



Interamerican Association for Environmental Defense
Asociación Interamericana para la Defensa del Ambiente

PLAN COLOMBIA AERIAL SPRAYING PROGRAM -- ANALYSIS & CRITIQUE OF THE U.S. DEPARTMENT OF STATE REPORT TO CONGRESS REGARDING RISK TO AMPHIBIANS AND THREATENED SPECIES

I. Introduction

Scientific research has shown that glyphosate pesticide formulations may have potentially significant adverse impacts on amphibian populations and other aquatic species.¹ Having learned of this potential threat from the Inter-American Drug Abuse Control Commission (CICAD),² the U.S. Congress in 2005 required the Department of State (DoS) to evaluate the risk posed by the U.S.-funded aerial spraying program in Colombia on amphibians and other threatened species. DoS contracted CICAD to conduct the scientific work in response to the Congressional directive.

Unfortunately, the August, 2006 Department of State report to Congress on the “Preliminary Evaluation of the Risk Posed to Colombia’s Amphibians and Threatened Species by the Government of Colombia’s U.S.-Supported Program of Aerial Eradication of Illicit Crops”³ utterly fails to comply with the Congressionally mandated reporting requirements.

Specifically, in November of 2005, Congress required:

“the Secretary of State, in consultation with the EPA and appropriate Colombian authorities, to submit a report not later than 180 days after enactment of the Act, with the following information: the results of a GIS analysis of the proximity of small, shallow water bodies to coca and poppy fields and of tests to determine the toxicity of the spray mixture to Colombian amphibians; and, an assessment of potential impacts of the spray program on threatened species, including in Colombia’s national parks.”⁴

Despite the requirement that the DoS report the results of the studies no more than 180 days after November 14th, 2005, work on the studies has only recently begun. Thus, the document presented by DoS to Congress – the July, 2006 “Interim Report on Follow-up Studies to the CICAD Environmental and Health Assessment” – and used as basis for the DoS report to Congress, is an extremely preliminary document that cannot be used to justify the conclusions drawn by DoS. In addition, this Interim Report relies on non-scientific methods and evidence to compensate for the incomplete portions of the studies, and proposes certain future studies that

¹ Relyea, R.A. 2005a. The impact of insecticides and herbicides on the biodiversity and productivity of aquatic communities. *Ecological Applications* 15:618-627.

² Solomon, K.R., Anadon, A., Cerdeira, A.L., Marshall, J., Sanin, L-H, “Environmental and Health Assessment of the Aerial Eradication Program in Colombia”, Report prepared for the Inter-American Drug Abuse Control Commission (CICAD) of the Organization of American States (OAS), (March 31, 2005).

³ U.S. Department of State, Report to Congress: A Preliminary Evaluation of the Risk Posed to Colombia’s Amphibians and Threatened Species by the Government of Colombia’s U.S.-Supported Program of Aerial Eradication of Illicit Crops, Submitted to the Congress by the Secretary of State Pursuant to Senate Report 109-96 accompanying the Department of State, Foreign Operations, and Related Programs Appropriations Bill, 2006 (P.L. 109-102), (Aug. 2006).

⁴ Senate Report 109-96 accompanying the Department of State, Foreign Operations, and Related Programs Appropriations Bill, 2006 (P.L. 109-102) (Nov. 14, 2005).

are not appropriate. While the Department of State has not presented the required studies, the few that have been completed are described by DoS in a misleading manner, glossing over the potential harm of the spray mixture to amphibians. Finally, the Interim Report distracts readers from the harmful environmental impacts of the spraying program, and the lack of completed studies on the toxicity of the spray mixture, by inappropriately commenting on issues outside the Congressional mandate and focusing on environmental effects of activities other than the spraying program.

II. The Spray Mixture is Toxic to Amphibians

The testing conducted to date – on one African amphibian species – revealed that the spray mixture is potentially harmful to amphibians.⁵ The Interim Report showed that the spray mixture, at exposure concentrations likely to result from the aerial spraying program, killed 50% of amphibians exposed in 96-hours.⁶ This kill rate suggests an unacceptable risk for Colombian frogs, regardless of whether or not the species is endangered or found only in the area where spraying occurs.

This determination of potential risk to amphibians is serious enough to warrant a suspension of spraying until the actual level of risk is known or safer alternatives are found. Recognizing this, CICAD's proposal for future studies includes ones to be conducted on alternative mixtures that are potentially less harmful to amphibian species and just as effective in eradicating coca.⁷ Yet, despite proposing such studies, the DoS failed to convey the seriousness of this determination in the report to Congress.

