be used to launder capital and that have a fast turnover, over those that can produce high, long-term yields (132). The increased violence that accompanies the drug industry also imposes a burden on the rest of the economy as security expenses increase in other business activities, lowering their overall productivity.

Third, the large size of the drug industry has produced a struggle for the control of the country, between old monied elite and the newly emerging drug capitalists. Many elite, though attracted by the capital and foreign exchange that drugs generate, nevertheless do not accept drug businessmen as peers (11,124). This conflict also has been at the core of drug-related violence, and is reflected in government policies that have been predominantly reactive-responding to either external forces (U.S. pressure) or to the assassination of national political figures by the drug groups (129).

Fourth, direct employment in coca growing and cocaine production has been unimportant relative to the size of the labor force of the country and, thus, employment is not among the main impacts studied. Instead, most employment generated is believed to be in the "security" branch (e.g., bodyguards, paid assassins, paramilitary), which if anything, has a negative contribution to GDP (129).

Real Estate Construction and Rural Land Investment

Two areas of the domestic economy heavily infiltrated by narcotics investors are real estate and construction. Few sources of nonhousing mortgage funds exist in Colombia; therefore, a substantial proportion of commercial and industrial construction is financed by the informal capital market, short-term bank loans, or personal resources. In recent years, particularly from 1985 on, the amount of new construction financed by mortgage institutions, and the amount of new construction measured by the amount of area for which building permits were issued have deviated markedly. In the absence of formal funding, much of the new construction in Colombia is attributed to narcotics businessmen, whose investments are estimated at approximately $1 billion a year (65).



WORLD BANK

The climate for foreign and domestic investment in Colombia is severely undermined by drug- and guerilla-related violence. The personnel and property of important state and private industries increasingly have been targets of political terrorism.

Narcotics businessmen have invested heavily in urban real estate and construction and real estate and cattle holdings in certain rural areas of Colombia, particularly in the middle Magdalena valley, the Urabá area in Antioquia and the neighboring Córdoba department, and in the eastern piedmont and prairies. These regions have been settled recently, and frequently have land property rights that are still in question (119). Furthermore, they were regions of significant guerrilla activity before narcotics investors moved in (123). Narcotics investors have appropriated their own dairy and cattle plantations, as well as private paramilitary security forces which compete with local guerrilla forces for the rights to "protect" area estates (131).

The involvement of narcotics businessmen in these regions has had a technologically modernizing but socially backward effect (129). Their resources have allowed them to increase the capital intensity of production processes, and introduce new technologies for increasing productivity in beef and dairy. Simultaneously, the paramilitary groups have discouraged political participation among local peasants. Violent land counter-reform has led to increased land concentration, even in areas chosen for official land reform programs. Ironically, rural wages have increased in those areas, perhaps as a result of the higher productivity, and the emigration of rural workers pressed by the increased violence (123).

INCREASING NARCOTICS-RELATED VIOLENCE IN THE 1980s

The narcotics trafficking organizations brought urban and rural violence in Colombia to new heights in the late 1970s and throughout the 1980s, in the form of brutal assaults on the state, guerrilla action, and conflicts between rival drug organizations. Authorities responded with stepped-up military and police repression, which often served only to intensify the country's spiralling violence, multiply human rights abuses, and threaten further the stability of Colombia's democratic regime. In the ensuing cycles of government crack-downs, narcotics-related terrorist retaliations, and uneasy truces, Colombian leadership repeatedly nurtured and then abdicated their country's role as the frontline in Washington's "war' on drugs.

Included in the U.S.-supported counternarcotics effort, along with militarization and eradication (see Chapter 3), was a bilateral treaty for extradition of nationals directly between Colombia and the United States. The rationale was that such a treaty would deter drug lords, reduce narcotics trafficking, improve bilateraI relations, and alleviate the Colombian legal process from the burden of mounting drug-related offenses. Implicit in the agreement, however, was the U.S. Government's lack of confidence in the Colombian justice system. Nevertheless, the Treaty of Extradition was sanctioned in Colombia in November 1980, and ratified by the United States in late 1981 (17).

When the Betancur Administration took office in 1982, it refused to honor the extradition treaty, preferring to try Colombian traffickers in Colombian courts (41). Nevertheless, when successful police interdiction efforts against the Medellin "cartel' prompted the assassination of Betancur's Justice Minister in April 1984, the President signed an extradition order for Medellin leader, Carlos Lehder (17).

Betancur further invoked state-of-siege powers in 1984, announcing a "war without quarter,' which led to an unprecedented number of arrests, raids, and seizures. The success of these preliminary efforts, however, seemed to confirm U.S. Government officials' suspicions that Colombian authorities had more information about drug smugglers' operations than they routinely acted upon (17). Major "cartel' figures avoided the crackdown by fleeing Colombia. Several subsequently offered to negotiate a truce with the Colombian Government, conditional upon their exemption from extradition. Rather than bargain, President Betancur escalated the war. With U.S. Government backing, the Colombian Government extradited 10 Colombians, stepped up eradication programs, and seized more illegal drugs than all previous administrations combined (41).

The campaign was costly, however, for continuing violence between 1981 and 1986, resulted in the murder of more than 50 Colombian judges. It is widely believed in Colombia that the Medellin "cartel" paid guerrillas to seize the Palace of Justice in November 1985. The struggle ended in the deaths of 17 Colombian Supreme Court justices, all the guerrillas involved, and numerous military and police personnel (41).

Not long after President Barco took office, in 1986, a massive wave of army and police raids yielded almost 800 arrests, including three traffickers targeted for extradition. In February 1987,

the government captured and extradited Medellin kingpin Carlos Lehder. Despite the fanfare surrounding Ledher's capture and extradition, the flow of cocaine from Colombia and the wave of drug-related violence in the country were not stemmed. Furthermore, during the same period, eight of nine Colombian guerrilla groups broke the truces they had negotiated with the preceding administration, and, thus, began a new cycle of violent retaliation from the guerrilla and drug organizations (17,41).

The "cartels" mounted an all-out war against extradition, in which they aimed at government officials and judges, in particular. After Medellin assassins killed the Colombian Attorney General, in 1988, the Colombian President instituted state-of-siege measures, built up police forces, and appointed 5,000 new judges and assistants. More violence followed, including the assassination, in 1989, of Liberal politician and 1990 presidential candidate Senator Carlos Galán. Between August 1989 and January 1990,263 bombs were set off throughout Colombia, killing 209 people, and in late 1989 and early 1990, the Medellin "cartel" began a kidnapping campaign aimed at the Colombian elite. Most of the 420 police deaths in 1991 were related to counternarcotics efforts or narcotics-related terrorism (17).

These nationwide terrorist attacks made apparent the narcotics traffickers' ability to disrupt normal life throughout the country. In mid-December, members of the Colombian Congress attached a proposal for a national referendum on extradition to the Barco Administration's constitutional reform bill. President Barco ultimately withdrew the constitutional reform package altogether, but continued to face pressure to end the violence through talks with drug "cartel' members. Barco denied involvement in any such negotiations and, in January 1990, ordered the extradition of another Colombian trafficker. However, after January 1990, extradition efforts were reduced, and narcotics-related terrorism subsided noticeably (17).

WORLD BANK

Colombia's public infrastructure serves a greater portion of its population than does Peru's or Bolivia 's. Recently, however, these services have been threatened by mismanagement and neglect: drought-induced electricity shortages in 1992 wreaked havoc throughout Colombia and heightened political tensions.

