

Chemical Reactions

Fumigation: Spreading Coca and Threatening Colombia's Ecological and Cultural Diversity

In recent years, the Colombian government has vigorously pursued a strategy of aerial herbicide spraying – widely known as “fumigation” – in an effort to eradicate crops for illicit use, especially coca. Under the rubric of Plan Colombia, since the year 2000 the United States has strongly backed the spray program, financially, logistically and politically. The pace of the effort has steadily intensified, as the area sprayed rose each year from 2000 to 2006. Despite high hopes that aggressive spray operations would curb coca cultivation and reduce cocaine production in Colombia, it has become increasingly evident that neither of these goals is being achieved. Estimates vary, but they indicate that coca and cocaine production remain robust and that fumigation is not deterring farmers from replanting their coca crops. In 2006, the United Nations detected coca cultivation in 23 of Colombia's 34 departments, up from 12 in 1999.

A more detailed
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Faced with dismal results from a costly and controversial program, defenders of fumigation have argued that the situation would have been far worse if not for aerial spraying, and that the fumigation effort should now be expanded further to cope with coca's spread to new areas of the country. This argument fails to admit the possibility that alternative strategies might hold more promise than fumigation for reducing coca growing. Moreover, the call to continue and even expand spray operations fails to take into account serious concerns over the risks that fumigation poses to human health and the environment.



A campesino is brought to tears by his dead peppercorn crop post-fumigation. A pole flying a white flag in the background was meant to signal the spray pilots that he was not growing coca. (Photo: Witness for Peace)

Implicit in the insistence on pushing ahead with fumigation, despite its poor drug control results, is the argument that the aerial spray strategy has not been given the time it needs to show success. Several years ago, that idea may have resonated among U.S. and Colombian policymakers. Today, however, fumigation is widely perceived to have delivered meager results despite substantial investments in the program. Indeed, the 2008 U.S. aid package shifts funding away from fumigation, and Colombian President Álvaro Uribe Vélez and other high-ranking officials in his government have signaled their preference to de-emphasize aerial spraying in favor of manual eradication.

In light of these developments, this report aims to show that fumigation is not merely an ineffective strategy in achieving reductions in coca cultivation, but that fumigation is part of the problem. This is because the aerial spray operations tend to reinforce rather than weaken Colombian farmers' reliance on coca growing, prompting more rather than less replanting, thereby contributing to coca's spread into new areas of the country. Beyond



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the potential risks to human health and the environment posed by exposure to the herbicide chemicals, there is ample evidence that fumigation jeopardizes rural families' food crops and prompts coca growers to migrate and cultivate the crop in new areas, spreading the ecological destruction that coca growing entails. This report shows that the adverse health and environmental impacts of fumigation are not simply incidental to the fumigation approach, but help explain why the approach has failed, and why intensifying the same approach will only serve to magnify the damage already done.

There are more promising approaches to reducing coca growing, centered on working in cooperation with local communities to develop viable economic alternatives suited to their cultures and local ecosystems. More equitable and humane options are available in the effort to reduce cocaine production. Now is the time to refocus on rural development, targeting enforcement at drug traffickers and not peasant farmers.

Colombia: Biodiverse and Multicultural

Colombia's Biological Diversity: Fragile Ecosystems of Global Importance

Biologists classify Colombia as one of the world's most biologically rich countries, and one of only about a dozen "mega-diverse" nations, because of the extraordinarily high number of endemic species found within its borders. Its biological richness is surpassed only by Brazil, a country seven times its size. Ecosystems found in Colombia include high Andean valleys, marshlands, tropical jungles, plains, coasts and deserts.

While a complete inventory of its flora and fauna has never been carried out, apart from marine life Colombia is home

to a full 10% of Earth's known species, even though it represents only 0.7% of the planet's landmass. These include 1,754 bird species (19% of the world total), approximately 40,000 flowering and seed plants, and 155 species of bats (17% of the world total). There are believed to be around 2,900 species of fish. Approximately 55,000 species of vascular plants have been identified in Colombia, yet only 80% of the country's flora has been catalogued, according to some estimates.

Colombia's biological diversity is concentrated in the lower mountain regions and piedmont areas. There are also a large number of ecosystems in the Sierra Nevada de Santa Marta massif, the Amazon and Orinoco watersheds, and along the Pacific coast. The optimal altitude for rain in Colombia is found between 600 and 1,200 meters above sea level, which is the zone directly below the cloud forest and home to the greatest amount of flora and fauna. Coca plantings are found principally at this altitude.

Researchers with *Grupo ARCO*, a Colombian conservation organization, have categorized the country's territory according to the level of threat to biodiversity posed by human activities and according to the degree to which damage to local ecosystems could be reversed.¹ Many of the regions classified as vulnerable and irreplaceable are also areas with a strong presence of coca cultivation. In particular, there is a heavy overlap of coca growing and ecologically vulnerable zones in the extreme eastern section of the Sierra de la Macarena National Park, the southern part of Córdoba department and neighboring areas in the northeastern part of Antioquia, in the south of Bolívar, Arauca, the midsection of the Patía River basin in Nariño, the Putumayo piedmont, and Sierra Nevada de Santa Marta.

Thus, some of Colombia's most significant coca-growing zones, which have been

¹ Marta Fandiño and Wilhem van Wyngaarden, *Prioridades de acción: vulnerabilidad e irremplazabilidad de los Parques Nacionales y de las áreas focalizadas*. Grupo ARCO, 2006.

frequent targets of aerial spray operations, are also among the country's most ecologically rich and irreplaceable regions. Moreover, Colombia's internal armed conflict reaches its greatest complexity in these ecologically important and vulnerable zones, for reasons including the presence of crops for illicit use, disputes over routes for moving drugs and weapons, and fights for territorial control by the various armed groups. The strategic ecosystems included in Colombia's system of national natural parks (*Sistema de Parques Nacionales Naturales*, PNN) are not immune from these conditions. More than 17 million people depend on the fresh water that flows from these protected areas, which also provide 20% of the water resources used to generate hydroelectric power in Colombia. National park areas also overlap significantly with territories inhabited by indigenous and Afro-Colombian peoples, communities that merit special attention under Colombian law because of their cultural diversity and special relationship with their territories and natural resources.

Colombia's Cultural Diversity

Colombia is a multicultural state composed of diverse ethnic groups, including indigenous and Afro-descendant communities, and a mestizo population that is differentiated by region of origin (paisas, vallunos, vallenatos, pastusos, samarios, llaneros, patojos, rolos, santandereanos, etc.). The Colombian Constitution and legislation recognize special rights of indigenous peoples, Afro-Colombians, Raizals and gypsies. These include the right to territory and the natural resources located there, autonomy, cultural identity, their own forms of government, and the right to be consulted



about legislative and administrative decisions that may affect them.

Colombia's indigenous population is made up of 90 distinct peoples living in 638 reserves that encompass nearly 120,000 square miles and are located in nearly all of the country's 34 departments. Their lands generally coincide with areas rich in biodiversity, and are recognized by the Colombian Constitution as territorial entities where local authorities (traditional leaders and governors) exercise the functions of self-government according to traditional uses and customs.

Colombia's Afro-descendant communities² live primarily along the Pacific coast in 132 collective territories that cover more than 18,000 square miles; in the department of Bolívar in the community of San Basilio de Palenque; and in cities such as Cartagena, Cali, Barranquilla, Medellín and Bogotá.

A mural painted on the side of a public building in La Hormiga depicts Colombia's biodiversity – and its destruction after fumigation. (Photo: Sanho Tree)

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² An Afro-Colombian community is defined as a collection of families of African descent that possesses its own culture, shared history, and tradition and customs within a rural-community relationship that preserves an awareness of identity that distinguishes it from other ethnic groups (Law 70, 1993, included in the development of transitory Article 50 of the constitution). The Constitutional Court has indicated that black communities "are deserving of rights included in ILO Convention 169," in that they meet the criteria established in the definition of tribal peoples. As such, "the characterization recognized in constitutional Articles 1, 7, 8 and 10 that alludes to indigenous and tribal peoples also includes black communities, even though some constitutional dispositions pertaining to the issue list only the first group, because Articles 5, 13, 16, 63, 68, 70, 72, 79 and 176 recognize as equal all the existing cultures in the national territory, promoting their conservation, research, dissemination and development" (Constitutional Court, Sentences C-169, of 2001, and T-955, of 2003).

Some of Colombia's most significant coca-growing zones, which have been frequent targets of aerial spray operations, are also among the country's most ecologically rich and irreplaceable regions.

The presence of Afro-Colombians in urban areas is due principally to internal displacement resulting from violence involving illegal armed groups (guerrillas and paramilitaries) and security forces, the expansion of crops for illicit use and eradication operations, and human rights violations related to pressure from growing economic interest in their territories. Some analysts estimate the Afro-Colombian community at between 18% and 22% of the national population, significantly higher than the official figure of 8%. An estimated 12% of internally displaced people are indigenous and 30% are Afro-Colombian.³

Legal Strategies to Protect Colombia's Ecological and Cultural Diversity

Environmental legislation in Colombia has improved substantially in the past three decades, starting with the 1972 Stockholm Convention, the principles of which were incorporated into Colombia's Renewable Natural Resources and Environmental Protection Code (Decree Law 2811 of 1974). This was one of the first efforts in Latin America to establish legal norms for environmental protection.

The 1991 constitution, known as the "ecological constitution," redefined environmental protection as a collective right and created protection mechanisms with citizen involvement through grassroots and group actions. Following the United Nations Earth Summit in Rio de Janeiro in 1992, Colombia created the National Environmental System (SINA) and the Environment Ministry (Law 99 of 1993). The law was meant to bring a systematic, decentralized, participatory and multi-ethnic dimension to environmental management in Colombia. The 1991 Constitution was complemented by additional legislation, including Law 70 (1993) and Law 160 (1994) establishing the rights of Afro-Colombian communities

and regulating territorial rights for indigenous peoples and Afro-Colombians. Colombia's Constitutional Court has handed down numerous sentences defining the scope of these rights.

Situation of Colombia's Rural Sector

The Colombian countryside has been and remains the scene of brutal armed confrontations and a lack of effective state presence. Incoherent public policies and political violence are both the cause and effect of the acute poverty and inequality that characterize Colombian rural life. Most of the country's poor, however, now live in and around cities. Many have been forced to migrate, driven from their homes by the armed conflict or by lack of economic opportunities. They are in search of work and living conditions better than those that prevail in rural areas, where 44% do not have access to running water and 89% lack sewage disposal services. Others who stay in these regions are often compelled by economic necessity or pressure from drug traffickers, guerrillas or paramilitaries to plant crops for illegal drug production.

Colombia has witnessed a series of land reform efforts, starting with the 1936 Constitution and continuing with the political reforms of 1991. National, regional and local land-owning elites, however, have always managed to curb such initiatives, leading to what has been labeled the failure of agrarian reform. The result of this failure is reflected in the GINI land-concentration index, which measures concentration of land ownership and shows that Colombia has some of the most unequal land tenure patterns in Latin America, with a rate of 0.81 based on real estate appraisal and 0.85 based on gross area. Four-tenths of one percent of land owners hold 61% of registered lands, usually in estates larger than 500 hectares, while 57.3% possess 1.7% of registered

³ Association of Internally Displaced Afro-Colombians (AFRODES) and Global Rights, Report to the Inter-American Commission on Human Rights, March 2006.

FIGURE 1. Land distribution in Colombia

Size of property (hectares)	% Land owners	% Area of registered rural property
Smaller than 3	57.3	1.7
Between 3 and 100	39.7	22.5
Between 100 and 500	2.6	14.6
Larger than 500	0.4	61.2
Total %	100.0	100.0

Source: J.D. Jaramillo, *El recurso suelo y la competitividad del sector agrario colombiano*, 2004.

lands, usually in plots smaller than three hectares. (One hectare equals about 2.47 acres.)

This distribution is directly related to conflicts over land use. Studies by the *Instituto Geográfico Agustín Codazzi* show that of the 12.7% of land in Colombia suitable for agriculture, only 4.6% was used in 1987, with the number dropping to 3.6% in 2002. Only 2.5% of the area on properties larger than 200 hectares is dedicated to agriculture, while the number is 38.6% on properties smaller than 5 hectares.⁴ These small farms provide 30% of the food stuffs consumed in cities.⁵

Globalization in the 1990s

Macroeconomic management, a stronger peso, adverse climate conditions caused by El Niño, land ownership trends, drug trafficking and the armed conflict have converged to create a semi-permanent crisis in Colombian agriculture.⁶ This in turn has contributed to an increase in the area planted with crops for illicit use. The crisis in Colombian agriculture is reflected in:

- A reduction in areas under cultivation of licit crops, from 3.7 million hectares of permanent and semi-annual crops in 1990 to 3.1 million planted in 1998.

