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Environmental Casualties of the War on Drugs

Chemical control methods against illicit drug crops in producer countries have long been a fixture of the 20-year U.S. war on drugs. In 1998, President Bill Clinton unveiled an unprecedented $16 billion antidrug initiative that included a generous allotment for applying herbicides to crops in drug-producing nations. The U.S. initiative follows protocols outlined in the 1988 United Nations (UN) Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances. The UN accepts herbicidal crop eradication programs as part of the fight against the $60 billion global trade in drugs such as heroin and cocaine, which are abused by 8 million and 13 million people respectively worldwide, according to data collected by the UN International Drug Control Programme. But the issue at hand seems to be a question of which is the worse of two evils—the effects of drug crop cultivation and production or those of chemical eradication of such crops.

Drug use is clearly costly to societies and individuals. The White House Office on Drug Policy estimates that 13 million people in the United States use illegal drugs. In 1992, drug use cost the U.S. medical system $98 billion, resulted in $14 billion in lost productivity, and led to $59.1 billion in judicial costs, including costs of litigation and incarceration, according to *The Economic Costs of Alcohol and Drug Abuse in the United States—1992*, a report by the National Institute on Drug Abuse and the National Institute on Alcohol Abuse and Alcoholism. This report states that approximately 36% of AIDS cases reported to the Centers for Disease Control and Prevention in 1992 were related to intravenous drug use—a phenomenon mirrored in global figures on the AIDS pandemic.

The drug trade has also led to local drug abuse in producer countries. In the mid-1980s, studies by M. Morales-Vaca and F. Raul Jeri, published in the April–June 1984 issue of the *Bulletin on Narcotics,* noted that addiction to coca paste (an intermediary product in the extraction of the cocaine alkaloid) was occurring in epidemic proportions, particularly in Colombia, Peru, and Bolivia. These problems have continued into the 1990s, though they have not been quantified.

Drug production is also environmentally costly. In producer countries, crops of coca, opium poppy, and marijuana have replaced native vegetation in an area covering over 1 million hectares (ha), often in protected areas such as species-rich rain forests and erosion-prone cloud forests. Additional environmental damage ensues from the cultivation and processing of these crops, which involve large volumes of pesticides, fertilizers, and toxic processing

chemicals, generally dumped into rivers by farmers or washed into them by heavy rainfall. In a paper presented at the New York Botanical Garden's June 1993 symposium, Biodiversity and Conservation of Neotropical Montane Forests, Jaime Cavelier of the Department of Biological Sciences at the Universidad de los Andes and Andrés Etter of the Institute of Environmental Studies at the Universidad Javeriana (both in Bogotá, Colombia) wrote that at the end of 1992, almost 20,000 ha of primary montane rain forest in the Colombian Andes, mostly located in and around the Nevado del Huila National Park, had been deforested to make way for illegal plots of opium poppies. Cavelier and Etter warned that if these plantations are not controlled soon, most of Colombia's remaining montane forests will disappear "well before the end of the century." Proponents of chemical eradication claim that damage on this order justifies herbicidal eradication of drug crops.

Yet environmentalists and citizens' groups in the United States and producer countries increasingly claim that eradication efforts also cause large-scale harm to human and environmental health. Unfortunately, scientists have been unable to quantify such damage because of the violence surrounding drug production. The harm to both human and environmental health remains a disturbing question whose answer is tied up in the fundamental problems that underlie the global drug crisis: the political violence, poverty, and infrastructural weakness in the remote production zones that make illicit crops more profitable than legitimate agriculture.

Drug Crop Cultivation and Environmental Health

According to the U.S. State Department, whose Bureau of International Narcotics and Law Enforcement Affairs plans and implements U.S. drug policy overseas, about 200,000 ha of opium poppies were cultivated in 1996—potentially yielding 373 metric tons (MT) of heroin—mostly in Burma, Laos, and Afghanistan, and increasingly in western Mexico and in the Andean foothills of western Colombia. Cultivation of over 209,700 ha of coca was concentrated in Peru, Bolivia, and Colombia, potentially yielding 760 MT of cocaine. Together, opium poppy and coca cultivation cover an area about half the size of Puerto Rico. The UN International Drug Control Programme estimates that wild or cultivated marijuana may cover 670,000–1,800,000 ha worldwide. U.S. efforts chiefly target marijuana crops in Colombia and Mexico, which are mainly sold in the United States; the size of the U.S. marijuana crop is unknown.