The extradition policy dilemma faced in the 1980s is illustrative of two distinct facets comprising Colombia's narcotics problem: domestic violence and terrorism on the one hand, and international trafficking on the other. The security of the Colombian state most directly is threatened by narcotics-related terrorism, not drug trafficking (17). Barco's forceful reaction to the wave of violence that led to the murder of Senator Galán was motivated by the need to defend state security from a clear and present danger. Narcotics-related terrorism was viewed as an urgent Colombian problem that required an immediate response by the government. The international narcotics business, in contrast, was seen as a broader and more complicated problem that could not be solved quickly nor unilaterally by Colombian authorities and policy actions (17). Under the current admin-

istration a new constitution, ratified in 1991, again halted extraditions.

CURRENT POLITICAL CLIMATE

Strengthening and redefining the role of the state in Colombian society is a prerequisite for success of any narcotics-control policy. One significant step begun by the previous administration (Barco 1986-1990) and continued by the current one, was the institution of constitutional reform, which included strengthening the judiciary system and reforming the legal system. The Gaviria Administration also focused its efforts on accelerating the opening of the economy to foreign trade and investment, and broadening the political legitimacy and popular support of the state. In August 1991, the maximum tariff for most imports was reduced to 23 percent. On many other items, tariffs were reduced to zero, severely undermining g Colombia's once thriving contraband trade (17).

However, the economic *aperatura* (opening) has not been problem-free: interest rates have stayed high and the process has encouraged the re-entry of drug money. Another tax reform, granting amnesty to those who had illegally acquired assets and who had income abroad, was implemented in late 1991, to complement the elimination of the exchange control system (129). Foreign exchange reserves in 1991 alone grew by almost U.S. $2 billion, of which 60 percent is believed to be drug money (17).

Since the Gaviria Administration took office in August 1990, the dynamics of the drug problem in Colombia once more have come full circle. For a time, the narcotics-related terrorism of the late 1980s subsided, and many major figures of the Medellin "cartel" were in jail. Of the country's principle guerrilla groups, all but two had negotiated peace treaties with the government and were actively engaged in legal political activities. However, in mid-1992, widespread guerrilla and narcotics-related violence resumed. To the chagrin of the Colombian government, their most prominent state prisoner, Medellin drug leader Pablo Escobar, escaped. Terrorist attacks in rural and urban areas by Colombian guerrilla groups had been on the rise, and Escobar's escape coincided with a resurgence of narcotics-related terrorism. In November, 1992, the Colombian Government instituted a W-day state of emergency (55).

CONCLUSION

The Colombian President proposed steps at the Cartagena II Drug Summit, held in San Antonio in early 1992, to improve international cooperation to halt the flow of precursor chemicals for cocaine processing, control arms trafficking, curb international money laundering of drug profits, and improve judicial and law enforcement cooperation in the area of counternarcotics intelligence gathering and evidence sharing. Additionally, the Colombian Government has made efforts to democratize, and in general, to promote an economy in which profits are not associated with privilege and predatory capitalism. Unfortunately, reforms of this nature bear fruits in the medium and long term, and face many obstacles in the short run. As in Bolivia, entrenched economic and political groups that benefit from the current conditions will oppose any significant changes. Cooperation in foreign trade, economic assistance, and several types of technical assistance are needed (17).

Many Colombians believe that the influence of Colombia's drug "cartels" has continued to spread through the economic and political systems; and recent events like Escobar's escape suggest that drug trafficking activities continue largely unchecked in Colombia. When these problems are set in the context of Colombia's reduced economic growth, trend toward declining economic productivity, continuing widespread rural poverty, and infrastructural bottlenecks to the expansion of legal export agriculture, it is clear the Colombian Government and citizens face serious threats to social and political stability in the 1990s. Colombia remains one of the most violent countries in the hemisphere (e.g., murder is the leading cause of death in males aged 15 to

44, and overall second leading cause for all Colombians) and there has been no overall reduction in the number of Colombians killed in political and criminal violence (17,18).

Finally, the illegal drug industry in Colombia has continued to diversify. Although illegal drug cultivation in Colombia is not an especially profitable business, social and political factors, not economic imperatives, constitute the main impediments to the implementation of government-sponsored alternative development strategies. The conditions in some areas, such as the impoverished and badly neglected Southern Cauca regions, where marijuana is grown, add increasing urgency to the search for alternative development options for Colombia's rural poor.

Until viable economic alternatives are created for the poorer peasantry in rural areas, coca cultivation and, now, the opium poppy trade are likely to spread, bringing with them increasing levels of violence and corruption. Furthermore, most of the opium fields are believed to be in areas under the influence of the guerrillas groups with which the government has yet to negotiate peace. Partly because of the growing heroin industry, many observers doubt that peace talks will be successful soon. Even if a peace treaty is negotiated, a high risk exists that many factions of the two rebel groups could continue fighting as bandits or terrorists, using funds derived from their links in the heroin trade (17).

THE COCA ECONOMY

Nowhere, perhaps, is the social and economic importance of the coca industry more significant than at the local supply, or micro-level. Small-scale coca growers and coca-leaf processors and traffickers are the trade's principal dependents. Predictably, they remain at the bottom of the illegal industry's pay scale, and they are the least well represented actors in supply reduction efforts. Many international narcotics policymakers suggest that if the monetary value of coca could be sufficiently diminished, coca growers would voluntarily leave the coca trade for alternative crops (135). This overlooks many, less-direct circumstances that are promoting and perpetuating coca cultivation. The size and importance of the coca economy among small-scale industry-related producers, processors, and transporters clearly determine opportunities and constraints to source reduction at the microeconomic level.

Difficulties Establishing the Size of the Coca Economy

Gathering agricultural data for any crop in the Andean region is difficult for a variety of reasons, including: 1) diversified geography and topography, 2) variation in types of agricultural units, agricultural farming systems, and productivity levels, 3) wide dispersion of agricultural units, and 4) inadequate funding and personnel to develop official agricultural data. The remote nature of production regions, their inaccessibility, and dangerous trafficker or guerrilla presence further compound data gathering problems (5).

Establishing annual coca industry price estimates is hampered by frequent market price adjustments at the macro-economic level, and because the coca industry is so segmented, price variation often can be traced to a regional level as well. Variation may depend on a industry participants' "business connections." For example, growers, processors, or transporters from unconnected or unestablished regions likely will receive lower prices.[8] Thus, to arrive at a reasonably accurate price estimate, researchers would be required first to pool the prices posted from innumerable markets, and then to adjust these prices relative to the size of each particular market segment (131).

[8] An example of region- and, even, individual-specific price variation found in Peru, results from *Sendero Luminoso's* use of quotas. The *Sendero* charges quotas from transporters and peasant growers according to various criteria. The quotas in *Sendero*-controlled regions, have a direct adverse impact on the incomes of local producers, as well as an adverse, albeit indirect impact on local market prices (15).

Estimates of the size of the coca economy also vary with different assumptions regarding yield, geographical scope, number of hectares involved, different prices at different stages and, in particular, overall inaccurate knowledge about the underground "industry." This latter factor forces analysts to make arbitrary assumptions which may or may not reflect the changing reality of the cocaine industry (5). Researchers have labored since the early 1980s to calculate and report the size of the population employed and/or estimate the value of coca earnings by participants in the various stages of its cultivation and transformation. These numbers vary over years and across surveys. It is enormously difficult to collect accurate information for such figures.