- Falling production in some crops, e.g., cotton which dropped from 130,000 metric tons in 1975 to 427 metric tons in 1997.
- Loss of farming jobs and increased rural-to-urban migration.⁷
- Increased food imports, which rose from the equivalent of roughly 6% of Colombia's GDP in 1990 to 46% in 1997.⁸

At the same time, the Colombian government, following the prescriptions of the World Bank and other institutions, dismantled much of the farming sector's institutional supports while limiting the regulatory role of the state by eliminating subsidies, abolishing special interest rates and support for private banks that made loans to the sector, reducing the budget for research and development for specific products, and eliminating or merging various agencies in the farming sector.

Armed Conflicts and Land

Drug traffickers and paramilitary groups have been responsible for the so-called "counter agrarian reform" since the start of the 1980s. In 2005, the Colombian Comptroller's office (*Contraloría*) reported that as a result of forced

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⁴ Mario Valderrama y Héctor Mondragón, *Desarrollo y Equidad con Campesinos*. IICA–Tercer Mundo Editores, 1998.

⁵ The 2.8 million metric tons of food that entered Bogotá in 2002 was provided by 501 of the country's 1,089 municipalities (46%) and, of this, 35% was produced by peasant economies. Darío Fajardo Montaña, *La Ecuación del Desplazamiento: Usurpar tierras, controlar a los desterrados*, febrero de 2007.

⁶ Carlos F. Jaramillo, "La agricultura colombiana en la década del noventa," *Revista de Economía de la Universidad del Rosario*, 1998.

⁷ Ibid.

⁸ Ibid.



An IDP camp in Putumayo, where approximately 4,000 people fled after their homes were overrun by armed groups and their fields fumigated. There are more than 3 million internally displaced persons (IDPs) in Colombia. (Photo: Sanho Tree)

displacement, drug traffickers controlled 48 percent of the most productive land in the country.⁹ The paramilitaries, for their part, have appropriated “with blood and firepower the most valuable lands in the country,”¹⁰ for their own enrichment and to control territory for illicit drug production, transportation routes and for safe haven.¹¹ According to Consultancy for Human Rights and Displacement (CODHES), Colombians were forced to abandon an estimated 4.8 million hectares of land from 1995-2003.¹² Moreover, paramilitaries have also asserted control over territory for the benefit of drug traffickers, large local land owners, and “private companies involved in large-scale projects to exploit natural resources.”¹³ The guerrillas, for their part,

also exercise territorial control over crops and populations.

The appropriation of lands has led to the forced displacement of more than 3.8 million people,¹⁴ which the Constitutional Court termed in 2004 “an unconstitutional state of affairs.”¹⁵ Displacement is caused by threats, hostilities, massacres, assassinations and blockades perpetrated by the armed combatants.¹⁶ Clashes between different armed groups, between armed groups and security forces, and state actions, such as militarization and fumigation, have also led to people being displaced.

Indigenous groups have not escaped these situations. They have also been affected by large-scale development projects, which according to the UN Special Rapporteur on Indigenous Peoples, have led to “the loss of lands and traditional territories, displacement, migration and resettlement, depletion of resources necessary for physical and cultural survival, destruction and contamination of the environment, collapse of social and community organization, long-term negative effects on health and nutrition, and in some cases harassment and violence.”¹⁷

Racism and marginalization of Afro-Colombian and indigenous peoples, as well as the fact that they inhabit territories with characteristics attractive to Colombia’s armed groups, are “turning their territories into scenarios of violence and death” and resulting in especially high rates of forced displacement.¹⁸ Some indigenous lands are used to house

⁹ Contraloría Delegada para el Sector Defensa, Justicia y Seguridad, Dirección de Estudios Sectoriales. Luís Bernardo Florez, Vice-Controlor General de la Nación, *Desplazamiento Forzado: Un impacto territorial*, 2005.

¹⁰ *Revista Semana*, “Los señores de las tierras,” 5 de junio de 2004.

¹¹ Gustavo Duncan, *Señores de la Guerra*. Planeta, 2007.

¹² Colombian Episcopal Conference and CODHES, *Desafíos para construir nación, El país ante el desplazamiento, el conflicto armado y la crisis humanitaria, 1995-2005*, 2006.

¹³ United Nations, Informe de la Misión a Colombia realizada del 16 al 27 de enero de 2005, del relator Francis M. Deng, citado en Comisión Colombiana de Juristas, *Revertir el destierro forzado: protección y restitución de los territorios usurpados*, enero de 2007.

¹⁴ According to the Colombian government, 1,874,917 people migrated between 1995 and August 2006. CODHES estimates that 3,832,527 people have been displaced since 1985. There is consensus that under-reporting of displacement is close to 30%.

¹⁵ Constitutional Court, Sentence T-025 of 2004.

¹⁶ Alfredo Molano Bravo, “Más que complicado,” *El Espectador*, 8-14 de abril de 2007.

¹⁷ United Nations, *Report of the Special Rapporteur on Human Rights and Fundamental Freedoms of Indigenous Peoples*, (Rodolfo Stavenhagen) E/CN.4/2003/90, 21 January 2003.

¹⁸ Inter-American Commission on Human Rights, *Violence and Discrimination Against Women in the Armed Conflict in Colombia*, 2006.

military battalions or police barracks, without the consent of traditional authorities.¹⁹

Peasant, indigenous and Afro-Colombian communities have filed multiple complaints due to their displacement by “economic groups related to the development of agro-industrial activities (bananas, oil palm trees, etc.) and the exploitation of mineral resources.”²⁰ This process conforms to the description of displacement provided by Representative of the UN Secretary General on Internally Displaced Persons, Francis Deng, who reported in 2000 that displacement was “a way of acquiring lands to benefit large land-owners, drug traffickers and private businesses involved in development of large-scale projects to exploit natural resources.”²¹ Examples of this are the illegal occupation of collective territory of the Community Council of Alto Mira y Frontera in Tumaco, Nariño, by two companies, Palmeiras and Salamanca.

Agro-Industry and the Peasant Economy

The growth of Colombia’s rural sector has been pegged to the production of goods for export (timber, fruits) and plantation agriculture (large farms for growing cacao, rubber, oil palm and castor oil trees, among others). These final two, together with sugarcane and cassava, are being used to produce alternative fuels (biodiesel and ethanol).²² New government agricultural development plans, aiming for the “utilization of the countryside,” create “business development zones” that will be home to the crops listed above. These zones will expand from 1.8 million to 2.4 million hectares and will include planting 50,000

hectares of tree species, including acacia, melina, teak and eucalyptus.

These plans do not include similar incentives for the peasant economy and are not aimed at improving conditions for peasants and other rural residents, including indigenous and Afro-Colombian communities, who lack the resources to compete with the crops that will be introduced, which are capital-intensive and require technical assistance and development.²³ As such, rural residents face increased pressure to become salaried workers, migrate to the cities, or become involved in the production of crops for illicit use.

Various organizations have warned about the risks of linking alternative development exclusively to agro-forestry and agro-industry strategies that promote mono-culture crops such as oil palm, bananas, castor oil, acacia and other forest species. Such plantations impoverish natural ecosystems and biodiversity, modify the structure and composition of soils, reduce the variety and abundance of flora and fauna, stress water tables and undermine the sustenance of native populations and, in some cases, provoke the displacement of Afro-Colombian and indigenous communities from the area.

The situation faced by the communities of Jiguamiandó and Curvaradó in Urabá region is emblematic of this combination of human rights abuses with mono-crop agriculture. The members of these Afro-Colombian communities were displaced in 1996 by paramilitaries known as the Self-Defense Forces of Córdoba and Urabá and security forces.²⁴ When community members eventually were able to return,

¹⁹ CODHES, “¿Qué hacían dos oficiales del Ejército de Estados Unidos en una reunión del Comité de Atención a población desplazada en Caquetá?” 7 de junio de 2007.

²⁰ United Nations Human Rights Council, Fourth Session, Report presented by Walter Kälin, the secretary general’s representative on internally displaced persons, from the mission to Colombia. A/HRC/4/38/Add.3, 24 January 2007.

²¹ United Nations, E/CN.4/2000/83/Add.1, paragraph 23.

²² The spread of agro-industrial crops, especially castor oil trees, does not spare strategic ecosystems. According to President Uribe, “We have 6 million hectares in Orinoquia, in the plains, which we can conquer for biofuels.” (Press conference, 11 March 2007, at www.presidencia.gov.co.)

²³ Procuraduría General de la Nación, *Comentarios al Proyecto de Ley No. 30 del Senado*, 18 de octubre de 2006.

²⁴ “The drama of a marginalized people: A presentation on the Afro-Colombian situation,” sponsored by U.S. Rep. Donald Payne, Washington, DC, 20 November 2006.

As the OAS monitoring mission has reported, the paramilitary demobilization has not led to the effective dismantling of the paramilitaries' military, economic and criminal structures, and remnants of these groups and their successors remain heavily involved in cocaine production and trafficking.

they found that their territories had been planted with oil palm trees in projects promoted by authorities in Antioquia and the national government. Paramilitaries have participated in some of these projects, as paramilitary leader Vicente Castaño stated in an interview in *Semana* magazine.²⁵

Plan Colombia and the Paramilitary Demobilization Process

Colombia's fight against drugs since the early 1990s can be divided into five stages. The first stage began during President Cesar Gaviria's administration in 1992, with the adoption of the Program to Eradicate Illicit Crops with Chemicals (known as PECIG, the acronym in Spanish), while the second stage involved the National Anti-Drug Plan 1998-2002 during the government of President Andrés Pastrana Arango. The third stage saw the implementation of Plan Colombia, and stage four centered on attacking the sources of income of terrorist groups. These stages came during the governments of Andrés Pastrana and Álvaro Uribe. The fifth stage is centered on implementing the second phase of Plan Colombia.

The Gaviria government attempted to create a regulatory framework for aerial chemical spraying through the National Narcotics Council (*Consejo Nacional de Estupefacientes*, CNE), the agency assigned the task of designing drug control policies under Law 30 (1986). The council approved Resolution 001 in 1994, allowing for chemical spraying of coca and poppy crops on an experimental basis. The fumigation

program was to be permanently monitored and evaluated with an environmental audit and Epidemiological Monitoring Plan.

In 1999, President Pastrana presented in Puerto Wilches his plan for "an investment policy for social development, deactivation of violence and construction of peace."²⁶ As described by Colombia's *Contraloría*, the plan was modified in Washington with the goal of "ensuring order, stability and compliance with law; guaranteeing national sovereignty over territory and protecting the state and the civilian population from threats coming from armed group and criminal organizations; and breaking the existing ties between these groups and the drug industry that supports them."²⁷ According to an October 2000 White House report to Congress, Plan Colombia would require an investment of \$7.5 billion over three years.²⁸

Plan Colombia was altered in 2002, in the wake of the Al Qaeda attacks on U.S. soil, when Congress approved a request from President George W. Bush to use financial, human and technical anti-drug resources for Colombia to combat organizations classified as terrorist.²⁹ Financing was also approved for other operations, such as protecting the Caño Limón Coveñas pipeline in Arauca that is operated by Occidental Petroleum Corporation. Based on this change and within the framework of his "Democratic Security" policy, President Uribe launched the "Patriot Plan" aimed at ending the insurgency in the southern half of the country.

The Uribe government simultaneously undertook negotiations with the paramilitary groups. The process ran from the end of 2003 through the beginning of 2006 and would lead to the demobilization of 30,944

²⁵ *Revista Semana*, "Habla Vicente Castaño. El verdadero jefe de las autodefensas le da la cara al país por primera vez," junio de 2005. Castaño stated: "I found the businessmen to invest in these projects (oil palm) that are lasting and productive (...) state institutions arrive when the rich are brought in."

²⁶ Speech by President Pastrana in Puerto Wilches, October 1999.

²⁷ Contraloría General de la República, *Plan Colombia: Primer Informe de Evaluación*, 2001.

²⁸ The White House, *Report on U.S. Policy and Strategy Regarding Counternarcotics Assistance for Colombia and Neighboring Countries*, 26 October 2000.

²⁹ U.S. Public Law 107-206, "2002 Supplemental Appropriations Act for Further Recovery from and Response to Terrorist Attacks on the United States," 2 August 2002.

paramilitaries. The process included passage of Law 975, in 2005, guaranteeing alternative sentences for anyone who accepted its conditions. The demobilization process, however, has been plagued by serious problems with significant implications for drug control efforts, including the fumigation program. As has been reported by the Organization of American States (OAS) monitoring mission, the demobilization has not led to the effective dismantling of the paramilitaries' military, economic and criminal structures, and remnants of these groups and their successors remain heavily involved in cocaine production and trafficking.³⁰

Aerial Herbicide Spraying: Legal Framework and Challenges

The regulation of environmental impacts during the initial phase of the Program to Eradicate Illicit Crops with Chemicals (PECIG) was found in the Renewable Natural Resources Codes and enforced byINDERENA, an agency that opposed the use of chemical spraying in the 1980s. The evaluation of harm to human health fell to the Health Ministry during this time. It was assigned to the Expert Committee on Herbicides, which recommended in 1984 the design and launch of a toxicological monitoring program that would allow for the evaluation of effects of spray operations on human health and the environment. The request was reiterated in 1986, 1994 and again in 2001.