Licit cultivation of opium poppies and coca for use in pharmaceuticals or flavoring can take place without necessarily causing environmental harm. But the emphasis on high volume in illicit drug crop cultivation and processing is tremendously damaging. Typically, illicit crop plots replace native vegetation on government-owned lands. Often, these areas have been set aside to protect valuable natural resources, but such protection is unreliable because the parklands are frequently very remote, transportation is difficult, and land tenure laws are inadequate. At the height of coca cultivation in Peru in the late 1980s, for example, an estimated 200,000 ha of biologically rich high jungle were slashed and burned to make way for coca crops, with cultivation concentrated in the Huallaga Valley at the western edge of the Amazon Basin. Clear-cutting left the steep, rainwashed slopes vulnerable to erosion, which also washed heavily applied fertilizers and pesticides into the rivers that crisscross the region. But security issues in areas where drug crops are cultivated make assessment of environmental damage very difficult, and virtually no substantive information quantifying this damage is available.

Chemical contamination and the resulting environmental health effects flow downstream when raw crops are processed. Coca processing, for example, involves precipitating out the cocaine alkaloid using a series of baths in sulfuric acid, kerosene, quicklime, carbides, acetone, and toluene. Chemical residues are dumped into local streams and rivers with environmental consequences that include reduction of dissolved oxygen, increased pH, and toxicity to aquatic fauna and flora. In a 1987 paper published in the Peruvian journal *Medio Ambiente*, Buenaventura Marcelo, a professor at Peru's Universidad Nacional Agragria La Molina, estimated that, based on total coca cultivation in Peru, 57 million L of kerosene, 32 million L of sulfuric acid, 16,000 MT of lime, and 6.4 million L of acetone and toluene entered the streams and rivers of the Peruvian Amazon in 1986. Marcelo also noted the disappearance of endemic aquatic animals and plants in some streams, and that portions of the Huallaga River in the coca-growing areas were reported to be biologically dead.

Similar ecological disturbance has been noted in the coca fields of southern Colombia and in the opium and marijuana fields of Mexico's ecologically rich Sierra Madre region, according to case studies in the Trade and Environment Database, a compilation of case studies concerned with trade and environment issues located on the Internet at http://gurukul.ucc.american.edu/ted/ted.htm. However, scientists have been unable to do more than estimate the human and environmental damage caused by drug production in Peru and other drug-producing countries because of social factors in these countries, primarily political violence. At the height of Peruvian coca production in the late 1980s, the coca zones were controlled by the terrorist group Shining Path. Shining Path taxed coca operations in the Peruvian Amazon to finance a destructive and bloody revolution throughout Peru that left 25,000 people dead. Political extremist groups similarly hold sway in other drug-producing regions, including the Wa ethnic group in Burma's Shan State (a group that is now also diversifying into methamphetamine production), the Taliban faction in Afghanistan, and a variety of groups in Colombia including the Colombian Revolutionary Armed Forces, a left-wing guerilla group, and right-wing paramilitary organizations. The presence of such groups makes it impossible to document the effects of illicit drug production.

In drug-producing countries, political violence tends to feed on other social factors, such as a lack of infrastructure and poverty. In the rural areas of Asia and Latin America, about 700,000 families, or around 4 million people, depend on income derived from the cultivation of coca leaf and opium poppies. Most of them live below the poverty level and rely on this activity for some 50% of their income, according to UN data. In Peru, for example, illegal coca can earn three or more times the price of legal produce, and is transported by small aircraft across the Peruvian Amazon, bypassing the poorly maintained roads that make transport of legal commerce so unreliable.

Herbicides: A Healthy Solution?

U.S. support for aerial eradication of illicit drug crops began in the 1970s during the Nixon administration, and accelerated in the 1980s. Over the years, the United States has worked with Panama, Belize, Venezuela, Guatemala, and now Colombia on joint aerial eradication programs, applying a liquid form of the broad-spectrum herbicide glyphosate to illicit crops, according to reports in the *Washington Post*.

According to the EPA, glyphosate has a "relatively low oral/dermal toxicity." But citizens' rights groups have expressed concern about possible human health effects from the aerial spraying. "There have been reports of skin and bronchial effects," says

Colombia specialist Winifred Tate, a fellow at the Washington Office on Latin America (WOLA), a nonprofit advocacy and policy organization. "But there's only anecdotal evidence, and the environment [itself] is not conducive to human health. The cultivation takes place in lowland jungle that has not traditionally been a place of human habitation; people tend to get a lot of problems like skin infections. Also, they don't have access to health care and potable water."

In the late 1970s, Mexico used equipment and training supplied by the United States in an aerial eradication program using paraquat provided by the Mexican government. Paraquat is a highly toxic herbicide that affects the lungs, liver, kidneys, and cornea. It has caused many human deaths, some of which were reported in the March–April 1993 issue of *Archives of Environmental Health* in an article describing 16 deaths from paraquat poisoning in Chiapas, Mexico, between 1988 and 1990.