Importance of Coca Production at the Macroeconomic Level

A former Finance Minister of Bolivia stated that if the narcotics industry were to disappear overnight, the result would be rampant violence and unemployment. Indeed, as a relatively stable source of income and employment, the cocaine industry has cushioned the blow of poverty for many in the Andes. The cocaine industry provided work for between 750,000 and 1.1 million people in Bolivia, Peru, and Colombia according to some 1988 employment estimates (58).

The cocaine industry comprises a large assortment of workers, who have assumed a variety of occupational and socio-economic niches. The three principal categories of the locally employed are:

- Those involved in coca cultivation, whether as plantation and land owners, farmers and their families, migrant laborers, or fertilizer and pesticide merchants;
- Those involved in coca paste and cocaine processing, such as laboratory owners, their hired "chemists," pit laborers, and armed guards, and those who trade in leaf-processing and paste-processing materials and chemical ingredients;
- Participants in the transport of coca, processing ingredients, and paste and cocaine, including local manufacturers, suppliers, traders, and haulers, international dealers and associated transport vehicle and small aircraft owners and operators, airfield security guards, bribed government abettors, and directly and indirectly employed legal and financial advisers (75).

Table 2-8-Percentage of the Mid-1990 Wholesale Value of a Kilogram of Cocaine Received at Successive Stages of Activity

Stage	Bolivia	Colombia	Peru
Coca leaf	43%	NA[a]	1.80%
Coca paste	2.12	NA	2.01
Cocaine base	3.29	3.29	2.53
Cocaine hydrochloride	10.70	5.80	19.50
Miami wholesale level cocaine hydrochloride (U.S. $20,500/kg)	100%	1 00%	100%

a Colombian organizations or cooperative ventures process coca leaves directly into cocaine base. Leaves are not usually sold separately.

SOURCE: Adapted from U.S. Department of Justice, Drug Enforcement Administration, "From the Source to the Street: Mid-1990 Prices for Cannabis, Cocaine, and Heroin--Special Report," Intelligence *Trends* (Washington, DC: U.S. Department of Justice, 1990).

No more than 1 or 2 percent of the fina1 coca revenue is enjoyed by coca growers. Instead, coca-product prices increase substantially at each marketing stage, with value added more so for the risk involved than for actual processing or transportation costs (131). In producing the smallest proportion of raw coca, but refining and transporting the highest proportion of cocaine bound for the United States and elsewhere, Colombians historically have obtained the lion's share of the illegal drug profits (table 2-8) (129).

Some trafficker networks establish close ties with coca growers in specific regions, and provide them with seeds, tools, suppliers' credits, and other forms of assistance that obligate the farmers to sell their crops exclusively to the traffickers sponsoring them. The traffickers use these patron-client relations to wield considerable social and

political control in some coca-growing regions. Like the insurgent groups with whom they may compete in Colombia and Peru, traffickers are able to limit the state's ability to execute alternative development projects in coca growing areas. The traffickers have brought jobs and higher income to otherwise impoverished zones of some Colombian and Peruvian rural communities long-neglected by the government. As a result, traffickers in some of these areas commonly are sheltered and protected from police and other authorities (17).

SIZE OF THE COCA-COCAINE INDUSTRY

Conservative employment estimates in early 1990 for Peru's illegal coca industry (based on a survey of 60,000 families) suggested that 200,000 people, or 3 percent of the total population of Peru, may be directly employed by coca activities (50). The figure would be higher if indirect employment were considered (6). In Bolivia, an estimated 120,000 people labored in the drug industry in 1990, or about 1.7 percent of the total population (50). However, a wide range of estimates are available concerning most aspects of the coca economy's size and value (table 2-9). Given Peru's and Bolivia's cocaine industry employment estimates, the number of Colombian's employed is negligible, an arbitrary estimate being about 50,000, or no more than 0.2 percent of Colombia's total population (130). Nevertheless, the U.S. Department of State estimates suggest that there were 40,100 hectares of coca in Colombia in 1990; this represents 18.8 percent of the total area cultivated in the Andean countries. Colombia produces about 13.7 percent of the coca leaf volume, a share that has been increasing continuously during the last decade (129).

EARNINGS AT THE MICRO-ECONOMIC LEVEL

Although information on coca farmers' earnings are scattered and commonly anecdotal, the contrasts between annual income from illegal coca production and any other source of income are marked. AID estimated in 1989 that $375 million in coca profits went to small-scale cultivators, paste producers, and wage laborers, whereas legal crops brought in no more than $50 million (89). U.S. Government sources report that coca-leaf prices remained fairly stable, at an average of $3 to $4/kilogram, throughout the 1980s (89). While an average Bolivian worker's income was approximately U.S. $600 a year, a Chapare coca farmer's earnings were up to U.S. $5,500 a year (28).

The earning opportunities for migrant and day laborers are also impressive. For example, in Peru migrant farmers were earning U.S. $16 a day picking coca, whereas rice field laborers collected only $3 a day (133). Similar disparities also occur

Table 2-9--Range of Estimates of the Importance of Coca in Bolivia (1989) and Peru (1988)

	Bolivia	Peru
Coca production value (millions $U.S.)	313-2,300	869-3,000
Coca exports (millions $U.S.)	132-850	688-2,100
Total income (millions $U.S.)	246-442	743-1,200
Total employment (thousands)	207-463	145-700
Area of coca production (hectares)	35,000-55,400	115,530-166,500
Share of coca economy relative to legitimate' (percent)		
GDP	6-19%	2-11%
Exports	15-98	14-78
External debt .,	7-25	3-18

a For Bolivia: totals for 1989 were GDP, U. S.$4,494 million; exports, U. S.$868 million (includes goods and services); and total external debt, U. S.$3,420.2 million. For Peru: totals for 1988 were GDP, U.S. $28,200 million; exports, U.S.$16,494 million; and external debt, U. S.$2,691 million.

SOURCES: Adapted from E. Alvarez, "Opportunities and Constraints to Reduce Coca Production: The Macroeconomic Context in Bolivia and Peru," contractor report prepared for the Office of Technology Assessment, March 1992; R. Henkel, "The Cocaine Problem," Bolivia *After Hyper Inflation: The Restructuring of the Bolivian Economy* (Tempe, AZ: Arizona State University, Canter for Latin American Studies, 1990); R. Henkel, "Coca Cultivation, Cocaine Production, and Peasants in Bolivia," presented at the annual meeting of the Association of American Anthropologist, Washington, DC, November 1989; U.S. Department of State, Bureau of International Narcotics Matters, International Narcotics Control Strategy Report (Washington, DC: U.S. Department of State, 1991).

in urban wages. For instance, in 1986, a seasonal coca plantation worker in Monson or Uchiza, Peru, might earn a daily minimum wage of U.S. $2 or $3, respectively, in addition to room and board. These wages were significantly higher than the U.S.$1.60 daily minimum wage paid to the unskilled industrial laborers in Lima (106). Figures in 1989 were reported as follows: day laborers could expect about U.S. $12 a day ($3,600/year); and cultivators/owners a gross of U.S. $3900/hectare a year. On average, coca laborers could earn from 2.5 to 8 times more than other laborers; and coca farmers and coca field owners, from 3 to 11 times more than their law abiding counterparts (89). Although coca production employs a predominantly unskilled class of laborers, they may receive 20 times more than public employees, and 3 to 5 times what they would earn in their home departments (50).