Environmental rights were elevated to constitutional status in 1991.INDERENA demanded an environmental audit to permanently monitor and evaluate the application of the PECIG. In 1996, the Environment Ministry, which was created by Law 99 in 1993 and replacedINDERENA, ordered the National Narcotics Bureau (*Dirección Nacional de Estupefacientes*, DNE) to present the PECIG Environmental Management Plan. This plan was finally adopted in 2001.

Challenges in Colombia

In a 2003 class-action case, the Cundinamarca Administrative Court ordered a provisional halt to aerial herbicide spraying throughout the country “until compliance is reached with the Environmental Management Plan ordered by the Environment Ministry” and the “Social Security Ministry has carried out the medical-scientific studies to determine the effects [of the herbicides] on the health of Colombians.”³¹ The following year, however, the State Council – the highest court overseeing the defense of collective rights³² – overturned the lower court's injunction, arguing that it left “the state defenseless before the mafia, guerrillas and paramilitaries, the trilogy that is tearing it apart and the source of its most serious troubles.”³³

In 2003, the Organization of Indigenous Peoples of the Colombian Amazon (OPIAC) filed a constitutional action to

³⁰ Organization of American States (OAS), *Tenth Quarterly Report of the Secretary General to the Permanent Council on the Mission to Support the Peace Process in Colombia* (MAPP/OEA), 31 October 2007. The report notes that “There is a clear relationship between illicit crop zones and corridors and the presence of rearmed remnants of units. The emerging factions control the illegal crops planted in areas such as Sierra Nevada, Bajo Cauca, Alto Sinú and San Jorge (in Córdoba), in the south of Bolívar, near the Gulf of Urabá, in Vichada and Meta – Mapiripán; in the foothills of Caquetá, in Bajo and Alto Putumayo; as well as in the mountain zone and the Pacific coast of Nariño. They also control corridors linking the Atlantic and Pacific coasts, as well as border areas. These dynamics are driven by an adaptation process whereby some members of the dismantled United Self-Defense Forces of Colombia (AUC) have joined private armies that serve drug traffickers and are clearly mafioso in nature.”

³¹ Class Action: 01-0022 against the Environmental Ministry and others, 2003.

³² Dirección Nacional de Estupefacientes (DNE), Appeal of the ruling in the first instance by the Cundinamarca Administrative Court, Bogotá, 2004.

³³ State Council. Vote of María Elena Giraldo Gómez, Jesús María Lemos Bustamante and Rafael E. Ostau de Lafont Planeta, File No. 250002325000200100022, 2 November 2004. The decision overlooked the draft decision by the judge originally assigned to the case, who stated that “[F]aced with the sound and indisputable goal of combating outright the degrading scourge of illicit crops in our country with aerial spraying using glyphosate, it is preferable to first protect health-life, the environment and other associated rights affected by policies established to meet the first goal. It is about eminently humanistic priorities that are fully supported in our legal system, particularly in the understanding that fumigation programs have not had the conclusive results expected when they were started.”



A plane sprays herbicide on a field, above. On the right, a pilot points out bullet holes in the wing of his spray plane. Below, a spray plane flies high above the ground to avoid gunfire, resulting in a wider spray pattern and greater spray drift. (Photos: Jeremy Bigwood)



indigenous peoples.³⁴ The court delegated to the State Council the decision on the violation of collective rights to public health and the environment,³⁵ which handed down the ruling described above.

Ecuador's Concerns

The Constitutional Tribunal of Ecuador, where fumigation is illegal, ordered the Ecuadorian government to “sign a memorandum of understanding with Colombia so that it does not implement spray operations within a 10-kilometer belt starting from the border and moving into the Republic of Colombia.”³⁶

Ecuador's concerns were acknowledged in a December 2005 agreement reached by the foreign ministries of both countries. Colombia agreed to stop spraying within a 10-kilometer strip along the border starting January 1, 2006. The Colombian government, however, resumed operations in late 2006, spraying more than 13,000 hectares in the border region, provoking a diplomatic dispute that has yet to be completely resolved.

In May 2007, the UN special rapporteur on the right to health, Paul Hunt, visited Ecuador on an invitation extended by President Rafael Correa to investigate the impact of aerial spraying on the health of Ecuadorians living near the border. The rapporteur also requested meetings with the Colombian government, but his requests were denied at the time. He was subsequently invited to visit Colombia and did so in September 2007. According to Hunt's preliminary conclusions,³⁷ presented in Quito in May:

- “There exists credible and trustworthy evidence that aerial fumigation with glyphosate on the border between Colombia and Ecuador is affecting

obtain “transitory protection of the rights to life, health, free personal development, cultural integrity, participation, due process and a healthy environment.” The Constitutional Court ordered that prior consultation be conducted in collective territories before fumigation was undertaken, as a way of upholding the fundamental right of the participation of

³⁴ Constitutional Court, Sentence SU-383 of 2003.

³⁵ Three judges expressed their disagreement with the ruling because it did not refer to the fundamental right to a healthy environment for present and future generations (Constitutional Articles 79 and 80) and did not apply the principle of precaution, despite “abundant evidence” that “did not demonstrate that glyphosate is not harmful human beings, animals, plants and water resources.”

³⁶ Consejo de Estado, Sala Plena de lo Contencioso Administrativo, Expediente: IJ-25000-23-25-000-2001-00022-02, octubre de 2004.

³⁷ *El Comercio*, “Relator de la ONU pide a Colombia suspender fumigaciones en frontera ecuatoriana,” 18 de mayo 2007.

FIGURE 2. Differing estimates of land under coca cultivation, with reported area subjected to fumigation, 1999-2006

Base year	*INCSR	**SIMCI	***Year fumigated	Hectares fumigated	Change (INCSR)	Change (SIMCI)
1999	122,500	160,000	2000	60,703	13,700	3,000
2000	136,200	163,000	2001	95,594	33,600	-18,000
2001	169,800	145,000	2002	130,373	-25,350	-43,000
2002	144,450	102,000	2003	132,817	-30,600	-16,000
2003	113,850	86,000	2004	136,551	250	-6,000
2004	114,100	80,000	2005	138,778	29,900	6,000
2005	144,000	86,000	2006	172,024	13,200	-8,000
2006	157,200	78,000	2000-2006	866,840		

* State Department, March 2007; ONDCP, June 2007

** UNODC, June 2007.

*** DIRAN; General Command of the Colombian Armed Forces, January 2007.

the physical and mental health of the residents of Ecuador.”

- ▶ “There is sufficient evidence to apply the principle of precaution and, in this sense, fumigation should be suspended until it is clear that it does *not* harm human health.”
- ▶ “Colombia is responsible for demonstrating that aerial spraying does not affect human health or the environment.”
- ▶ “Interpreting in this way Colombia’s responsibility with respect to human rights based on the principle of precaution, I have no doubts that Colombia should not restart aerial fumigation with glyphosate on its border with Ecuador.”

In the final report that will be presented to the UN Human Rights Council and General Assembly, the rapporteur will expand on these preliminary conclusions and present the legal foundation on which the recommendations are based. Based

on this report, the UN Human Rights Council can decide to extend and broaden the investigation on the health impact of aerial fumigation and recommend precautionary measures.

Results of Colombia’s Eradication Campaigns, 2000–2006

Since 2000, the U.S. government has invested more than \$5 billion under the rubric of Plan Colombia, with the overarching drug control goal of reducing “Colombia’s cultivation, processing, and distribution of drugs by 50 percent over six years,”³⁸ with a heavy reliance on fumigation to eradicate the country’s burgeoning coca crop.

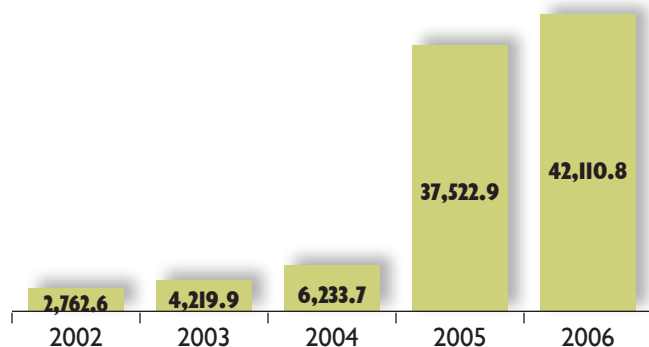
According to U.S. government estimates published in the annual International Narcotics Control Strategy Report (INCSR),³⁹ the greatest impacts from fumigation corresponded to the years

According to UN special rapporteur Paul Hunt, fumigation near the border with Ecuador “should be suspended until it is clear that it does *not* harm human health.”

³⁸ The White House, *Report on U.S. Policy and Strategy Regarding Counternarcotics Assistance for Colombia and Neighboring Countries*, 26 October 2000.

³⁹ *International Narcotics Control Strategy Report* (INCSR), published in March each year by the U.S. State Department.

FIGURE 3. Manual Eradication, 2002-2006



Source: Dirección Antinarcóticos (DIRAN)
General Command of the Colombian Armed Forces, January 2007

2002 and 2003, with reported net reductions of 25,350 and 30,600 hectares, respectively. Based on the Integrated Illicit Crops Monitoring System (known as SIMCI, its Spanish acronym), the UN Office on Drugs and Crime (UNODC)⁴⁰ reported the greatest reductions as having occurred in 2001 and 2002. According to UNODC, there were 78,000 hectares of coca in Colombia as of December 2006, a reduction of 8% compared to the 2005 figure. By contrast, the White House Office of National Drug Control Policy (ONDCP) estimated that there were 157,200 hectares of coca in Colombia at the end of 2006, a 13,200 hectare increase over 2005.

Forced Manual Eradication

Beginning in 2005, the Uribe government has pursued forced manual eradication undertaken by Mobile Forced Manual Eradication Groups (*Grupos Móviles de Erradicación Manual Forzosa*, GMEs).⁴¹ The

government simultaneously implemented “Everyone Against Coca,” a program through which the National Police manually eradicate coca and poppy crops.

This strategy resulted in the eradication of 92,850 hectares in 84 municipalities located in 20 departments. Half of the crops eradicated through these operations in 2006 were located in four departments – Nariño, Meta, Putumayo and Cauca.⁴² Some of the GMEs have been formed at the initiative of former paramilitary leaders and have been comprised of demobilized paramilitary combatants.⁴³

UNODC reported that 15% (3,865) of the total number of hectares manually eradicated in 2006 were replanted in the same area, and that there was uncertainty over the extent of replanting with regard to another 10,283 hectares because the coca had been eradicated only a short time before the satellite images were taken.⁴⁴ Significant replanting should be considered likely to continue given the lack of adequate support for the affected families with regard to food security in the short-term, and shelter, employment, and relocation (where national parks are concerned) in the medium- and long-term.

Manual Eradication and Fumigation in National Natural Parks (PNN)

In 2003, the CNE approved fumigation in national parks on the condition that the requirements established by the council itself are met.⁴⁵ The first official eradication operation in a protected area occurred in the Sanquianga PNN in Nariño in October 2005, when 16 hectares of coca were uprooted manually. In January 2006,

⁴⁰ Eight annual censuses have been conducted since 1999 with the support of the UNODC's Illicit Crop Monitoring Program.

⁴¹ Acción Social, *Programa Presidencial contra Cultivos Ilícitos, Informe de Gestión I semestre 2006*, 2006. <http://www.acci.gov.co>

⁴² UNODC, *Colombia Coca Cultivation Survey*, 2006.

⁴³ *El Tiempo*, “¿Al fin cuánta coca hay sembrada? Gobierno incorporará dos mil desmovilizados a erradicación manual de cultivos ilícitos,” 17 de abril de 2006. A GME created in the first half of 2006 in Tierralta, Córdoba (which coincided with the Paramillo National Park) involved 490 ex-combatants. Other GMEs have been formed in areas of Urabá, Antioquia, that have been controlled by demobilized combatants Salvatore Mancuso and Fredy Rendón Herrera, also known as ‘José Alfredo Berrio’ and ‘El Alemán’, respectively.

⁴⁴ UNODC, *Colombia Coca Cultivation Survey*, June 2007.

⁴⁵ Consejo Nacional de Estupefacientes (CNE), Resolución 13, September 2003. According to UNODC, the p area planted with coca in the national parks fell by 41% between 2005 and 2006, from 6,100 to 3,600 hectares, less than the 3,790 hectares detected in 2003 and the 5,364 hectares in 2004.

the Uribe government moved ahead with forced manual eradication⁴⁶ in the country's oldest protected area, Sierra de La Macarena PNN.⁴⁷ The Ministry of Defense viewed the eradication operation as part of its counterinsurgency effort, which implied the adoption of "all the necessary police and military measures," including bombardment.⁴⁸ Guerrillas launched an armed response, killing several members of the eradication brigade and security forces.