An outcry arose in the United States in the late 1970s when law enforcement officials found paraquat-contaminated marijuana in five U.S. cities. Since then, paraquat has been banned for sale in the United States and other countries, but it is still manufactured and used globally. In Mexico, it is still used for agriculture and for limited aerial eradication of illicit drug cultivation in remote areas, chiefly in unoccupied lands of the western Sierra Madre, where 4,000 ha of poppies and 5,000 ha of marijuana have been eradicated using the herbicide in accordance with UN guidelines, according to the Mexican Attorney General's Office. The United States does not fund the Mexican eradication program.

So far, none of the literature on the herbicides considered for U.S. programs (including glyphosate, tebuthiuron, and hexazinone) provides evidence of human health effects from pesticide spraying through presence in soil, water, or leaves. Though the paraquat reputedly still used in Mexico is known to be a factor in pesticide-related poisonings, reports have not specified poisonings as a result of exposures through eradication programs. In July 1998, WOLA recommended in a U.S. congressional briefing on coca eradication efforts in Colombia that a credible environmental organization or university be contracted to conduct thorough, independent studies of the health and environmental impact of aerial application of chemical herbicides in the quantities used and under the conditions faced in Colombia. As a result of WOLA's recommendations and those of other human rights and environmental groups, the Congressional Foreign Appropriations Committee recommended that Congress fund such a study, though no specific measures have been taken yet.

Chemical eradication programs have had mixed effects in controlling illicit crops. Efforts are hampered by such factors as growers replanting fields after eradication, the need to revisit the site (sometimes multiple times during a growing season), incomplete destruction of cultivations, failure of herbicides, and problems of quality control, according to the U.S. State Department's 1997 *International Narcotics Control Strategy Report.* In the coca zones of southern Colombia, glyphosate has eradicated only 30% of crops since application began in late 1993, and coca cultivation has actually expanded from 37,100 ha in 1992 to 67,200 ha in 1996, according to the report, with growers pushing southeastward into the Amazon Basin. Opium production in western Colombia has shrunk only slightly, despite glyphosate spraying.

Security concerns, as well as the mixed performance of glyphosate, prompted a push to use tebuthiuron as an adjunct to glyphosate in Colombia. This past June, under intense pressure from the United States government, the Colombian government agreed to test a pellet form of tebuthiuron to destroy coca and opium poppy crops. In the rebel-controlled growing zones, the pellet form allows spraying from higher altitudes, offering pilots greater protection from gunfire (according to the 1997 *International Narcotics Control Strategy Report*, 51 aircraft were hit by hostile fire in 1997 while "involved in or supporting spray operations" in Colombia). The pellet-form tebuthiuron is also more resistant to being washed away by rain because the pellets are soil-applied, unlike glyphosate, which adheres to coca leaves but may be washed off by rainfall before enough of the chemical has penetrated to kill the plant. By September, the testing initiative had stalled, hampered by public refusal by the chemical's U.S. manufacturer, Dow AgroSciences, to sell the herbicide for use in Colombia. Dow says the chemical can damage aquatic organisms and is not suited for application in hilly, rainy areas, or when other, desirable plants are present. All of Colombia's illicit crop zones are rainy, and the opium-producing regions are extremely steep. However, Charles S. Helling, lead soil scientist at the Weed Science Laboratory of the United States Department of Agriculture Agricultural Research Service, says that Dow's argument is not appropriate because the service has not recommended tebuthiuron for use against poppy plants.

U.S. groups including the Sierra Club, the World Wildlife Fund, and Greenpeace have raised concerns about the potential, though unsubstantiated, health and environmental effects of aerial drug crop eradication. These groups, along with Latin American citizens' organizations and the Colombian minister of the environment, claim that tebuthiuron poses dangers to the environment due to its high potential for leaching and its long half-life (the time in which half of the chemical degrades—12–15 months in temperate climates, according to the Extension Toxicology Network, a pesticide information network archived at Oregon State University).