Information on wages is sketchier for small-time participants in other sectors of the coca and coca-product industry. Nevertheless, the following breakdown of the highly lucrative kerosene trade in Bolivia illustrates the increase of value as it enters the black market. In 1985, a 5-liter daily ration of kerosene was routinely resold on the black market for about 20 times its original value. In the Chapare, its black market price could again double or triple (75). Meanwhile, the salary for paste transport was usually U.S. $2.00 per arroba (approximately 11 1/2 kilograms), resulting in an average day's earnings of about U.S. $8, an amount 500 percent greater than the average $1.60 minimum wage for a Lima laborer (106).

CONCLUSION

As sociocultural, political, and economic circumstances in the Andean region suggest, differing U.S. and Andean interests that have long hindered cooperation on the drug front are not likely to be resolved soon. Bilateral cooperation on anti-drug policies is hinged less on straightforward agreement than on rhetoric, tension, and protracted negotiation (100).

Coca generates high incomes because it is illegal, (i.e., the market has to pay a premium to the producers involved for the risk associated with it). Coca-leaf products, in addition, are high value/low volume commodities that cover high transportation costs particularly where transportation is primitive. Legal crops cannot command a comparable premium under these conditions. Thus, coca has been incorporated as part of a portfolio of crops, in which it is the chief cash crop (5).

Because of the coca economy's size, it may not be realistic to believe that alternative crops will be enough to substitute for coca in the short or even the medium run. Coca remains the best alternative for many farmers and, if its price declines, growers always have the option of simply leaving the leaves on the bush until the price improves. Interdiction activities have helped lower the price of coca in the past, but without adequate demand control, industry participants are assured that higher prices eventually will return (4).

Other important considerations for long-term coca substitution include:

- *Creating secure economic opportunities*—Growers already obtain the smallest piece of the cocaine industry pie. While artificially created coca-price declines such as those created by interdiction activities cause some growers to find other sources of income to offset their losses (coca paste and base processing, in some cases), they do not provide long term solutions. The need to diversify agricultural activity is recognized by growers (5). Crop substitution and alternative development may not have to replace coca income on a dollar-for-dollar basis, if they create a safer and more stable social and economic environment.
- *Diminishing comparative advantage—The* Bolivian, or Huánuco, variety of coca has a high cocaine alkaloid content and grows successfully in the Chapare and Alto Huallaga. However, features that further contrib-


UNKNOWN

In a seemingly timeless tradition, young, unemployed men migrate to the Bolivian Chapare to find work in the coca trade.

ute to the ''comparative advantage' of producing coca in these areas are twofold: 1) their ecological conditions, and 2) their remoteness. The latter, creates difficulties first for policing illegal activity and second for profitability of other livelihoods. Although it would be undeniably useful to drug traffickers, developing and improving transportation infrastructure in the Chapare and Alto Huallaga areas would, in particular, improve the profit potential of alternative crops and resources vis-á-vis coca by facilitating their internal and external movement and marketability.

- *Reinforcing the role of the state—In* general, strengthening the state's presence and role in producing public goods and services would contribute to alternative development. There are a number of things the Andean countries can do to increase the standard of living of agricultural producers that the coca industry does not. The national government, through help from the international community, could provide potable water, access to basic health care, electricity, and better schools. These are basic preconditions for almost any type of successful economic development.
- *Fostering equity and political stability--* Alternative development strategies that target populations at the bottom of the scale of income distribution need to be applied to the agricultural sectors of Bolivia, Peru, and Colombia. The neglected rural peasant populations long have been a major target group for the guerrilla organizations' membership expansion, as well as being primary illegal drug cultivators. Increased stability in the Andean states likely will require improvements in the standard of living of rural populations.

The U.S. and Andean Governments have differed with respect to the correct ratio of "sticks" (repression of drug production and trafficking) to "carrots' (economic support and development assistance). Drug policymakers across the board have thus far been unable to fashion a realistic, consensus-based, multilateral, long-term approach to address demand and supply sides of the drug equation effectively. Although difficult, no other approach is likely to offer anything but temporary and partial victories on specific battle fronts in an overall failing effort. Profound changes are probably needed in the economic and social structure and public policy of the United States and Latin America, yet these changes are unlikely to be achieved quickly and cheaply, and certainly not by law enforcement and military tactics alone (17).

CHAPTER 2 REFERENCES

1. Albó, X., and Barnadas, J. M., La *Cara Campesina e Indígena de Nuestra Historia* (La Paz, Bolivia: UNITAS, 1985), In: Healy, 1992.
2. Alford, D., "The Geoecology and Agroecosystems of the Northern and Central Andes," contractor report prepared for the Office of Technology Assessment, March 1991.

3. Allen, *C., The Hold Life Has: Coca and Cultural Identity in an Andean Community* (Washington, DC: Smithsonian Institution Press, 1988), In: Reeve, 1991.
4. Alvarez, E., economist, State University of New York, Albany, NY, personal communication, May 1992.
5. Alvarez, E., "Opportunities and Constraints to Reduce Coca Production: the Macroeconomic Context in Bolivia and Peru," contractor report prepared for the Office of Technology Assessment, March 1992.
6. Alvarez, E., ''Reasons for the Expansion of Coca Exports in Peru," U.S. Congress, Senate Permanent Subcommittee on Investigations, Committee on Governmental Affairs, *Cocaine Production, Eradication, and the Environment: Policy, Impact, and Options, Proceedings* of a Seminar Held by the Congressional Research Service--February 14, 1990, Senate Print 101-110 (Washington, DC: U.S. Government Printing Office, 1990), pp. 67-79.
7. Alvarez, E., *Política Económica y Agricultura en el Perú, 1969-1979* (Lima, Peru: Instituto de Estudios Peruanos, 1983), In: Painter and Bedoya, 1991a.
8. Antognini, J., Research Leader, Tropical Science and Research Lab, U.S. Department of Agriculture, '' Remarks,' U.S. Congress, Senate Permanent Subcommittee on Investigations, Committee on Governmental Affairs, *Cocaine Production, Eradication, and the Environment: Policy, Impact, and Options, Proceedings* of a Seminar Held by the Congressional Research Service—February 14, 1990, Senate Print 101-110 (Washington, DC: U.S. Government Printing Office, 1990), p. 3.
9. Aramburú, C., ''Problemática Social en las Colonizaciones." *Población y Colonización en la Alta Amazonía Peruana* (Lima, Peru: Consejo Nacional de Población [CNP] y Centro de Investigación y Prornoci6n Amazónica [CIPA], 1984), In: Painter and Bedoya, 1991a.
10. Aramburú, C., Alvarado, J., and Bedoya, E., La *Situación Actual del Crédito en el Alto Huallaga* (Lima, Peru: INANDEP, 1985), In: Painter and Bedoya, 1991a.
11. Arango, M. (ed.), *Impacto del Narcotráfico en Antioquía, 3rd Ed.* (Medellin, Colombia: n.p., 1988), In: Thoumi, 1992.
12. Arango, M., and Child, J., *Narcotráfico: Imperio de la Cocaína (Mexico* City, Mexico: Editorial Diana, 1987), In: Thoumi, 1992.
13. Ardila, P., "Beyond Law Enforcement: Narcotics and Development, " The Panes Institute, February 1990, pp.1-8.
14. Armstead, L., *Illicit Narcotics Cultivation and Processing: The Ignored Environmental Drama,* United Nations Intentional Drug Control Programrne, May 1992.
15. Arroyo, A., and Medrano, O., ''Huallaga in Flames," *CARETAS*, August 13, 1992, pp. 30-37, In: *Terrorism,* JPRS Report, JPRS-TOT-92-029-L (Washington, DC: Foreign Broadcast Information Service/Joint Publication Research Service, 1992).
16. Arthur, H., Houck, J., and Beckford, G., *Tropical Agribusiness Structures and Adjustments—Bananas,* Harvard University, School of Business Administration (Boston, MA: 1968), In: Alford, 1991.
17. Bagley, B., "Coca Eradication and Crop Substitution in Colombia," contractor report prepared for the Office of Technology Assessment, April 1992.
18. Bagley, B., "Colombia and the War *on Drugs, " Foreign Affairs,* 67(1):70-92, *1988.*
19. Barraclough, S., *Agrarian Structure in Latin America* (Lexington MA: DC Heath and Co., 1973), In: Alford, 1991.
20, Bascopé Aspiazu, R., *La Veta Blanca: Coca y Cocaína en Bolivia* (La Paz, Bolivia: n.p., 1982), In: Painter and Bedoya, 1991a.
21. Basile, D. G., *Tillers of the Andes: Farmers and Farming in the Quito Basin, Studies in* Geography, No. 8 (Chapel Hill, NC: University of North Carolina, Department of Geography, 1974), In: Alford, 1991.
22, Bastien, J., *Healers of the Andes: Kallawaya Herbalists and Their Medicinal Plants* (Salt Lake City, UT: University of Utah Press, 1987), In: Reeve, 1991.
23. Bastien, J., *Mountains of the Condor: Metaphor and Ritual in an Andean Ayllu* (St. Paul, MN: West Publishing Co., 1978), In: Reeve, 1991.