Subsequently, the CNE authorized fumigation in the Sierra de La Macarena PNN with the goal of eliminating close to 1,800 hectares of coca.⁴⁹ The decision effectively ignored Colombia's Environment Minister, who maintained that it was of "utmost importance that spraying with glyphosate in the Sierra de La Macarena PNN not be initiated unless it can be carried out in full compliance with applicable environmental norms."⁵⁰ This disregard for norms and procedures led in 2006 to the start of investigations against the DNE and the Anti-Narcotics Bureau of the National Police (*Dirección Antinarcóticos*, DIRAN), for alleged use of banned chemical substances and unauthorized fumigation in national parks.⁵¹

Contradictory Estimates of Coca Cultivation

Although crops that serve as the raw materials for illicit drugs have been grown in Colombia for decades and

substantial sums have been spent in the effort to eradicate them, estimates of the extent of illicit crop cultivation continue to have a wide margin of uncertainty. For Colombian poppies, the only source of information is the DIRAN itself, which is in charge of eliminating the plants and responsible for reporting on eradication operations.⁵² This process has created friction between the DNE and DIRAN and some departmental governors, who have at times asserted that poppy and coca growing continues at higher levels than the official figures suggest.⁵³

As Figure 2 makes clear, coca cultivation estimates provided by UNODC and the U.S. government have differed significantly over the years, never more so than for 2006, when the U.S. estimate of 157,200 hectares was more than *double* the UN figure of 78,000 hectares. (DIRAN's coca estimates have often been at odds with those of the UN's SIMCI. For example, while the DIRAN reported that there were 10,431 hectares of coca in Colombia's national parks in 2004, the SIMCI reported 6,100 hectares for that year.) UNODC has acknowledged that insufficient satellite coverage, gaps in the images that are available, and cloud cover pose obstacles to the accurate measurement of the extent of coca cultivation.⁵⁴ Moreover,



A member of the Colombian National Police stands guard while men manually eradicate a field of coca. (Photo: Sanho Tree)

⁴⁶ The operation was carried out by 863 peasants, mostly from the other regions of the country, particularly the coffee-growing zone, and by 1,147 members of the National Police.

⁴⁷ Prior to the operations conducted in La Macarena, there were allegations that fumigation had been carried out in national parks, including the Sierra Nevada de Santa Marta, which was declared a biosphere reserve by UNESCO in 1979. The reserve is also home to Arhuaco, Kogui, Chimila, Kankuamo and Wiwa indigenous peoples. Despite complaints by indigenous groups and national parks officials, the government denied that spray operations had been carried out in national parks.

⁴⁸ Ministerio de Defensa, "Erradicación manual en La Macarena seguirá hasta el final," 16 de febrero de 2006, www.midefensa.gov.co

⁴⁹ CNE, Comunicado, 4 de agosto de 2006.

⁵⁰ Ministerio de Medio Ambiente, Vivienda y Desarrollo Territorial (MAVDT), Oficio-1000-2-70998, 3 de agosto de 2006. *El Tiempo* editorialized on 8 August 2006 that "the decision to fumigate in a natural park is, on its own, an attack on irreplaceable biodiversity. Employing this strategy in a natural sanctuary takes to an extreme a strategy of the war on drugs has demonstrated its ineffectiveness with each passing day."

⁵¹ MAVDT investigations opened on 18 August and 22 August 2006.

⁵² UNODC, *Colombia Coca Cultivation Survey*, June 2007.

⁵³ *El Tiempo*, "Las Farc estarían detrás de movilizaciones campesinas en Nariño, Putumayo y Meta," 16 de mayo de 2006. The governor of Nariño complained that the government "only now admits that there are more than 45,000 hectares of coca and not the 18,000 it said existed last year."

⁵⁴ UNODC, *Colombia Coca Cultivation Survey*, June 2007.

Although fumigation has often been referred to as “aerial eradication,” implying that the spray operations effectively eliminate the targeted coca fields, in fact fumigation is far from synonymous with eradication.

SIMCI does not reliably detect plots smaller than 0.25 hectares (about half an acre). Given that the average size of the coca fields that are being detected by UNODC is decreasing, the inability to account for plots smaller than 0.25 hectares suggests that a significant amount of land planted with coca is not being recorded. ONDCP, which releases the official U.S. coca estimates each year, has said that SIMCI’s measurement methods “tend to underestimate replanting or reconstitution” and therefore “tend to underestimate production.”⁵⁵

The U.S. figures provided by ONDCP have also raised questions. From 2004 to 2005, ONDCP reported an increase of 29,900 hectares in the area considered to be under coca cultivation, attributing much of the increase to an expansion in the area surveyed. ONDCP considered it “likely that much of the newly-surveyed coca was already present in past years, and better intelligence led to its recent observation.”⁵⁶ For 2006, ONDCP reported a further increase of 13,200 hectares, again attributing the increase to a wider area studied and suggesting that some of the newly-detected coca fields had probably already existed prior to 2006.⁵⁷ But if the substantial increases reported by ONDCP for 2005 and 2006 are to be considered more a function of expanded survey areas than actual new plantings, then the figures reported for previous years – including the significant reductions in coca reported for 2002 and 2003 – must be considered to be of doubtful reliability.

Indeed, ONDCP’s presentation of the 2006 coca estimates provided an overdue acknowledgement that the coca estimates are far from an exact science. For the first time, ONDCP presented the estimates in the form a range – not simply as a single figure or “point estimate” – thereby conceding the substantial uncertainties entailed in the esti-

mates. For Colombia, ONDCP reported that the 2006 estimate “is subject to a 90 percent confidence interval of between 125,800 and 179,500 hectares,” which means that ONDCP is 90 percent confident that the true figure lies somewhere in the range of 125,800 and 179,500 hectares.⁵⁸ Such a wide range makes clear that the coca cultivation figures should be considered very rough estimates. In light of ONDCP’s caveats to its 2005 and 2006 estimates, the wide range also suggests that the official U.S. figures over the years have been serious understatements of the true extent of coca cultivation in Colombia, especially as new plantings have become more dispersed.

Fumigation Is Not Synonymous with Eradication

Although fumigation has often been referred to as “aerial eradication,” implying that the spray operations effectively eliminate the targeted coca fields, in fact fumigation is far from synonymous with eradication. Farmers have taken countermeasures to avoid having their coca sprayed and to help it survive if it is sprayed, and have hedged against losses due to spraying by planting more coca and by replanting rapidly. Sprayed coca can be saved by washing the bush’s leaves or if there is rainfall soon after the spraying has occurred, since the herbicide can be effective only if it is first absorbed by the leaves. Also, coca is a perennial plant, so it can become productive again after spraying if it is pruned back. According to the findings of UNODC research that included face-to-face interviews with nearly 1,400 coca farmers from May 2005 through February 2006, 45% of coca farmers whose crops are fumigated wait for them to recover, 20% prune them, 12% replant, and 23% combine several strategies, recovering what they lose after six to eight months.⁵⁹ The U.S. Embassy in Bogotá has

⁵⁵ John Walters, Director, Office of National Drug Control Policy (ONDCP), press briefing, 17 November 2005.

⁵⁶ *El Tiempo*, “Hay más coca de la que se pensaba,” 15 de abril de 2006. According to Walters, “If we were comparing ‘apples to apples,’ the number of hectares would have dropped to 105,500, but we used a broader survey in 2005 so we cannot make comparisons to the numbers from previous years. In other words, the higher number today does not necessarily mean that crops have increased.”

⁵⁷ ONDCP, “2006 Coca Estimates for Colombia,” 4 June 2007.

⁵⁸ *Ibid.*

⁵⁹ UNODC, *Colombia Coca Cultivation Survey*, 2006.

FIGURE 4. Estimated coca yield and cocaine production, 2006

Regions – Departments	Average number of harvests (2006)	Average yield per harvest (kilo/hectare)	Average annual yield (kilo/hectare/year)	Hectares planted	Coca leaf production (metric tons)	Cocaine production (metric tons)
Meta – Guaviare	6.0	1,552	9,900	20,540	203,300	154.1
Orinoquia	5.6	1,441	8,552	6,829	58,400	51.2
Catatumbo	5.3	1,070	5,510	488	2,700	3.7
Putumayo – Caquetá	3.5	1,529	5,559	17,221	95,700	129.2
Sur de Bolívar	3.3	1,899	6,288	11,643	73,200	87.3
Sierra Nevada de Santa Marta	3.3	1,613	4,840	437	2,100	3.3
Pacific	2.5	1,027	2,705	18,807	50,900	141.1
Amazon			5,559	1,905	10,600	14.3
All regions (totals rounded)	4.3	1,446	6,343	78,000	495,000	585.0

Source: UNODC, 2007

acknowledged that, according to ONDCP calculations, four out of every 10 hectares fumigated or manually eradicated are subsequently replanted with coca.⁶⁰ The Colombian government has estimated the rate of coca replanting after fumigation at 70%.⁶¹

A December 2006 document by Colombia's DNE corroborates these points. The limited-circulation document, *Comentarios a la Política de Lucha contra las Drogas*, identifies the following "difficulties" that face the fumigation effort: reduction in the size of the coca plots; development of new strategies for crop concealment; and development of new strategies to evade eradication operations. The disappointing results of the spray program and the obstacles to its success have not been lost on the Colombian government. In a July 2007 speech to the Colombian Congress, President Uribe said that it was time to invest less in fumigation and more in manual eradication.⁶² The same month, Colombian Defense Minister Juan Manuel Santos, in an interview with *The*

Washington Post, underscored that the Colombian government is "convinced of the advantages of manual eradication over spraying, and that's why we want to give more importance to manual eradication."⁶³

The December 2006 DNE report also pointed out that fumigation efforts have been focused in areas with comparatively low coca and cocaine productivity per hectare of coca planted, such as the department of Nariño. UNODC's 2006 coca survey reinforced this concern, noting that 35% of the aerial spraying that took place in 2006 (nearly 60,000 hectares) occurred in Nariño, "although the potential production of cocaine of Nariño is the lowest in the country." By comparison, 15% of hectares sprayed in 2006 were in Meta, which has the highest per-hectare cocaine productivity rates in Colombia.

Colombian Cocaine Production Remains Robust

In June 2006, the UNODC reported that research conducted in 2005 and 2006

⁶⁰ *El Tiempo*, "En la Macarena volvió a aparecer la coca," 11 de junio de 2007.

⁶¹ Presidency of the Republic, "Acción Social: Presidential Program against Illicit Crops," presentation in Washington, DC, October 2007.

⁶² Colombian President Álvaro Uribe, Speech before Colombian Congress, 20 July 2007, Presidencia de la Republica, www.presidencia.gov.co. "[A]delantamos con los Estados Unidos las conversaciones sobre lo que sería la nueva etapa del Plan Colombia contra las drogas ilícitas. Creemos que debe darse menos presupuesto a las fumigaciones, que sean apenas un recurso marginal, y mucho más soporte a la erradicación manual, introducida en gran escala por nuestro Gobierno y financiada básicamente con recursos propios, erradicación manual que produce excelentes resultados."

⁶³ Juan Forero, "Colombia's Low-Tech Coca Assault," *The Washington Post*, 7 July 2007.

Adjustments by suppliers resulting in a rebound in cocaine availability would comport with the historical pattern, in which occasional price spikes have always been followed by declines, as producers respond to higher prices.

indicated that “current Colombia [coca] crops are more productive than previously estimated” in terms of yield per hectare and production of cocaine per ton of coca. The UNODC estimated yield at 7.7 kilograms of coca per hectare (kg/ha), more than 60% higher than the 4.7 kg/ha on which previous cocaine production estimates were based. As a result, the agency modified its estimate of cocaine production in Colombia for 2004 from 390 metric tons to 640 tons, equal to its estimate for 2005. If Colombian coca fields are yielding more leaves per hectare, and the leaves are yielding more cocaine per ton, then the overall reduction in the area under coca cultivation reported by UNODC does not necessarily mean there has been a decline in the amount of cocaine being produced. Indeed, UNODC’s estimate for cocaine production in Colombia for 2005 (640 metric tons) was slightly higher than the estimate for 2001 (617 metric tons) even though, by UNODC’s measures, the area under coca cultivation in 2005 (86,000 hectares) was 40% less than in 2001 (145,000 hectares). “These higher figures for cocaine yield in Colombia suggest,” according to UNODC, “that there is more cocaine on the international market than previously believed.”⁶⁴

The U.S. government has long maintained that “crop control is the most cost-effective means of cutting [drug] supply.”⁶⁵ The intensification of aerial spraying in Colombia led U.S. officials to predict imminent success in curbing supply and restricting cocaine availability in the United States and elsewhere. ONDCP Director John Walters declared in July 2003 that “we expect to see in the next six to nine

months significant disruptions in the purity and availability of cocaine throughout the world.”⁶⁶ In June 2004, Walters testified before Congress that “for the first time in 20 years ... we are on a path to realize dramatic reductions in cocaine production in Colombia, and a complementary reduction in the world’s total supply of cocaine.”⁶⁷

Such predictions have not been borne out. In recent years, student perceptions of cocaine’s availability have been fairly stable,⁶⁸ and assessments by the Justice Department’s National Drug Intelligence Center (NDIC)⁶⁹ have offered no reason to suppose that U.S. cocaine availability has been squeezed:

- *January 2005*: “Key indicators of domestic cocaine availability show stable or slightly increased availability in drug markets throughout the country...”
- *January 2006*: “Cocaine is widely available throughout most of the nation, and cocaine supplies are relatively stable at levels sufficient to meet current user demand.”
- *October 2006*: Despite record levels of cocaine lost or seized in transit toward the United States, “there have been no sustained cocaine shortages or indications of stretched supplies in domestic drug markets.”