III. The Questions Asked by the U.S. Congress Remain Unanswered

Aside from the initial determination of the potentially toxic nature of the spray mixture, DoS does not provide the information requested by the U.S. Congress, and thus does not resolve outstanding concerns regarding potential environmental risk.

a. GIS Analysis of the Proximity of Small, Shallow Water Bodies to Coca and Poppy Fields

The Department of State failed to deliver “the results of a GIS analysis of the proximity of small, shallow water bodies to coca and poppy fields” and did not implement appropriate alternative studies to determine potential risk to amphibians inhabiting such

⁵ The EPA assessment of the CICAD toxicity studies performed on the African amphibian species *X laevis*, and included in the documents sent to Congress, determined that the mixture was “moderately toxic” to the amphibian species tested. (Memorandum from Thomas Steeger, Environmental Fate & Effects Division, Office of Pesticide Programs, U.S. EPA to Jay Ellenberger, Associate Director of Field and External Affairs Division, Office of Pesticide Programs, U.S. EPA (May 26, 2006)).

⁶ The CICAD team determined that the lethal median concentration for a 50% kill rate over 96 hours for the African species tested to be 1,100 ug AE/L (Interim Report, Table 2, p. 5). In the same results table, CICAD then presented three different likely scenarios for exposure to the spray mixture, every single one of which exceeds the 96-hour lethal median concentration (1,229 ug AE/L, 2,473 ug AE/L, and 1,237 ug AE/L) (Interim Report, Table 2, p. 6).

⁷ Interim Report, p. 3. Also, in interviews in 2005, the lead scientist of the CICAD team stated: “Should these toxicity tests indicate that the spray formulation is moderately toxic to amphibians, the (Scientific Advisory Team) will then perform toxicity tests on alternative formulations that are equally efficacious at controlling illicit crops.” (Phone interviews between Betsy Marsh of AIDA and Dr. Keith Solomon, February 6 and March 6, 2006.).

water bodies. According to the CICAD Interim Report, the GIS study was not done because there is a “lack of ground-based wetland data” and because of “difficulties of linking GPS data to images taken from the helicopters.”⁸ CICAD alleges that these difficulties will make the completion of a GIS analysis impossible. However, CICAD does not provide sufficient information regarding the alternative studies suggested for the reader to gauge how, when, and by whom the data will be obtained.⁹

Currently, without the results of a GIS study or appropriate and objective alternate studies, there is no way to know whether small, shallow, or temporary water bodies are being accurately located, and, thus, whether they are being sprayed. Certainly, a supposition that water bodies are not being sprayed can not be justified at this time.

Despite the CICAD team’s recognition that it was not able to scientifically determine the location of water bodies, the team draws conclusions based on anecdotal evidence about where the team *thinks* shallow water bodies may lie.¹⁰ Guesswork that has little scientific basis is an inappropriate response to a Congressionally mandated request for a GIS analysis. Moreover, these anecdotal conclusions are not well-founded. For example, the Interim Report infers that coca grows only in dry areas,¹¹ supporting that statement with merely anecdotal evidence. This hypothesis is not consistent with information from other sources, which suggest that at least some of the regions that are being sprayed are anything but dry. For example, according to the United Nations Office on Drugs and Crime (UNODC), “opium poppy, coca and marijuana are all grown in the wet or humid forest biomes.”¹² Moreover, forty-six percent of coca crops in Colombia are located in the regions of Meta, Guaviare, Putumayo and Caquetá,¹³ regions that, close to the Eastern Andes, contain tropical rainforest areas with high humidity and annual rainfall averages as high as 6,000 mm (234 inches).¹⁴ Another 21% of the coca crops are in the Pacific region,¹⁵ also a humid region of tropical rainforest¹⁶ with an average annual rainfall of up to 13,600 mm (530 inches).¹⁷ These are regions with some of the highest levels of precipitation in the world.¹⁸ The allegation by the team that coca grows mostly

⁸ Inter-American Drug Abuse Control Commission (CICAD), Interim Report on Follow-Up Studies: Environmental and Human Health Assessment of the Aerial Spray Program for Coca and Poppy Control in Colombia (Interim Report), Table 1, Study M1, p. 2, (July 2006).