24. Bedoya, E., "Intensification and Degradation in the Agricultural Systems of the Peruvian Upper Jungle," P.D. Little and M.M. Horowitz (eds.), *Lands at Risk in the Third World* (Boulder, CO: Westview Press, 1987).
25. Bedoya, E., *La Destrucción del Equilibrio Ecológico en las Cooperatives del Alto Huallaga*, Serie Documento CIPA No. 1 (Lima, Peru: 1981), In: Painter and Bedoya, 1991a.
26. Beek, K. J., and D.L. Baramo, "Nature and geography of South American soils," E.J. Pittkau, et al. (eds.), *Biogeography and Ecology in South America (The* Hague, the Netherlands: Dr. D.W. Junk Publishers, 1968), pp. 82-112, In: Alford, 1991.
27. Belaúnde, F. *Peru's Own Conquest.* (Lima, Peru: American Studies Press, 1%5), In: Painter and Bedoya, 1991a.
28. Bird, B., "Christians Who Grow Coca. *Christianity Today* 33(12):40-43, *1989.*
29. Bolton, R., "Andean Coca Chewing: A Metabolic Perspective," *American Anthropologist* 78(3):630-634, *1976, In:* Reeve, 1991.
30. Bray, W., and Dollery, C., "Coca Chewing and High Altitude Stress: A Spurious Correlation, " *Current Anthropology* 24(3):269-282, *1983, In:* Reeve, 1991.
31. Brush, S. B., "The Natural and Human Environment of the Central Andes," *Journal of Mountain Research and Development* 2(1):19-38, *1982, In:* Alford, 1991.
32. Brush, S., *Mountain, Feild, and Family: The Economy and Human Ecology of an Andean Valley* (Philadelphia, PA: University of Pennsylvania Press, 1977), In: Alford, 1991.
33. Buenaventura, M., "Victims of the Drug Trade,' U.S. Congress, Senate Permanent Subcommittee on Investigations, Committee on Governmental Affairs, *Cocaine Production, Eradication, and the Environment: Policy, Impact, and Options, Proceedings* of a Seminar Held by the Congressional Research Service—February 14, 1990, Senate Print 101-110 (Washington, DC: U.S. Government Printing Office, 1990), pp. 143-148.
34. Burchard, R., "Una Nueva Perspective Sobre la Masticaci6n de la Coca. " J. Boldó e I. Clement (eds.), *La Coca Andina: Visión Indígena de una Planta Satanizada.* (Mexico City, Mexico: Instituto Indigenista Interamericano, 1986), In: Reeve, 1991.
35. Burchard, R., "Coca y Trueque de Alirnentos," G. Alberti and E. Mayer (eds.), *Reciprocidad e Intercambio en los* Andes *Peruanos* (Lima, Peru: Instituto de Estudios Peruanos, 1974), In: Reeve, 1991.
36. Burgos, H., "Adiós a las Aulas: del Ajuste Económica al 'Shock' Educative," *QueHacer*, No. 73:36-56, 1991.
37. Caballero, J.M., and Alvarez, *E., Aspectos Cuantitativos de la Reforma Agraria (1969-1979)* (Lima, Peru: Instituto de Estudios Peruanos, 1981), In: Alvarez, 1992.
38. Camino, A., "Coca: del Uso Traditional al Narcotráfico," D. García-Sayán (cd.), *Coca, Cocaína, y Narcotráfico: Laberinto en 10S Andes* (Lima, Peru: Comisi6n AndinadeJuristas, 1989), pp. 91-108, In: Reeve, 1991.
39. Carter, W.E., Parkerson, P., and Mamani, M., "Traditional and Changing Patterns of Coca Use in Bolivia," F. Jerí (cd.), *Cocaine 1980: Proceedings of the Interamerican Seminar on Coca and Cocaine. (Lima,* Peru: Pacific Press, 1980), In: Reeve, 1991.
40. CENCIRA, "Diagn6stico Socio-Econ6mico de la Colonización Tingo María-Tocache-Campanilla," (Lima, Peru: 1973), In: Painter and Bedoya, 1991a.
41. Claudio, A., "United States-Colombia Extradition Treaty: Failure of a Security Strategy," *Military Review* 71:69-77, 1991.
42. Clawson, D.L., "Genetic Diversity of Staple Food Crops in Subsistence Tropical Agriculture," 79th Annual Meeting of the Association of American Geographers, Los Angeles, CA, 1981, In: Alford, 1991.
43. Clawson, D.L., and Crist, R.E., "Evolution of land-use patterns and agricultural systems," *Journal ofMountain Research and Development* 2(3):265-272, *1982, In:* Alford, 1991.
44. Conaghan, C., Malloy, J., and Abugattas, L., "Business and the 'Boys': The Politics of Neoliberalism in the Central Andes," *Latin American Research Review* 25(2):3-30, 1990, In: Alvarez, 1992.