More recently, in November 2007, ONDCP presented evidence of nationwide cocaine “shortages,” including estimates that cocaine’s price had climbed nearly 50% during the first three quarters of 2007.⁷⁰ While the methods behind these latest

⁶⁴ UNODC, *Colombia Coca Cultivation Survey*, 2006.

⁶⁵ Department of State, INCSR, March 2007.

⁶⁶ John Walters, Director, ONDCP, press briefing, 29 July 2003.

⁶⁷ John Walters, Director, ONDCP, testimony before the House of Representatives, 17 June 2004.

⁶⁸ L.D. Johnston, P.M. O’Malley, J.G. Bachman, and J.E. Schulenberg, *Monitoring the Future national results on adolescent drug use: Overview of key findings*, 2007. National Institute on Drug Abuse, December 2007. In 2007, 47.1% of U.S. high school seniors replied that cocaine would be “fairly easy” or “very easy” to get, comfortably within the range of findings over the past decade, which included a high of 51.3% in 1998 and a low of 43.3% in 2003.

⁶⁹ Department of Justice, National Drug Intelligence Center, *National Drug Threat Assessment 2005*, January 2005; 2006, January 2006; 2007, October 2006.

⁷⁰ ONDCP press release: “White House Drug Czar, DEA Administrator Release New Data Showing Significant Disruptions in U.S. Cocaine and Methamphetamine Markets,” 8 November 2007, at http://www.whitehousedrugpolicy.gov/news/press07/110807_2.html.

price estimates remain unclear,⁷¹ there seems little doubt that the U.S. cocaine market was disrupted in 2007. However, the disruptions have evidently been related to reasons other than curtailed cocaine production and trafficking from Colombia. In particular, the disruptions appeared to stem from factors such as stepped-up drug enforcement and interdiction by Mexican authorities, disputes within and between Mexican drug trafficking organizations, increased shipment of cocaine to European markets (where currencies had become stronger against the U.S. dollar), and perhaps increased cocaine distribution within transit countries.⁷²

In fact, although ONDCP's John Walters made the November 2007 announcement of a cocaine price spike at a press conference in Bogotá, the Drug Enforcement Administration (DEA) and NDIC were clear in their assessments that the market disruption was *not* the result of reduced cocaine production in Colombia and the other major Andean producer nations. "There is not more or less cocaine entering the pipeline," said DEA intelligence chief Tony Placido when describing the disruptions in an interview with *USA Today*.⁷³

NDIC's latest report, which was released the day before Walters' announcement in Bogotá, was even more emphatic, citing among its "strategic findings" that "[p]otential South American cocaine production increased in 2006 as Colombian coca growers adapted their growing practices to counter intensified coca eradication." Moreover, NDIC noted that Mexican drug trafficking organizations "will most likely undertake concerted efforts to reestablish their supply chain, and because cocaine production in South America appears to be stable or increasing, cocaine



availability could return to normal levels during late 2007 and early 2008."⁷⁴

Adjustments by suppliers resulting in a rebound in cocaine availability would comport with the historical pattern, in which occasional price spikes have always been followed by declines, as producers respond to higher prices. Indeed, the most recent *long-term* cocaine price trend data published by ONDCP – which were produced by the RAND Corporation and cover the period from 1981 through mid-2003 – display clear downward trends at both retail (2 grams or less) and wholesale (more than 50 grams) levels.⁷⁵

The price estimates presented by ONDCP in November 2007 were derived using different methods from those used to generate RAND's 1981-2003 time-series, and the new estimates extend back only to the second quarter of 2005, making direct comparisons impossible. However, the obvious downward trajectory of the longer

Coca bushes begin to sprout again soon after being cut back post-fumigation. (Photo: Sanho Tree)

⁷¹ Michael Dobbs, "Is There a 'Cocaine Shortage'?" *The Washington Post* on-line at <http://blog.washingtonpost.com/fact-checker/?hpid=news-col-blog>

⁷² Department of Justice, National Drug Intelligence Center, *National Drug Threat Assessment 2008*, November 2007.

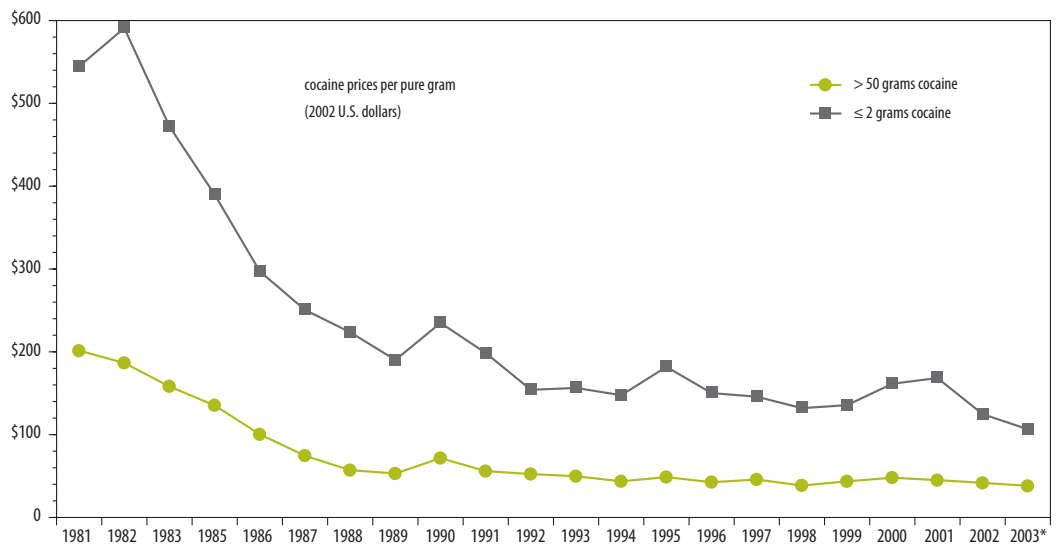
⁷³ Donna Leinwand, "DEA hopeful over drop in cocaine," *USA Today*, 12 September 2007.

⁷⁴ Department of Justice, National Drug Intelligence Center, *National Drug Threat Assessment 2008*, November 2007.

⁷⁵ ONDCP, *Price and Purity of Illicit Drugs, 1981 through the 2nd quarter of 2003*, November 2004.

Figure 5: U.S. wholesale and retail prices of cocaine, 1981-2003

wholesale = purchases of more than 50 grams, retail = purchases of 2 grams or less



Source: Prepared by the RAND Corporation for the Office of National Drug Control Policy (ONDCP), 2005

*2003 figures based on January-June data

time-series suggests that the cocaine price spike detected in 2007 will also eventually be reversed. For example, a 55% increase in cocaine's U.S. retail price per pure gram over three quarters in 1990 was fully reversed within 18 months, with prices lower than before the price spike began. At roughly the same time, a 57% increase in cocaine's U.S. wholesale price per pure gram over five quarters in 1989-1990 was also fully reversed within 18 months.⁷⁶

Fumigation's Effects on Health and the Environment

The U.S. government has insisted that "aerial eradication causes no significant damage to the environment or human health."⁷⁷ The U.S. Congress, for its part,

has conditioned the annual allocation of funds for aerial spraying on certification by the Secretary of State that "the herbicide, in the manner it is being used, does not pose unreasonable risks or adverse effects to humans or the environment including endemic species."⁷⁸ Between 2002 and 2006, the State Department issued annual certifications to guarantee continued approval of funding for the spray program, including the purchase of the required chemicals.⁷⁹ The chemical mixture used by the spray program combines Roundup Ultra Herbicide, water, and the surfactant Cosmo-Flux 411 – a blend of two additives that enhance the mixture's adherence to and penetration of the leaves of the coca plants. Roundup itself, manufactured by the Monsanto Company, consists of glyphosate, the surfactant polyoxethylene

⁷⁶ Ibid. Cocaine's retail price per pure gram in the 4th quarter of 1989 was \$179, after which it rose for three consecutive quarters, reaching \$278 (a cumulative increase of 55%); 18 months later, in the 1st quarter of 1992, the price had fallen to \$147. Similarly, cocaine's wholesale price per pure gram in the 2nd quarter of 1989 was \$50, after which it rose for five consecutive quarters, reaching \$78 (a cumulative increase of 57%); 18 months later, in the 1st quarter of 1992, the price had fallen to \$46 (all prices in 2002 constant dollars).

⁷⁷ Department of State, INCSR, March 2007.

⁷⁸ Andean Counterdrug Initiative section of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, Division D, Consolidated Appropriations Act, 2006, (P.L. 109-102).

⁷⁹ Department of State, Memoranda of Justification Concerning the Secretary of State's Certifications, 2002-2006, at <http://www.state.gov/p/inl/rls/rpt/aeicc>.

alkylamine (POEA), and another unnamed additive.⁸⁰

The State Department's 2005 and 2006 certifications cite the findings of a study prepared for the OAS' Inter-American Drug Abuse Control Commission (CICAD).⁸¹ The six-member panel that prepared the March 2005 report for CICAD concluded that "the risks to humans and human health from the use of glyphosate and Cosmo-Flux® in the eradication of coca and poppy in Colombia were minimal" and that "the risks to the environment ... were small in most circumstances." According to the study, compared to the environmental damage caused by planting coca or poppies, especially "the uncontrolled and unplanned clearing of pristine lands in ecologically important areas ... the added risks associated with the spray program are small."

The CICAD report has been hailed by the State Department as an "objective, independent scientific study."⁸² Nevertheless, doubts about the spray program have multiplied as a result of new scientific research that points to more serious risks to human health and the environment stemming from exposure to the herbicide mixture. The present report is not meant as a definitive review of the potential negative effects of aerial spraying on human health and the environment, but aims to show that the debate remains open, and that limited understanding of the risks potentially being incurred suggests the need for precaution. In particular, this report seeks to promote debate on the following questions:

- ▶ Is fumigation as innocuous for human health and the environment as the U.S. government maintains?
- ▶ Might the aerial spray program entail significant risks to health and the



environment that have not been adequately evaluated?

- ▶ In assessing the impact of the spray program on human health and the environment, should the impacts on communities' well-being, and their subsequent decisions, be considered? For example, if aerial spraying affects a family's most lucrative crop (coca), as well as the other crops necessary for the family's subsistence, their food security will likely be compromised. Likewise, if other crops from alternative programs are also damaged, their economic security will also likely be jeopardized (employment, income and compliance with financial obligations), as well as their living conditions.
- ▶ If fumigation, due to its impacts on families' subsistence and livelihoods, compels farmers to move to another area to cultivate coca again, should this move be considered among the range of environmental damages caused by fumigation?

The rash on this woman's arm is typical of the type of skin rash believed to be caused by exposure to the sprayed herbicide. (Photo: Sanho Tree)

Doubts about the spray program have multiplied as a result of new scientific research that points to more serious risks to human health and the environment stemming from exposure to the herbicide mixture.

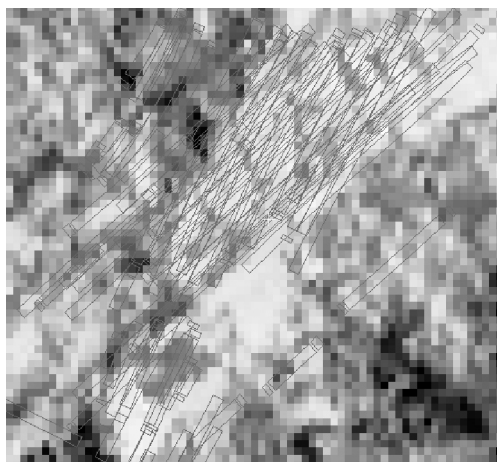
⁸⁰ Connie Veillette and Carolina Navarrete-Frías, *Drug Crop Eradication and Alternative Development in the Andes*, Congressional Research Service, 18 November 2005.

⁸¹ Keith R. Solomon, Arturo Anadón, Antonio Luiz Cerdeira, Jon Marshall, and Luz-Helena Sanin, *Environmental and Human Health Assessment of the Aerial Spray Program for Coca and Poppy Control in Colombia*, a report prepared for the Inter-American Drug Abuse Control Commission (CICAD) section of the OAS, 31 March 2005.

⁸² Department of State, Memorandum of Justification Concerning the Secretary of State's Certification, 2006, at <http://www.state.gov/p/inl/rls/rpt/aeicc/c18686.htm>.