⁹ Interim Report, pg. 2. According to the report, the CICAD team plans to use data gathered with the “Gyrocam” imaging technology, the same technology that has been proposed for use during spray flights to confirm areas to spray. It is unclear from the report, however, how the individuals gathering the data will be trained to identify shallow water bodies, whether images will be taken during the wet period or dry period, and what sort of quality control will be available to ensure objective data collection, among other things.

¹⁰ Interim Report, p. 7.

¹¹ *Id.*

¹² United Nations Office on Drugs and Crime (UNODC), Colombia, Monitoreo de Cultivos de Coca, Bogotá, UNODC June 2006, p. 19.

¹³ UNODC Op Cit, p. 119. The far east of these regions have a savannah climate with dry seasons during the year.

¹⁴ Biblioteca Luis Angel Arango. BLa Digital, available at

<http://www.lablaa.org/blaavirtual/ayudadetareas/geografia/geo82.htm>. Last visited November 10, 2006.

¹⁵ UNODC, Op Cit, p. 119.

¹⁶ Educar, Op Cit, p. 99.

¹⁷ Biblioteca Luis Angel Arango. BLa Digital, available at:

<http://www.lablaa.org/blaavirtual/ayudadetareas/geografia/geo120.htm>. Last visited November 10, 2006.

¹⁸ U.S. Department of Commerce, National Climatic Data Center, “Global Measured Extremes of Temperature and Precipitation,” Last updated August 2, 2004, available at:

<http://www.ncdc.noaa.gov/oa/climate/globalextremes.html#sites>. Last visited November, 16, 2006.

in dry areas, and that there is thus no threat to amphibians, therefore, does not seem to be well-founded.

The Interim Report further obfuscates the issue of where coca is located in Colombia when it states that “[n]either coca nor opium poppy grows in wet soil such as that found in wetlands, marshes, and ponds used by the aquatic stages of amphibians.”¹⁹ There is no debate as to whether coca grows in permanent wetlands. Rather, the concern relates to smaller water bodies that would appear seasonally and can be important amphibian breeding habitat.

Regardless, the CICAD team should not be looking at the typical crop growing region, but rather the worst case scenario to adequately assess the danger of the spraying. This requires that the team address the issues mentioned above, including rainfall and seasonal variations, whether the spraying has taken place during the wet season (a factor that will have ramifications for contamination of run-off), and the possibility of spraying small, shallow and temporary standing bodies of water. None of these factors are even mentioned in the report.

As no field studies locating shallow water bodies have been concluded,²⁰ there is absolutely no basis for the supposition that the spray is “accurately applied” to coca fields, a condition that the Interim Report states as necessary for the safe use of the mixture.²¹ Quite to the contrary, scientists (including professional colleagues of the lead scientist on the CICAD team) have emphasized that small wetlands are difficult to avoid during aerial application of herbicides.²² With no data to support their allegations as to the location of water bodies, the assumption, as in any proper risk assessment, must be of the worst case scenario: that shallow, small and temporary water bodies – prime amphibian habitat – are, in fact, being sprayed.

b. Toxicity of Spray Mixture to Colombian Amphibians

The required tests to determine the toxicity of the spray mixture to Colombian amphibians have also not been completed. As of October, 2006, the CICAD team had only tested one African amphibian (*X laevis*).²³ No field-based tests had been performed, and no Colombian amphibian species had been identified for testing. While the baseline data collected on the African species is an important starting point for conducting scientific studies of this nature, the procedures being followed are problematic for a number of reasons.

¹⁹ Interim Report, p 7.

²⁰ Interim Report, p 2.

²¹ Interim Report p. 7, stating “the spray mixture would therefore pose very little risk to these amphibians **when accurately applied.**”

²² “One important, but often overlooked, environmental risk pertains to potential deleterious effects in small wetlands that are ubiquitous in many forest landscapes.... Small wetlands are difficult to avoid during aerial application of herbicides.... Thus, **small wetlands occurring within the target site are likely to be directly oversprayed**, resulting in relatively higher potential exposures and effects for constituent biota as compared to those in adjacent or buffered wetlands. Many of these small wetlands constitute prime breeding and foraging habitat for frog species.” Thompson, D.G., B.F. Wojtaszek, B. Staznik, D.T. Chartrand, and G.R. Stephenson. 2004. “Chemical and biomonitoring to assess potential acute effects of Vision herbicide on native amphibian larvae in forest wetlands. *Environmental Contamination and Toxicology*” 23:843-849.