45. Crabtree, J., Duffy, G., and Pearce, J., *The Great Tin Crash: Bolivia and the World Tin Market* (London, England: Latin America Bureau, Research and Action, Ltd., 1987), In: Painter and Bedoya, 1991a.
46. Crist, R. E., and Nissly, C. M., *East from the Andes* (Gainesville, FL: University of Florida Press, 1973), In: Alford, 1991.
47. Cuellar, F. H., ''Incidencia del cultivo de coca en la economía Colombian y comparaci6n con 10S cases de Perú y Bolivia,' (Santafe de Bogotá, Colombia: Instituto Interamericano de Cooperaci6n para la Agricultural, 1991).
48. Dandier, J., "Campesinado y Reforrna Agraria en Cochabamba (1952-1953): Dinámica de un Movimiento Campesino en Bolivia," F. Calder6n and J. Dandier (eds.), *Bolivia: La Fuerza Histórica del Campesinado*, (Cochabamba, Bolivia: Centro de Estudios de la Realidad Ecónomica y Social and UNRISD, 1984), In: Painter and Bedoya, 1991.
49. Dandier, J., ''Sindicalismo Campesino en Bolivia,' *Cambios Estructurales en Ucaren, 1935-52* (Cochabamba, Bolivia: Centro de Estudios de la Realidad Económica y Social, 1983), In: Healy, 1992.
50. DeFranco, M. and Godoy, R., "Economic Consequences of Cocaine Production in Bolivia: Historical, Local, and Macroeconomic Perspectives," Harvard University (Boston, MA: 1990).
51. Direcci6n Nacional de Reconversion Agrícola (DIRECO), *Programa de Reconversión Agrícola* (Cochabamba, Bolivia: Ministerio de Asuntos Campesinos y Agropecuarios, Subsecretaría de Desarrollo Alternative, DIRECO, 1988), In: Painter and Bedoya, 1991a.
52. Doherty, C.J., ''Lawmakers Support Decision to Halt Funding for Peru," *Congressional Quarterly* 50(15):961, 1992.
53. Dourojeanni, M., ''Impactos Ambientales del Cultivo de Coca y la Producci6n de Cocaína en la Amazonía Peruana,' F.R. Leon and R. Castro de la Mata, (eds.) *Pasta Básica de Cocaína: Un Estudio Multidisciplinario* (Lima, Peru: Centro de Informaci6n y Educación Para la Prevenci6n del Abuso de Drogas, 1989) pp. 281-299.
54. Duke, J., "Crop Diversification in Lowland Bolivian Hills, " *Hill Lands, Proceedings* of the 1976 International Symposium, West Virginia University (Morgantown, WV: 1979), pp. 331-335.
55. "Emergency, Emergency," *The Economist 325* (785):45, *1992.*
56. ''Peru and its Neighbors,'' *The Economist* 323(760): 44, 1992.
57. ''Getting Away with It,'' *The Economist* 323 755): 44, 1992.
58. "The Cocaine Economies, Latin America's killing fields," *The Economist,* October 8,1988, pp. 21-24.
59. Eidt, R.D., "The climatology of South Amerca,' E.J. Pittkau, et al. (eds.), *Biogeography and Ecology in South America (The* Hague, the Netherlands: Dr. D.W. Junk Publishers, 1968), pp. 54-81, In: Alford, 1991.
60. Estudios Andres Ibanez, *Tierra, Estructura Productiva, y Poder en Santa Cruz* (La Paz, Bolivia: Estudios Andres Ibanez, 1983), In: Healy, 1992.
61. Feder, E., *The Rape of the Peasantry (New* York, NY: Doubleday and Co., 1971), In: Alford, 1991.
62. Federation of American Scientists (FAS), *The Sendero File* (Washington, DC: FAS Fund's Project for Peru, 1992).
63. Fondo International de Desarrollo Carnpesino, Centro de Estudios Para el Desarrollo Laboral y Agrario, ''Propuesto Para Una Estrategia de Desarrollo Rural de Base Campesino,' *Informe Especial de Programmación de Bolivia, vol. 1 y 2* (La Paz, Bolivia: 1985), In: Healy, 1992.
64. Fuchs, A., "Coca Chewing and High-Altitude Stress: Possible Effects of Coca Alkaloids on Erythropoiesis,'' *Current Anthropology* 19(2):277-282, 1978, In: Reeve, 1991.
65. Giraldo, F., ''Narcotráfico y Construcci6n," *Economía Colombiana* N. 226-227:38-39, 1990, In: Thoumi, 1992.
66. G6mez, H. J., "El Tamaño del Narcotráfico y Su Impacto Econ6m.ice," *Economía Colombian N.* 226-227:8-17, 1990, In: Thoumi, 1992.
67. Gonzales, J.A., President, Peruvian-U.S. Chamber of Commerce of Florida, Inc., "Prepared Statement," Hearings, House Ways and Means Committee, Sub-Committee on Trade, 25 July 1991.
68. Gonzales de Olarte, E., *Una Economía Bajo Violencia*, Working Paper No. 40 (Lima, Peru:

Instituto de Estudios Peruanos, 1991), In: Alvarez, 1992.

69. Gonzales Manrique, J., "Peru: Sendero Luminoso en el Vane de la Coca, ' D. Garcia-Say/in (cd.), *Coca, Cocaína, y Narcotráfico: Laberinto en 10S Andes* (Lima, Peru: Comisión Andina de Juristas, 1989), In: McClintock, 1992.
70. Gorriti, G., "Mouse Trap," *The New Republic* 206(18):14-15, *1992.*
71. Gorriti, G. *Sendero. Historia de la Guerra Milenaria en el Perú* (Lima, Peru: Apoyo, 1990), In: Alvarez, 1992.
72. Hanna, J., "Coca Leaf Use in Southern Peru: Some Biosocial Aspects," *American Anthropologist* 76(2):281-296, *1974, In:* Reeve, 1991.
73. Harris, O., and Albó, X., *Monteras y Guardatojos: Campesinos y Mineros en el Norte de Potosí* (La Paz, Bolivia: CIPCA, 1984); originally published 1974, In: Painter and Bedoya, 1991a.
74. Healy, K., "The Bolivian Sociopolitical Context for Rural Development," contractor report prepared for the Office of Technology Assessment, 1992.
75. Healy, K., ''Coca, the State, and the Peasantry in Bolivia, 1982- 1988," *Journal of Interamerican Studies and World Affairs,* Special Issue, 30(2-3):105-126, 1988.
76. Healy, K., "The Boom Within the Crisis: Some Effects of Foreign Cocaine Markets on Bolivian Rural Society and Economy," D. Pacini and C. Franquemont (eds.), *Coca and Cocaine: Effects on People and Policy in Latin America,* Cultural Survival Report #23 (Peterborough, NH: Transcript printing Company, 1986), pp. 101-143.
77. Heath, D. B., ''Land Reform and Social Revolution in Eastern Bolivia," H.C. Beuchler, C. Erasmus, and D.B. Heath (eds.), Land *Reform and Social Revolution in Bolivia (New* York, NY: Praeger Publishers, 1969), In: Painter and Bedoya, 1991a.
78. Heaton, L., *The Agricultural Development of Venezuela (New* York, NY: Praeger Publishers, 1969), In: Alford, 1991.
79. Henkel, R., "The Cocaine Problem," *Bolivia After Hyper Inflation: The Restructuring of the Bolivian Economy* (Tempe, AZ: Arizona State University, Center for Latin American Studies, 1990).
80. Henkel, R., "Coca Cultivation, Cocaine Production, and Peasants in Bolivia,'' presented at the annual meeting of the Association of American Anthropologists, Washington, DC, November 1989.
81. Hockstader, L., ''Peruvian President Takes Case to OAS,'' *The Washington Post,* May 18,1992, p.A12.
82. Hurtado, O., *Political Power in Ecuador,* Mill, *N.* (trans.) (Albuquerque, NM: University of New Mexico Press, 1980, In: Alford, 1991.
83. Instituto Cuanto, *Ajuste y Economía Familiar: 1985-1990* (Lima, Peru: 1991), In: Alvarez, 1992.
84. James, D.E., "The Evolution of the Andes," *Scientific America* 229(2):60-69, *1973, In:* Alford, 1991.
85. Jerí, F.R., "Coca Paste and Cocaine Abuse in Peru: Associations, Complications, and Outcomes in 389 patients, " in E. Morales (cd.) *Drugs in Latin America,* Studies in Third World Societies #37 (Williamsburg, VA: College of William and Mary, 1986) pp. 149-162, In: Reeve, 1991.
86. Jerí, F. R., *La Epidemia de Pasta de Coca en America del Sur,* Campana Educativa Sobre Estupifacientes (La Paz, Bolivia: n.p., 1982), In: Reeve, 1991.
87. Kraljevic, I.J., "Migration, Social Change and the Coca/Cocaine Economy in Bolivia" contractor report prepared for the Office of Technology Assessment, February 1992
88. Lago, R., "The Illusion of Pursuing Redistribution Through Macropolicy. " R. Dombusch and S. Edwards (eds.), *The Macroeconomics of Populism in Latin America* (Chicago, IL: The University of Chicago Press, 1991), In: Alvarez, 1992.
89. Laity, J., "The Coca Economy in the Upper Huallaga,'' (Lima, Peru: U.S. Agency for International Development, 1989).
90. Larrain, F., and Sachs, J.D., "International Financial Relations," C.E. Paredes and J.D. Sachs (eds.), *Peru's Path to Recovery* (Washington, DC: Brookings Institution, 1991), In: Alvarez, 1992.
91. Larson, B., *Colonialism and Agrarian Transformation in Bolivia: Cochabamba 1550-1900*