As a consequence of the narrow focus of the 2005 CICAD study, the impact of spray operations on families' decisions to replant coca elsewhere, and the implications of this replanting on ecosystems, were not considered.

FIGURE 6. Satellite image of aerial spray flight lines in the Sierra Nevada de Santa Marta, 2004



SOURCE: Interior Ministry. SPOT Image 644327, August 31, 2003, vs. fumigation "buffer" area, July 2004.

Shortcomings of the CICAD Study

The 2005 CICAD study mentioned above has drawn numerous criticisms, including a May 2005 response by researchers at the *Universidad Nacional de Colombia's* Institute for Environmental Studies (IDEA),⁸³ who pointed to numerous shortcomings, including:

- An excessively narrow conception of the subject of the assessment, in that the economic and social consequences of the spray program were explicitly considered beyond the purview of the study, despite the fact that the affected human communities play a major role in shaping the local environment. As a consequence of the narrow focus of the CICAD study, the impact of spray operations on families' decisions to replant coca elsewhere, and the implications of this replanting on ecosystems, are not considered. As discussed in more detail below, this is a significant exclusion, as environmental damage

due to the mobility of coca in the face of fumigation may be among the most important adverse environmental impacts related to the spray operations.

- A misplaced focus on aspects of the ecosystem where there is reason to suppose that the threats posed by fumigation would be smaller (for example, impacts on land animals) rather than on aspects in which the impacts of spraying can be considered to be direct and substantial, including the destruction of licit crops and the consequences for soil erosion.
- An inadequate basis in field research conducted in Colombia and reflecting the actual conditions in which the spray operations are carried out. Findings based on research regarding different climates, topography, affected populations and methods of herbicide application may not fit the particular circumstances where the spray operations are conducted in Colombia.

Regarding the actual spray operations, there is evidence of overlapping flight lines of spray planes, suggesting that some areas are sprayed more than once during the same operation, which would increase the amounts and concentrations of the herbicide to which residents and the environment are exposed. For example, former Colombian Interior Ministry official Alberto Rueda has documented the occurrence of the same areas being fumigated more than once as part of July 2004 spray operations carried out in Sierra Nevada de Santa Marta.

The Institute for Environmental Studies' (IDEA) critique also highlighted the many aspects in which knowledge of the impacts of fumigation remains limited due to a lack of on-the-ground research.⁸⁴

⁸³ Tomás León Sicard, Javier Burgos Salcedo, Catalina Toro Pérez, Cesar Luengas Baquero, Claudia Natalia Ruiz Rojas, and Claudia Patricia Romero Hernández, *Observaciones al "Estudio de los efectos del programa de Erradicación de Cultivos Ilícitos"*, Instituto de Estudios Ambientales (IDEA), Universidad Nacional de Colombia, May 2005.

⁸⁴ Clínica Uribe Cualla, *Informe Final del estudio de las denuncias de daños a la salud relacionadas con la erradicación aérea en Colombia*, 2001. The Uribe Cualla Hospital assessed the impact on the health of residents of towns in Nariño and Putumayo. Conducted several months after aerial spray operations took place, the study called for "research that includes a health assessment prior to and after fumigation operations, since the studies conducted were retrospective. For the health impacts to be measured, it is necessary to evaluate health conditions before and after fumigation, both at the medical and analytical levels."

In this respect, in 2006 the UN Committee on the Rights of Children recommended that the Colombian government conduct “independent, rights-based evaluations on the environmental and social effects of fumigations in different regions of the country,” specifying that such evaluations should be conducted where indigenous communities could be affected and urging that these communities be previously consulted in order to take “all the necessary precautions to avoid harmful effects on children’s health.”⁸⁵

While the CICAD report has been touted by proponents of fumigation as a conclusive scientific assessment that the health and environmental risks posed by aerial spraying are minimal, IDEA’s critique makes clear that the CICAD study was too narrowly conceived to offer anything close to definitive findings, leaving important dimensions of the problem inadequately considered if not entirely unexplored. Among those dimensions are the potential for reproductive problems in humans due to exposure to the herbicide mixture and the impact of the herbicide on amphibians, which are especially susceptible to harm because they easily absorb chemicals through their skin. Both of these issues have been explored by researchers whose findings throw into question the contention that fumigation is more-or-less benign for human health and the environment.

A French research team led by Sophie Richard has found that glyphosate and Roundup are toxic to human placental cells at concentrations significantly lower than those found in agricultural use. Sensitivity to glyphosate itself was lower than to the Roundup mixture, whose surfactants

are known to facilitate cell penetration. The team concluded that with exposure to Roundup at levels below typical agricultural dilutions, the herbicide’s “toxicity on placental cells could induce some reproduction problems.”⁸⁶

Only Brazil has more endemic amphibian species than Colombia (337), and in no country are there more threatened species of amphibians than Colombia (209). Amphibians play important roles in their local ecosystems and are beneficial to humans because they eat pest insects. According to the Global Amphibian Assessment, the “major threats to amphibians in Colombia are habitat loss, although there have been many as-yet unexplained declines in amphibian populations also occurring, and the dramatic topography of the Andes means that many of the amphibians have very restricted ranges, making them more vulnerable to threatening processes.”⁸⁷

The CICAD study found that “moderate risks could occur in aquatic organisms in shallow surface water that are over-sprayed during the eradication program,” an important possibility since many amphibians reproduce in small, temporary pools.⁸⁸ The potential vulnerability of amphibians to the spray program has been underscored by the research of University of Pittsburgh biologist Rick Relyea. Based on research using North American tadpoles, frogs and toads, Relyea’s results suggest that Roundup “can cause extremely high rates of mortality to amphibians and that could lead to population declines.”⁸⁹ The hazards posed to amphibians by Roundup, in Relyea’s view, appear due to the presence of the surfactant POEA rather than glyphosate

A French research team found that with exposure to Roundup at levels below typical agricultural dilutions, the herbicide’s “toxicity on placental cells could induce some reproduction problems.”

⁸⁵ United Nations Committee on the Rights of the Child, *Report on the 42nd session period*, Geneva, 15 May to 2 June, 2006. CRC/C/42/3, 3 November 2006.

⁸⁶ Sophie Richard, Safa Moslemi, Herbert Sipahutar, Nora Benachour, and Gilles-Eric Seralini, “Differential Effects of Glyphosate and Roundup on Human Placental Cells and Aromatase,” *Environmental Health Perspectives* 113(6), June 2005, pp. 716-720.

⁸⁷ World Conservation Union, Conservation International, and NatureServe, *Global Amphibian Assessment*, at <http://www.globalamphibians.org>.

⁸⁸ Interamerican Association for Environmental Defense, “Critical Omissions in the CICAD Environmental and Health Assessment of the Aerial Eradication Program in Colombia.”

⁸⁹ Rick A. Relyea, “The Lethal Impact of Roundup on Aquatic and Terrestrial Amphibians,” *Ecological Applications* 15(4), 2005, pp. 1118-1124.

One of fumigation's main effects has been the displacement and dispersal of coca to different areas of Colombia.

itself, reinforcing earlier findings of Chinese researchers M.T. Tsui and L.M. Chu that POEA alone was more toxic for aquatic creatures than Roundup, and that Roundup was more toxic than glyphosate alone.⁹⁰

The Mobility of Coca in the Face of Fumigation

As the pace of fumigation has increased under Plan Colombia, U.S. officials have contended that spray operations, by deterring coca growing, would prove beneficial to the environment. In 2002, the then U.S. Assistant Secretary of State for International Narcotics and Law Enforcement Affairs, Rand Beers, predicted that an expanded spray program would constitute a bulwark against environmental destruction in Colombia. As “a major retardant on the growth of coca and a major deterrent to the growth of coca in the time ahead,” Beers described fumigation as “one of the best ways, if not the best way, to prevent the horrible environmental damage that is happening in Colombia because the coca industry, the narcotraffickers, are inducing poor peasants to grow a crop for a high return and destroy the Amazon rainforest in the process.”⁹¹ The State Department made a similar argument on behalf of the environmental benefits of an aggressive spray program in 2005 congressional testimony.⁹²

This argument rests on the assumption that fumigation actually deters new coca growing. But as the cultivation estimates described above suggest, that has not been the case. On the contrary, one of fumigation's main effects has been the displacement and dispersal of coca to

different areas of Colombia. UNODC's 2006 report notes that in the Meta–Guaviare region, 52% of the areas under coca cultivation were not planted with coca in the 2001–2005 period; a similar ratio was observed on the Pacific coast, where a 67% of the total area under coca cultivation corresponded to new coca fields. The trend is repeated in the Putumayo–Caquetá, Central, Orinoquía, Amazonía and Sierra Nevada de Santa Marta regions, which combine for a total of 61% of areas identified as new coca fields. According to UNODC, “such observations suggest a high mobility of coca cultivation in Colombia.” Fumigation evidently plays a role in the opening of new coca fields, indirectly causing a loss of biodiversity.⁹³

UNODC reported that 76,000 hectares of primary forests were logged to clear the way for new crops between 2001 and 2005. This includes environmentally protected territories, such as national parks and reserved areas, indigenous reservations and areas belonging to Afro-Colombian communities on the Pacific Coast. This deforestation has come in addition to deforestation resulting from settlers and the expansion of large-scale agriculture and livestock ranching.⁹⁴

Primary forests located in the departments of Antioquia, Bolívar, Caquetá, Cauca, Putumayo and Vichada were affected by the expansion of coca fields in 2004 and 2005. While the amount of land cultivated with coca in the departments of Guaviare, Meta and Nariño went unchanged, new areas were deforested to replace fields that were old, abandoned or eradicated. This trend appears to have changed during 2006,

⁹⁰ M.T. Tsui and L.M. Chu, “Aquatic toxicity of glyphosate-based formulations: comparison between different organisms and the effects of environmental factors,” *Chemosphere* 52, 2003, pp. 1189–1197.

⁹¹ Foreign Press Center Briefing, “Narco Pollution: Illicit Drug Trade in the Andes,” 28 January 2002.

⁹² Jonathan Farrar, Department of State, testimony before the House of Representatives, 11 May 2005. “The scientific evidence of the safety of aerial spraying stands in stark contrast to the environmental devastation caused by illicit cultivation and drug processing ... [which is] – very sadly – quickly destroying some of the richest and most varied biodiversity in the world. In a little over a decade, it is estimated that illicit cultivation of drugs [sic] in Colombia has destroyed almost three million acres of rain and cloud forest. If we do not stop this now, the destruction will continue.”

⁹³ Dirección Antinarcóticos (DIRAN), “Costo producción por hectárea coca país,” agosto de 2004. According to DIRAN, “to plant one hectare of coca, farmers have to destroy three hectares (3) of forest, and for one of hectare of poppies, two and one-half (2.5) hectares of Andean forest.”

⁹⁴ UNODC – Proyecto SIMCI II, *Análisis multitemporal de cultivos de coca 2004–2005*, 2006.

according to the UNODC, which has reported that coca crops were increasingly planted in forest-free areas. In the period 2000-2001, 55,000 hectares of forests were cleared to plant coca, while 8,332 hectares were deforested in the period 2005-2006 for the same purpose.⁹⁵

An important example of coca crop mobility is seen in areas of Nariño inhabited by Afro-Colombian and indigenous communities. According to UNODC, “Coca cultivation in Nariño became significant in 2002, at a time when coca cultivation decreased in the neighboring departments of Putumayo and Caqueta. Between 2001 and 2002, coca cultivation decreased by 40,000 hectares in Caqueta and Putumayo, while increasing by 7,600 hectares in Nariño.”⁹⁶ The cultivation and eradication of coca fields have created an unprecedented humanitarian crisis in this department, which has meant the displacement of 55,000 people between 1999 and 2005, according to CODHES.⁹⁷

The conditions faced by the displaced population, mostly Afro-Colombians, are worsened by “the government’s failure to adopt measures intended to stop operations by the security forces [including fumigations] from resulting in forced migration or, when this cannot be foreseen, taking steps to lessen the effects on the population,” as the Attorney General’s Office (*Procuraduría*) wrote in 2006.⁹⁸

Proceeding with Precaution

Ignoring the concerns and findings from recent studies on the risks posed by fumigation could have grave risks for human health and the environment. The U.S. and Colombian governments have pointed to the 2005 CICAD report to bolster their

contention that the aerial spray program poses minimal risks to human health and the environment. But, as described above, the conclusions of the CICAD report suffer from a lack of field research on the affected communities and ecosystems and the actual conditions in which spraying is carried out. Far from being considered the last word on the subject, the CICAD study should be understood as a preliminary step toward fuller scientific understanding of the risks involved in fumigation.

The two governments prefer to focus attention on the environmental damage caused by coca cultivation and cocaine processing, arguing that fumigation, rather than a threat to the environment, should be understood as a means of halting or containing the damage caused by coca growing. But this argument is at odds with the evidence in UN and U.S. government reports, which indicate that coca growing has spread in Colombia even as the spray program has intensified. Far from preventing new coca plantings and thereby reducing environmental damage, the fumigation program evidently has contributed to the spread of coca cultivation to new, more remote areas of the country. Fumigation is not a solution to coca cultivation or to the environmental damage caused by it, but rather a part of the problem. Nor does fumigation appear to have weakened drug trafficking networks and organizations in Colombia.