However, the EPA supported testing of tebuthiuron in Colombia on the basis of research conducted by Helling. His work on glyphosate, tebuthiuron, and hexazinone indicates that climate can dramatically affect the persistence and mobility of pesticides. "Much of tebuthiuron use in the United States is in semiarid areas," Helling says. "But conditions are different in the tropics, with high rainfall, high temperatures, and high soil microbial activity. You get a shorter half-life under such conditions." He adds that tebuthiuron is already used in the tropics on sugar cane. Helling's tests took place on illicit coca plots in Peru and Panama, and on a tropical U.S. test site chosen for its similar soil and climate. "The Panama site was selected particularly as a 'worst-case scenario' [with] steep hillsides ending at a small stream. I monitored for erosion and herbicide residues in water," Helling explains. No residues of hexazinone or tebuthiuron were detected in streams near the Panama and Peru sites. Glyphosate (applied at the Panama site) was undetected in water one-and-a-half months after treatment, and caused no obvious long-term ecological shift, Helling wrote in his paper. Natural vegetation in Peru and Panama regrew within a few months of treatment with hexazinone, tebuthiuron, or glyphosate, while food crops (growing in or near Peruvian coca fields and treated with hexazinone or tebuthiuron) showed no apparent injury.

It should be noted, says Maria Teresa Hart, an official at the Embassy of Peru, that Peru does not apply chemical eradication methods to drug crops. Says Hart, "Peru only eradicates manually and only in natural reserves, for our [drug] policy is not geared against the farmer but against the trafficker. That is why our success has been based in the combination of interdiction of traffickers plus alternative development [for farmers]." According to Hart, Peru reduced its area of coca fields by 27% in 1997.

Helling's work forms part of a very meager body of research on the environmental effects of chemical drug crop eradication. There are relatively few studies of herbicide fate in tropical soils, still fewer studies of herbicides used or considered for drug crop eradication, and no substantive studies of the environmental effects of drug production and processing. "In the real world of coca growing, it's very difficult to collect samples of the type you'd like, because of logistics and safety," Helling says. He has proposed a U.S.–Colombian study on the effects of both chemical eradication and processing of coca, but the study is stalled in Colombia due to protests as to the safety of tebuthiuron.

Helling is convinced that properly applied herbicides can eradicate both coca and opium poppy crops without major environmental damage, and points out that the erosion blamed on coca cultivation would be a common factor in all cultivated agriculture in the region. "Erosion is a serious concern with opium production," he says. "But the worst problem I've seen during recent overflights has been with legitimate agriculture. Overall, the environmental problem that surpasses erosion seems to me to be the deforestation caused by the slash-and-burn technique used to clear land for narcotic crops or conventional agriculture." Anecdotal evidence suggests that persistent eradication operations may convince some growers to turn to other crops.

Some groups say that strategies that focus on eradicating illicit drug crops may ignore the problems underlying drug crop cultivation. According to Tate, this is the case in Colombia, where a focus on aerial eradication is "keeping Colombia from looking at the issues behind coca cultivation—land tenure and political violence."

Critics charge, however, that chemical eradication has done little to stem the spread of illicit crops, or to prevent their processing and ultimate sale in consumer countries. Despite a tenfold expansion in antidrug budgets since 1981, production of opium gum has increased steadily from 2,242 MT in 1987 to 4,137 MT in 1997, and coca leaf production decreased only slightly during that period—from 291,100 MT to 263,900 MT, according to the 1997 *International Narcotic Control Strategy Report.* In a February 1997 letter report entitled *Drug Control: Long-standing Problems Hinder U.S. International Efforts,* the U.S. General Accounting Office noted that, despite some successes in eradication and other initiatives, illegal drugs still flood the United States.

Winning the Drug War

Principals in the global drug war are increasingly heeding long-standing calls by grassroots organizations to address underlying problems that encourage drug use and production, and to support alternative development in producer countries. This past June at a UN General Assembly special session on the global drug problem, leaders from member countries endorsed supporting alternative development programs as part of a global strategy to combat the production and abuse of illegal drugs. Peru is one of the drug-producing countries that has chosen the alternative development route. Upon taking office in 1990, Peruvian president Alberto Fujimori addressed issues of terrorism and hyperinflation, apprehended and jailed the leaders of the Shining Path movement, and stabilized the country's currency. Peru then cooperated with the United States in an initiative to destroy the aerial corridor used by traffickers to fly illicit coca from Peruvian fields to processing operations in Colombia. In 1995 and 1996, the Peruvian government used equipment and technical assistance provided by the United States to force or shoot down approximately 60 aircraft along this corridor. The effect of destroying the air bridge was a drop in the price of illicit coca and a gradual abandonment of the plots. The country has leveraged $270 million in pledges from donor countries and allotted $300 million in Peruvian funds for alternative development and infrastructure improvements in coca zones.

Although alternative development is certainly an option, questions about the environmental and human health effects of chemical eradication of drug crops remain. The small body of scientific evidence suggests that chemical eradication might cause less environmental damage than cultivation, but much of the argument remains in the realm of estimates and anecdotes. Definitive studies on exactly how drug cultivation and chemical eradication affect human and ecological communities could serve as an important tool in approaching the global drug war and its aftermath.

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