(Princeton, NJ: Princeton University Press, 1988), In: Painter and Bedoya, 1991a.

92. Lauer, W., "Ecoclimatological Conditions of the Paramo Belt in the Tropical High Mountains," *Journal of Mountain Research and Development* 1(3-4):209-221, 1981, *In:* Alford, 1991.
93. Ledec, G., and Goodland, R., "Epilogue: An Environmental Perspective on Tropical Land Settlement. " D.A. Schumann and W. Partridge (eds.) *The Human Ecology of Tropical Lund Settlement in Latin America* (Boulder, CO: Westview Special Studies in Latin America and the Caribbean, 1989), In: Painter and Bedoya, 1991a.
94. Lerner, R., and Ferrando, D., "El Consumo de Drogas en Occidente y Su Impacto en el Peru,' D. Garcia-Sayán (cd.) *Coca, Cocaína, y Narcotráfico: Laberinto en 10S Andes* (Lima, Peru: Comisión de Juristas, 1989), In: Reeve, 1991.
95. MacNeish, R. S., "The Beginnings of Agriculture in Central Peru," C. Reed (cd.), *Origins of Agriculture (The* Hague, the Netherlands: Mouton Publishers, 1977), In: Alford, 1991.
96. Malloy, J., and Gamarra, E., *Revolution and Reaction: Bolivia, 1964-85 (New* Brunswick, NJ: Transaction Books, 1988), In: Healy, 1992.
97. Martin, R., "The Role of Coca in the History, Religion, and Medicine of South American Indians,' *Economic Botany* 24(4):422-438, *1970, In:* Reeve, 1991.
98. Martinez, H., Las *Colonizaciones Selváticas en el Perú* (Lima, Peru: UNAMS, 1983), In: Painter and Bedoya, 1991a.
99. Mayer, E., "The Uses of Coca," E. Morales (cd.), *Drugs in Latin America,* Studies in Third World Societies #37 (Williamsburg, VA: College of William and Mary, 1986), In: Reeve, 1991.
100. McClintock, C., "Opportunities and Constraints to Source Reduction of Coca: the Peruvian Sociopolitical Context," contractor report prepared for the Office of Technology Assessment, April 1992.
101. McElroy, A., and Townsend, P. K., "Profile: Coca Chewing and Health in the High Andes," *Medical Anthropology in Ecological Perspective* (Boulder, CO: Westview Press, Inc., 1989), pp. 189-192.
102. Milliones, O., "Patterns of Land Use and Associated Environmental Problems of the Central Andes: an Integrated Summary," *Journal of Mountain Research and Development 2(1):49-61, 1982, In:* Alford, 1991.
103. Ministerio de Agricultura y Asuntos Campesinos-FAO-PNUD, *Lineamientos de Política Agropecuaria,* Manuscript (La Paz, Bolivia: n.p., 1990), In: Healy, 1992.
104. Molina, E., and Little, A. V., "Geoecology of the Andes: the Natural Science Basis for Research Planning," *Journal of Mountain Research and Development* 1(2):115-144, *1981, In:* Alford, 1991.
105. Morales, E., *Cocaine: White Gold Rush in Peru* (Tuscon, AZ: University of Arizona Press, 1989),
106. Morales, Edmundo, "Coca and Cocaine Economy and Social Change in the Andes of Peru," *Economic Development and Cultural Change* 35(1):143-161, *1986.*
107. Murra, J., "El 'Control Vertical' de un Máximo de Pisos Ecologicos en la Economía de las Sociedades Andinas," J. Murra (cd.), *Visita de la Provincia de León de Huánuco (1562). Iñigo Ortiz de Zuniga, Visitador, tomo II* (Huánuco, Peru: Universidad Nacional Hermilio Valdizán, 1972) pp. 429476, In: Alford, 1991; and Reeve, 1991.
108. Painter, M., *Upland-Lowland Production Linkages and Lund Degradation in Bolivia,* IDA Working Paper No. 81 (Binghamton, NY: Institute for Development Anthropology, 1991).
109. Painter, M., and Bedoya, E., "Institutional Analysis of the Chapare Regional Development Project (CRDP) and the Upper Huallaga Special Project (PEAH)," contractor report prepared for the Office of Technology Assessment, July 1991a.
110. Painter, M., and Bedoya, E., *Socioeconomic Issues in Agricultural Settlement and Production in Bolivia's Chapare Region,* IDA Working Paper No. 70 (Binghamton, NY: Institute for Development Anthropology, 1991 b).
111. Pérez Crespo, C.. A., *Why Do People Migrate? Internal Migration and the Pattern of Capital Accumulation in Bolivia,* IDA Working Paper No. 74, Cooperative Agreement on Settlement and Natural Resource Systems Analysis (Bing-

harnton, NY: Institute for Development Anthropology, 1991).

112. Plowman, T., "CocaChewing and the Botanical Origins of Coca (*Erythroxylum* ssp.) in South America," D. Pacini and C. Franquemont (eds.), *Coca and Cocaine: Effects on People and Policy in Latin America, cultural* Survival Report #23 (Peterborough, NH: Transcript Printing Company, 1986), pp. 5-33.

113. Population Reference Bureau, *1992 World Population Data Sheet* (Washington, DC: Population Reference Bureau, 1992).

114. Posner, J., Antonini, G., Montanez, G., Cecil, R., and Grigsby, M., "A Classification of the Steeplands in the Northern Andes," *Journal of Mountain Research and Development, 2(3);273-280, 1982, In:* Alford. 1991.

115. Raymond, J. S., "A View from the Tropical Forest,' R. Keatinge (cd.), *Peruvian Prehistory: An Overview of Pre-Inca and Inca Society* (Cambridge, England: Cambridge University Press, 1988), In: Reeve, 1991.