The risks to human health and the environment are being played out in a context of scientific uncertainty through a policy that has not demonstrated results. The continued application of aerial spraying contradicts the principle of precaution, recognized in international agreements such as the Universal Principles of Sustainable Development from the

Fumigation is not a solution to coca cultivation or to the environmental damage caused by it, but rather a part of the problem. Nor does fumigation appear to have weakened drug trafficking networks and organizations in Colombia.

⁹⁵ UNODC, *Colombia Coca Cultivation Survey*, June 2007.

⁹⁶ UNODC, *Colombia Coca Cultivation Survey*, 2006.

⁹⁷ CODHES, *Informe Especial: Empeora la situación humanitaria y se intensifica el conflicto armado en el departamento de Nariño*, 3 de marzo de 2005.

⁹⁸ Procuraduría General de la Nación, *Análisis a la ejecución de la reforma agraria y la gestión del Instituto Colombiano de Desarrollo Rural – Incoder*, 2006.

The risks to human health and the environment posed by aerial spraying are being played out in a context of scientific uncertainty through a policy that has not demonstrated results.

1992 Declaration of Rio de Janeiro on the Environment and Development, and incorporated as a general principle of Colombian environmental law.⁹⁹

Fumigation Violates International and Colombian Legal Protections

States have three fundamental obligations with respect to international law on human rights: respect the rights established in treaties; guarantee the enjoyment and full exercise of the rights of individuals that come under their jurisdiction; and adopt the necessary measures to make the protected rights effective.

Aerial spraying in Colombia, which is carried out with U.S. financial, human and logistical aid, does not meet the obligations of respect for those treaties and the rights emanating from them. On the contrary, it has infringed on the rights of vulnerable populations living in areas that are fumigated. The spray program has also violated Articles 2 and 13 of the Colombian Constitution, which establish that all public authorities have the duty to protect the life, honor and possessions of all Colombians, especially the most vulnerable or marginalized groups.

The case for supporting the spray program is based on the notion that eradicating coca and poppy plants with herbicides preserves the “general interest” of the nation by combating mafias and drug production. But the Colombian Constitutional Court has ruled that eradication policies “cannot translate into operations that harm the environment, since it is the state’s obligation to protect the diversity and integrity of the environment ... This means that the Colombian state should always evaluate the

potential environmental damage caused by anti-drug polices since the strategies of eradication of illicit crops are capable of negatively affecting the ecological systems and do not uphold the constitution.” Therefore “the fight against drug trafficking cannot result in the state ignoring its obligation to protect the environment, not only for the present generation but also for future generations.”¹⁰⁰

The aerial spray program has ignored the Constitutional Court’s ruling to guarantee the basic right to participation of ethnic groups through prior consultation.¹⁰¹ There has been no process of prior consultation in the region inhabited by Afro-Colombian communities targeted in this program. In addition, as the Constitutional Court has pointed out, there are no specific policies to deal with the ethnic groups, despite the fact that they are the most affected by internal displacement caused by armed conflict and fumigation,¹⁰² situations that become “serious violations of specific constitutional rights, including their collective rights to cultural and territorial integrity.”

In this regard, authorities in charge of the spray program have ignored that the damage “to the environment of an ethnic group, given the biological inter-dependence of the ecosystem, can contribute passively to the perpetration of ethnocide, consisting in the forced disappearance of the ethnic group (Article 12, Colombian Constitution). This is due to the destruction of their living conditions and belief systems,” as the Constitutional Court wrote in 1993.

Aerial spraying has led to forced internal displacement of peasants and members of Afro-Colombian and indigenous

⁹⁹ Ley 99 de 1993, artículo 1, numeral 6.

¹⁰⁰ Corte Constitucional, Sentencias C-058 de 1994, SU-039-97 y SU-383 de 2003.

¹⁰¹ The Awá people have charged reiterated violations of their rights due to “massive fumigation of territory affecting the life, health and dignity of our families, as well as the integrity of our territory, in which the food chains of all beings whom inhabit the area are being destroyed. This affects both our access to food and our traditional way of life and sacred places for the reproduction of our culture and for the survival of living spaces.” Pronouncement by the Awá people on human rights violations in our ancestral territory, San Juan de Pasto, 26 April 2006.

¹⁰² National Council for Attention to Displaced Populations. *Appendix to the normal follow-up report presented to the Constitutional Court in response to the ninth order reached in Ruling 218 of 2005.*

communities, violating the United Nations' Guiding Principles on Internal Displacement.¹⁰³ In this respect, the court cited in 2005 as causes of displacement "the actions of the military or police and state security agencies in confronting criminal actions of armed groups, or in carrying out fumigation and eradication of illicit crops." The court came to this conclusion after analyzing cases of displacement in Chocó, Nariño, Cauca, Meta, Caquetá and Putumayo,¹⁰⁴ areas in which the Patriot Plan and the spray operations were carried out.

While a formal complaint process exists (CNE Resolution 017 from 2001), it has proved inadequate, largely due to the fact that the DIRAN, the authority charged with evaluating and admitting petitions for complaints is at the same time the body that implements the spray program. This dual role for the anti-drug police would seem to undermine the complainants' right to due process. The December 2006 DNE document cited above noted several obstacles to effective functioning of the complaints system, including "difficulties with municipal representatives regarding the reception of claims; public security conditions that make verification in the field difficult; and ... unwillingness on the part of the United States [which] appears not to want to assume the payment of these indemnities in the future." As a result, of the 6,616 complaints that DIRAN¹⁰⁵ reports having received, field visits were made to fewer than 6%. The number of individuals compensated was less than 1% of the total. This indicates a lack

of political will to protect and compensate the affected communities from harm related to the spray program.

Alternative Development Proposals

UNODC's 2007 report noted that the "sustainability of eradication efforts depends to a large extent on the real alternatives open to farmers and the displacement of cultivation into new and more remote areas of the country (balloon effect)."¹⁰⁶ Yet, on the basis of its 2005-2006 interviews with nearly 1,400 coca farmers, UNODC found that "only 9% of the coca farmers reported having received any kind of assistance to stop growing coca plants."¹⁰⁷

According to Acción Social,¹⁰⁸ the Colombian government's development agency, proposals to establish viable alternatives to the cultivation of crops for illicit use are being developed through the Productive Projects Program (PPP) as part of the strategy of the Presidential Program against Illicit Crops (PCI). The program's main aim is to launch projects that are self-sustaining and profitable, offer alternatives for legal, stable employment, and improve food security for peasant communities. As described by the government, the program goals are certainly laudable. There are nevertheless serious obstacles to their effective implementation, including:

- Scant and precarious state presence in the regions targeted for the projects, as

Based on interviews with nearly 1,400 coca farmers in 2005-2006, UNODC found that "only 9% of the coca farmers reported having received any kind of assistance to stop growing coca plants."

¹⁰³ United Nations, Guiding Principles on Internal Displacement, presented to the UN Human Rights Commission in 1998, by the Representative of the Secretary General on Internally Displaced, Francis M. Deng, DOC E/CN.4/1998/53/Add.2, 11 February 1998. These principles become part of a block of provisions whose constitutionality is affirmed by virtue of Article 93 of the Constitution. This article establishes that treaties and international conventions ratified by Colombia which recognize human rights take precedence over internal security. (Constitutional Court, Sentences T-025 of 2004 and T-327 of 2001, among others). The UN guiding principles on internal displacement note that states have the specific obligation to adopt measures of protection against displacement of indigenous peoples and minorities in light of their special dependence on the land.

¹⁰⁴ National Council for Attention to Displaced Populations, *Appendix to the normal follow-up report of presented to the Constitutional Court in response to the ninth order reached in Ruling 218 of 2005*.

¹⁰⁵ Among the reasons for not admitting the complaints are failure to use the official forms to file the complaints and differences between the complainants' dates and DIRAN's dates on which spraying was carried out.

¹⁰⁶ UNODC, *Colombia Coca Cultivation Survey*, June 2007.

¹⁰⁷ UNODC, *Colombia Coca Cultivation Survey*, 2006. The Pacific region includes Nariño, where more aerial spraying was carried out than in any another department in 2004, 2005, and 2006 (one-third of the nearly 450,000 total hectares sprayed over these years). Yet none of the Pacific region farmers interviewed reported having received any assistance to stop planting coca.

¹⁰⁸ Agencia Presidencial para la Acción Social y la Cooperación Internacional (Presidential Agency for Social Action and International Cooperation).

Another obstacle to alternative development initiatives is mistrust of government authorities among communities who have participated in alternative development projects but have nonetheless been subsequently subjected to aerial spraying.

FIGURE 7. Coca and opium poppy cultivation and investments in alternative development

Department	Hectares of coca 2000-2006	Hectares of opium poppy 2002-2006	Percentage of participation in projects	
			Finalized Projects % of investment	Ongoing Projects % of investment
Huila	0	2,829	4.4	8.5
Tolima	0	3,486	4.3	4.5
Cesar	0	1,935	4.7	0.1
Santander	7,307		3.1	11.1
Córdoba	7,880			3.4
Cauca	17,353	3,191	5.1	3.9
Bolívar	27,443		5.0	4.5
Antioquia	30,760		8.0	20.4
N. de Santander	32,324		6.3	33.5
Vichada	40,870		0.2	
Caquetá	73,216	289	4.9	
Meta	91,692		3.4	
Nariño	93,231	3,021	3.7	7.6
Guaviare	114,620		1.8	
Putumayo	160,029		34.5	0.4
Subtotal	696,725	14,751	89.4	97.9
Others	42,973	351	10.6	2.1
Total	739,698	15,102	100.0	100.0

Source: UNODC, 2007

well as the close relationship “between armed groups, drug-trafficking and the production of illicit crops, which creates a vicious circle.”¹⁰⁹ Security problems and the presence of new armed groups, in addition to the insurgency, make the implementation of alternative projects difficult. Likewise, the government lacks capacity to guarantee security and conditions for the transport and marketing of the products.

- The lack of property titles or effective measures to protect land rights. These problems create, on the one hand, obstacles to obtaining government support (e.g., credit and incentives) and,

on the other, encourage re-population of lands that were abandoned or seized as a consequence of grave human rights violations.

- The failure to recognize the diverse cultural and economic characteristics of indigenous, Afro-Colombian and peasant communities in the design of the projects. Moreover, failure to recognize the communities’ legitimate authorities in promoting certain projects has created friction and internal divisions within communities.
- Development objectives at odds with the conservation of protected ecosys-

¹⁰⁹ Sandro Calvani, *La coca: Pasado y presente, mitos y realidades*, 2007.

tems, as is the case with the cultivation of oil palm trees on the Pacific coast and in Puerto Wilches. These programs seek to cultivate the wetlands of La Colorada, Caimán and Paredes, ecosystems with special environmental protection in which specific programs are developed for the protection of the manatee, a threatened species.¹¹⁰

- Corruption in government institutions operating in the Colombian rural sector, such as INCODER. This has led to the removal of some of its officials, several of whom were close to legislators linked to the “parapolitics” scandal involving secret ties between politicians and paramilitary groups,¹¹¹ including the use by some officials of government jobs for their private benefit.¹¹²
- Violation of labor laws through the establishment of so-called “cooperatives,” through which businessmen can bypass regulations regarding health and pension benefits, labor unions and the prohibition of work on Sundays.¹¹³ This model, used in regions where oil palm trees are planted, has particularly affected the Afro-Colombian communities on the Pacific coast.
- Mistrust of government authorities among communities who have participated in alternative development projects but have nonetheless been subsequently subjected to aerial spraying.¹¹⁴

While much of the initial investment in alternative development, especially in Putumayo, was geared toward food security, there

has been an evident shift toward coordinating alternative development with export-oriented agro-industrial and agro-forestry projects.¹¹⁵ In 2007, UNODC reported that 67% of the budget for ongoing projects is being used to finance long-term projects (cacao, oil palm and rubber) in central region departments of Antioquia, Norte de Santander, Bolívar and Magdalena.¹¹⁶

According to the funding figures reported by UNODC in 2007:¹¹⁷

- Nearly 45% percent of the alternative development budget in the first phase of Plan Colombia was invested in the departments of Putumayo, Meta, Guaviare, and Caquetá, but there are almost no ongoing projects in these departments, although in 2006 they accounted for 48% of the area under coca cultivation and 42% of the area subject to fumigation. According to UNODC, investment in “ongoing projects in Putumayo represents only 0.4% of the national budget available for alternative development while the spraying activities maintain the same high level of past years.”
- Nariño had more area under coca cultivation than any other department in 2006 (20% of the national total) and was subject to more aerial spraying than any other department from 2000-2006 (25% of the 7-year national total), but has received only 3.7% of the budget for finalized alternative development projects and only 7.6% of the budget for projects underway.

UNODC notes that the “sustainability of eradication efforts depends to a large extent on the real alternatives open to farmers and the displacement of cultivation into new and more remote areas of the country (balloon effect).”

¹¹⁰ Procuraduría General de la Nación, *State defender asks to revoke titles granted illegally in Puerto Wilches (Santander)*, 14 May 2007, and Agriculture Ministry awarded land to settlers in Puerto Wilches, 1 December 2006, www.presidencia.gov.co.

¹¹¹ *El Tiempo*, “Ex jefe de Incoder denuncia cuotas políticas,” 16 de junio de 2007. In his statement, the official said that Incoder gave the Colombia Viva political movement lands and that the quotas of Congressmen Jairo Merlano, Luís Vives and Dieb Maloof were among those approved by the Agriculture Ministry.

¹¹² *El Espectador*, “El zar del agro. El caso del ex ministro de Agricultura Carlos Murgas,” semana del 17 al 23 de junio de 2007.

¹¹³ Aricapa Ricardo, *Desierto verde y ruina labora: Cooperativas de Trabajo Asociado en la agroindustria de la palma africana en el Magdalena Medio*, www.viva.org.co.

¹¹⁴ Centro Interdisciplinario de Estudios Regionales (CIDER), *Sistema de monitoreo auditoria técnica al Programa Nacional de Desarrollo Alternativo, Informe Final*, 2001; and Red de Consejos Comunitarios del Pacífico Sur (RECOMPAS), “Carta dirigida a la dirección nacional del proyecto ADAM y ARD denunciando el hecho y solicitando la reformulación de las propuestas,” Tumaco, Nariño, 2006.

¹¹⁵ Departamento Nacional de Planeación, *Programa de desarrollo alternativo 2003 – 2006*, Bogotá, 2003.

¹¹⁶ UNODC, *Colombia Coca Cultivation Survey*, June 2007.

¹¹⁷ Ibid.

Thus far, alternative development efforts in Colombia continue to fall well short of the aims expressed by UNODC's Executive Director, Antonio María Costa. In his preface to UNODC's June 2006 coca survey, Costa noted that "the second strong popular mandate received by President Uribe should make it possible for his new government to launch a major drive in favor of greater assistance to farmers in coca cultivation areas, accompanied by structural policies devised to redistribute land (especially land seized from drugs lords) to internally displaced people."¹¹⁸

Forest Warden Families Program

The Forest Warden Families Program seeks to incorporate peasant, Afro-Colombian and indigenous families in processes of voluntary eradication of coca plants through economic incentives equivalent to \$1,836 per family paid out over an 18-month period.¹¹⁹ According to Acción Social, nearly 59,000 families have participated, receiving a total of \$201 million since 2002 and eradicating more than 9,000 hectares of coca. According to UNODC, which is monitoring the program, as of December 2006 1,515 hectares of secondary forest had been recovered.

However, numerous concerns have arisen regarding the effectiveness and sustainability of the program. As in the case of other efforts, the Forest Warden Families Program is hampered by threats from armed groups opposing the program or fighting for territorial control, as well as by the lack of definition regarding property rights to the land. At the same time, there are concerns that some participants receive the program's benefits but continue to grow coca.¹²⁰ Moreover, the promotion of agricultural

projects in protected areas such as national parks and ethnic reserves can lead to environmental destruction, displacement and conflicts among communities over use of resources. In addition, the inclusion of demobilized paramilitary fighters raises the possibility that the program could be used to help solidify criminal networks involving demobilized groups.¹²¹

Questions about Alternative Development

The issues presented above prompt important questions about fostering successful and sustainable alternatives to the cultivation of crops for illicit use.

- Is it possible to design strategies for production, processing, credit and marketing capable of competing with coca in economic terms, and at the same time being compatible with the protection of the environment, natural resources and the socio-cultural values of the affected communities?
- Is it ethical or legal to promote projects focused on a single crop (such as palm) in the face of reluctance or refusal on the part of authorities and members of local indigenous and Afro-Colombian communities to undertake these projects?
- How can alternative development projects shield themselves from corruption, illegal accumulation, illegal appropriation of lands, and laundering of assets?
- Can resources be oriented toward initiatives proposed by the affected communities themselves and tailored to their needs and customs, in which priority is given to food security?

¹¹⁸ UNODC, *Colombia Coca Cultivation Survey*, 2006.

¹¹⁹ Presidency of the Republic, "Acción Social: Presidential Program against Illicit Crops," presentation in Washington, DC, October 2007.

¹²⁰ Sandro Calvani, *La coca: Pasado y presente, mitos y realidades*, 2007.

¹²¹ Bloque Élder Cárdenas - BEC de Autodefensas Campesinas, *Modelo de Negociación Centrada en un Proyecto de Alternatividad Social (Paso) – Propuesta al Gobierno nacional*, noviembre de 2004. The now-demobilized Elmer Cárdenas Bloc, a paramilitary group, has said that 200 of its former combatants will participate in an agro-industrial alternative development project aimed at reintegrating members of this group. "Former coca farmers" will also participate in the pilot project to be carried out on "3,000 hectares (of land) donated by a private company," as well as 300 families enrolled in the forest warden program and displaced people.

- Can indicators be devised to assess alternative development policy from the perspective of improvements in the well-being of households and communities, and not only figures on amounts of money invested or number of hectares eradicated?

With these questions in mind, several strategies appear crucial to enhancing the prospects for sustainable local development that can lessen reliance on growing crops for illicit use. The following points synthesize recommendations based on recent research on how to address the challenges to development in Colombia's rural sector.¹²² Strategies should include:

- Generating employment in rural areas, striking a balance between insertion in international markets and the local peasant economy, by leveraging comparative advantages (e.g., exotic fruits, ornamental and medicinal plants), as well as production for local consumption, which provides economic stability and ensures food security.
- Strengthening the internal market through infrastructure improvement and enhanced access to public services.
- Establishing tariff protections for products of the peasant economy, and devising strategies to market such products domestically and internationally.
- Increasing and stabilizing public investment in rural development and the institutions responsible for promoting development.
- Recovering the natural environment by redirecting scientific research toward encouraging production systems that take into account the deep and integral relationship of peasant, Afro-Colombian and indigenous communities with biodiversity and their lands and territories.
- Appreciating traditional knowledge and practices and understanding the central

role of the affected communities in promoting their own development.

Some Proposals from Affected Communities

Successful alternatives combine economic efficiency with social development and protection of the natural environment. Such initiatives not only account for the unique characteristics of Colombia's diverse ethnic groups, but support these communities in genuinely exercising their rights, which are undermined by the internal armed conflict and by the marginalization and inequities that persist in Colombia. Following are brief descriptions of programs underway in various parts of Colombia that demonstrate how, with relatively little investment and in ways that safeguard the environment, it is possible to generate viable alternatives to the country's agrarian crisis, which is ultimately to blame for the advance of crops for illicit uses.

Coagropacífico

Location: Nariño (southwestern region of the country) – western slope of the Cordillera Occidental and Pacific plain. Tumaco – Ríos Chagui, Tablón Salado, Tablón Dulce, Imbipí del Carmen, Mejicano, Gualajo and Rosario.

Description: This municipality covers 340,000 hectares, of which 76% are composed of Afro-Colombian Community Councils (264,000 hectares). The *Coagropacífico* Cooperative, founded 14 years ago, supports the councils and the network known as RECOMPAS (Network of Community Councils of the Pacific Coast) in implementing projects in the region. *Coagropacífico* is preparing a market study to sell fresh and processed coconut, exploring options to use coconut by-products such as coconut fiber, the shell and coconut water. The project, with a total of 10 units, has a value of more than 3 billion Colombian pesos, with 33% coming from the councils and the remaining 67%

Can indicators be devised to assess alternative development policy from the perspective of improvements in the well-being of households and communities, and not only figures on amounts of money invested or number of hectares eradicated?

¹²² Instituto de Estudios Rurales de la Universidad Javeriana, Instituto de Estudios Ambientales y Facultad de Ciencias Económicas de la Universidad Nacional de Colombia, y Centro de Investigación y Educación Popular (CINEP), *Políticas Agrarias para Colombia*, 2004.

The current strategy of attacking cultivation undermines the already precarious livelihoods of the Colombian peasants, settlers, indigenous peoples and Afro-Colombians who plant coca to survive, thereby increasing rather than lessening their reliance on coca.

from the Dutch ECOFONDO fund. The councils set project priorities, which are implemented in accordance with local ecosystems and traditional practices.

Results: Fourteen nurseries for growing 15 native species, 10 germ-plasma banks of cacao to select seedlings with around 50 hectares in incubators. Improvement of 425 hectares of agro-forestry and 100 hectares of coconut groves. Training in cacao management: grafting, selection of material for regional clones, formulation of 10 environmental management plans for the Councils. Introduction and management of small animals such as pigs and hens. A food security program.

Elder Community Council of the Atrato Integral Peasant Association (ACIA)

Location: Chocó and Antioquia. Quibdó, Medio Atrato, Atrato and Bojayá, Murindó, Vigía del Fuerte and Urrao.

Description: Association joining 120 Afro-Colombian councils with 7,094 families that manage 625,254 hectares with property titles. The basic work of the ACIA is centered on territorial defense and ethnic rights, strengthening of relations with indigenous groups, and improving quality of life.

Results: The recovery of food security, transformation, storage and transport of forestry products. ACIA has resisted displacement and has confronted different armed actors who have usurped their territories, using strategies like mobilizing in large groups and public denouncements to national and international institutions in defense of their human rights.

Southern Cauca Cooperative (COSURCA)

Location: Southwestern region of Colombia in mountainous southern part of Cauca department, municipalities of Almaguer, Argelia, Balboa, Florencia, La Sierra, La Vega, Mercaderes, Patía, Bolívar and Sucre.

Description: The main thrust of economic development is organic coffee farming and fruit production. Peasants have created their own export system called *Expocosurca*, allowing them to export their harvest without intermediaries. Profits are used for technical assistance, training and investment in the plantations, creating a system of self-control among the producers to avoid the expansion of crops for illicit uses. The goals proposed by this cooperative include: building and strengthening a peasant organization; offering ongoing training in economic, political, social, cultural and environmental themes; producing and marketing organic coffee and fruit, investing profits in the autonomous development of the producers' organizations.

Results: Creation of a system of investment to strengthen the food component of the farms, renewal of coffee plants, and a financing system to promote food security. A system of internal controls monitors the progress of the commitment on each farm and especially any cultivation of coca. Creation of *Expocosurca* S.A. (Exporting Company of Cosurca) in 2004 as a strategy to finance commercialization and export of coffee with its own export system to a closed market. Access to Carrefour supermarkets in the domestic market. In 2004, processors were obtained for export to the international market.

Nasa Coca Project of Resguardo, Calderas Interior of Cauca

Location: Resguardo de Calderas, located in northeastern Cauca department.

Description: Project developed by young people of the Nasa indigenous group beginning in 1999, deep in the forest. Recovery of the community's ancestral use of the coca plant as a strategy to protect the cultural patrimony of the indigenous people and at the same time to prevent cultivation of crops for illicit uses by people outside the community.

Results: The project buys coca leaves from neighbors who are also guards in the

program (25 in all). The leaves are then dried, ground and transported to Bogotá where they are packed as tea. Other leaves are processed in the forest and used for the production of drinks, crackers and energy bars. Part of the company's profits go to support food-production projects. *Nasa Coca* also supports, with indigenous organizations in Resguardo, programs to train local people in various activities.

Conclusions

Reducing the cultivation of crops for illicit use poses enormous challenges, as Colombia's experience over the last four decades has shown. Deeply ingrained structural problems provide the conditions that promote coca growing, including Colombia's agrarian crisis, the absence of effective governance, and the continued proliferation of illegal armed actors – criminal organizations, demobilized and remnant paramilitary groups, and guerrilla groups – that seek to expand and defend their stakes in the drug trade.

If these issues are not addressed, drug trafficking will continue to flourish, finding more innovative ways to operate, possibly becoming more violent and widespread and even more difficult to control. Colombian and U.S. citizens will continue to witness a massive waste of resources spent on operations that not only fail to resolve the

problems, but endanger biodiversity and hinder democratic progress and prospects for peace in Colombia.

The current strategy of attacking cultivation undermines the already precarious livelihoods of the Colombian peasants, settlers, indigenous peoples and Afro-Colombians who plant coca to survive, thereby increasing rather than lessening their reliance on coca. Aerial spraying with glyphosate and other chemicals is causing serious environmental, cultural and social damage. Another consequence is the repeated violation of rights that are well-established in international legislation, rights which the government has committed itself to safeguarding.

Are there alternatives to fumigation of crops for illicit use? Projects proposed and implemented by affected communities have shown that reducing coca through the stimulation of productive legal alternatives is possible, particularly when projects are supported by international cooperation and committed stakeholders and are consonant with the interests and know-how of local communities. Guaranteeing the sustainability of such projects is the key to offering a dignified life to thousands of rural Colombian families living in poverty. Only with viable alternatives in place can progress be made in lessening reliance on coca.



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