116. Reeve, M. E., "Traditional Roles and Uses of Coca Leaf in Andean Society." contractor report prepared for the Office of Technology Assessment, July 1991.

117. Reuters News Service, ''Peruvian President Schedules New Vote," *The Washington Post,* July 29, 1992, p. A24.

118. Reuters News Service, "Troops Surround Congress and Patrol Lima," *The New York Times* April *7, 1992, p.* A1.

119. Reyes, A., ''Geograffa de 10S Conflicts Sociales y de la Violencia en Colombia," presented at "Political Crisis in Colombia: Violence, Mobilization, and Restoration of Legitimacy'' Symposium, Center for Iberian and Latin American Studies, University of California, San Diego (La Jolla, CA: December, 1989), In: Thourni, 1992.

120. Riordan, J., *An Assessment of the Southern Valley Region of Bolivia,* Farm Policy Study Analytical Document No. 1A (La Paz, Bolivia: U.S. Agency for International Development, 1979), In: Painter and Bedoya, 1991a.

121. Robinson, L., "No Holds Barred,'' *U.S. News and World Report* 113(12):49-50, *1992.*

122. Sandagarda, A., ''Sociocultural Aspects of Coca Use," F. Jerí (cd.), *Cocaine 1980: Proceedings of the Interamerican Seminar on Coca and Cocaine,* (Lima, Peru: Pacific Press, 1980), In: Reeve, 1991.

123. Sarmiento, L., and Moreno, C., ''Narcotráfico y el Sector Agropecuario en Colombia," *Economía Colombian N. 226-227: 29-37,* 1990, In: Thoumi, 1992.

124 Sarmiento Palacio, E., ''Economía del Narcotráfico,'' C.G. Arrieta, et. al., (eds.), *Narcotráfico en Colombia: Dimensioned Políticas, Económicas, Jurídicas, e Internacionales* (Bogotá, Colombia: Tercer Mundo Editores, 1990), pp. 47-96.

125. Steward, J. (cd.), *Handbook of South American Indians, Volume 2: The Andean Civilizations,* Smithsonian Institute, Bureau of American Ethnology Bulletin 143 (New York, NY: Cooper Square Publishers, 1963), In: Reeve, 1991.

126. Steward, J., and Faron, L., *Native Peoples of South America (New York, NY:* McGraw-Hill, 1959), In: Reeve, 1991.

127. Stocks, A., *Fragile Lands Development and the Palcazu Project in Eastern Peru,* IDA Working Paper No. 34 (Binghamton, NY: Institute for Development Anthropology, 1988), In: Painter and Bedoya, 1991a.

128. Thorp, R., and Bertram, G., *Peru 1890-1977 (New* York, NY: Columbia University Press, 1978), In: Alvarez, 1992.

129. Thoumi, F., "Colombia: Opportunities and Constraints to Source Reduction of Coca and Cocaine," contractor report prepared for the Office of Technology Assessment, April 1992.

130. Thoumi, F., economist, Arlington, VA, personal communication, August 1991.

131. Thourni, F., "Institutional Crisis and Economic Policy Reform Challenges in Colombia,'' California State University, Chico, Department of Economics (Chico, CA: 1990).

132. Thoumi, F., "Some Implications of the Growth of the Underground Economy in Colombia,'' *Journal of Interamerican Studies and World Affairs, Special* Issue, 29(2):35-53, 1987.

133. Tullis, F.L., "Cocaine and Food: Likely Effects of a Burgeoning Translational Industry on Food Production in Bolivia and Peru," *Pursuing Food Security: Strategies and Obstacles in Africa, Asia, Latin America, and the Middle East*

(Boulder, CO: Lynne Rienner Publishers, Inc., 1987) pp. 247-283.

134. Ugarteche, O., *El Estado Deudor. Economía Política de la Deuda: Perú y Bolivia 1968-1984* (Lima, Peru: Instituto de Estudios Peruanos, 1986), In: Alvarez, 1992.

135. U.S. Congress, Office of Technology Assessment, "Biological Control of Coca," workshop held Jan. 23, 1992, Washington, DC.

136. U.S. Congress, Office of Technology Assessment, *Beneath the Bottom Line: Agricultural Approaches to Reduce Agrichemical Contamination of Groundwater*, OTA-F-418 *(Washington*, DC: Government Printing Office, November 1990).

137. U.S. Department of Justice, Drug Enforcement Agency, "From the Source to the Street: Mid-1990 Prices for Cannabis, Cocaine, and Heroin-Special Report," *Intelligence Trends (Washington*, DC: U.S. Department of Justice, 1990).

138. U.S. Department of State, Bureau of International Narcotics Matters (INM), *Narcotics: The Environmental Consequences* (Washington, DC: U.S. Department of State, 1991).

139. U.S. Department of State, Bureau of International Narcotics Matters (INM), *International Narcotics Control Strategy Report* (Washington, DC: U.S. Department of State, 1991).

140, Urioste, M., *Segunda Reforma Agraria: Compesinos, Tierra, y Educación Popular* (La Paz, Bolivia: Talleres CEDLA, 1987), In: Painter and Bedoya, 1991.

141, van den Berghe, P., and Primov, G., *Inequality in the Andes: Class and Ethnicity in Cuzco* (Columbia, MO: University of Missouri Press, 1977), In: Alford, 1991.

142. Verdera, F., "Estructura Productive y Ocupacional en la Selva Alta." *Población y Colonización en la Alta Amazonía Peruana* (Lima, Peru: CNP-CE?A, 1984), In: Painter and Bedoya, 1991a.

143, Washington Office on Latin America (WOLA), "Resurgence of Human Rights Violations in Bolivia," *Latin America Update*, 16(1):2, 1991, In: Healy, 1992.

144. Webb, R., and Fernandez Baca, G., *Perú en Numeros 1991* (Lima, Peru: Instituto Cuanto, 1991), In: Alvarez, 1992.

145, Webster, S., "An Indigenous Quechua Community in Exploitation of Multiple Ecological Zones,' *Actas y Memorias del XXXIX Congresso International de Americanistas, vol. 3* (Lima, Peru: 1971), pp. 174-183, In: Alford, 1991.

146. Willey, G.R., *An Introduction to America Archeology, Vol. 2* (Englewood Cliffs, NJ: Prentice Hall, 1971), In: Alford, 1991.

147. Winterhalder, B. P., and Thomas, B. P., *Geoecology of Southern Highland Peru: a Human Adaptation Perspective*, Occasional Paper No. 27 (Boulder, CO: University of Colorado, Institute of Arctic and Alpine Research, 1978), In: Alford, 1991.

148. World Bank, *World Tables 1992* (Baltimore, MD: The Johns Hopkins University Press, 1992).

149. World Bank, "Bolivia from Stabilization to Sustained Growth," Draft (Washington, DC: World Bank, 1991), In: Alvarez, 1992.

150, World Bank, *Country Study: Bolivia, Agricultural Pricing and Investment Policies, 1984* (Washington, DC: World Bank, 1984), In: Healy, 1992.

151, Zuidema, T., "The Lion in the City: Royal Symbols of Transition in Cuzco," G. Urton (cd.), *Animal Myths and Metaphors in South America* (Salt Lake City, UT: University of Utah Press, 1985), In: Reeve, 1991.