²³ The results of these studies are what led to the preliminary determination (discussed in Section II of this report) that the spray mixture is toxic to the amphibians tested.

First, amphibian biologists have acknowledged that no single experiment alone can provide a comprehensive assessment of the effects of a pesticide on aquatic species.²⁴ The insistence on the part of the CICAD team and DoS, therefore, that the harm to amphibians posed by the spray mixture is minimal compared to other harms,²⁵ is misleading and inconsistent with past recommendations. Second, the CICAD team states that “*X laevis* were the most sensitive species to formulated glyphosate,” implying that the team has tested the worst case scenario, but the Interim Report offers only one study to support that claim.²⁶ A number of recent tests have been performed to measure the effects of glyphosate-based pesticides on species other than the one tested by CICAD, and results have shown tremendous variation in susceptibility by species.²⁷ Considering that Colombia has the second highest diversity of amphibians in the world with more than 600 amphibian species, (over 300 of which are endemic,) as well as the highest number of threatened amphibian species,²⁸ and that only a small number of species globally have been tested for toxicity from glyphosate herbicides, it is unlikely that the African frog used by CICAD is in fact representative of the most sensitive Colombian species.

Furthermore, the team’s proposed future studies regarding the toxicity of the mixture focus only on rare, endangered species of amphibians,²⁹ although Congress asked DoS to report on the “toxicity of the spray mixture to Colombian amphibians” in general. Considering the wide-spread nature of the spraying and the potentially considerable risk to amphibians, it is not only rare and endangered species that should be studied. It is also unclear whether the team has even identified scientists in Colombia with whom to collaborate to complete the required Colombian studies.

Other studies proposed by the CICAD team to assess the toxicity of the spray mixture are also poorly devised. For example, despite the fact that recent studies have shown that the presence of sediments makes no difference with respect to the toxicity of glyphosate pesticides to amphibians,³⁰ the CICAD team conjectures that adsorption of the spray mixture to sediments may negate risks to amphibians, and bases one proposed test on that hypothesis.³¹ Additionally, although the team suggests that Cosmoflux makes no difference to the toxicity of

²⁴ “We submit that no single experiment represents an extensive investigation of pesticide effects on aquatic organisms.” Thompson, D.G., Solomon, K.R., Wojtaszek, B.F., Edginton, A.N., Stephenson, G.R., The impact of insecticides and herbicides on the biodiversity and productivity of aquatic communities, Letter to the Editor dated Dec. 2005, *Ecological Applications*, 16(5), 2006p. 2022-2027, 2022, (Oct. 2006).

²⁵ See, e.g., Interim Report, p. 7, stating “The spray mixture would therefore pose very little risk to these amphibians,” and p. 10, stating “there are a number of human activities associated with the production of coca and poppy that present greater risks to amphibians than the glyphosate + Cosmo-Flux® mixture.”

²⁶ Claim is based on: Edginton, AN, Sheridan PM, Stephenson GR, Thompson DG, Boermans HJ. 2004. Comparative effects of pH and Vision herbicide on two life stages of four anuran amphibian species. *Environmental Toxicology and Chemistry* 23:815-822. The study was conducted using a different herbicide mixture than that used in Colombia, on only four species of frogs.

²⁷ “Laboratory LC50 studies have now been conducted on 11 species of tadpoles and these data have shown substantial species and population differences in susceptibility.” Relyea, R.A., Response to Letter to the Editor dated April 5, 2006, *Ecological Applications*, 16(5), 2006, p. 2022-2033, 2031, (Oct. 2006).

²⁸ IUCN, Conservation Internacional, Nature Serve, “Global Amphibian Assessment”, 2006. Available at: <http://www.globalamphibians.org/patterns.htm>.

²⁹ Interim Report, Table 1, M3, p. 2.

³⁰ Relyea, R.A. 2005b. The lethal impacts of Roundup and predatory stress on six species of North American tadpoles. *Archives of Environmental Contamination and Toxicology* 48:351-357.

³¹ Interim Report, Table 1, T4, p. 3.

the mixture, the team also proposes studies focused on finding an alternative to Cosmoflux.³² This is inconsistent. Given what is known about the toxicity to amphibians of formulated glyphosate products, and if CICAD's studies have truly proven that Cosmoflux does not augment that risk, the focus should be on finding an alternative to formulated glyphosate (especially the POEA surfactant in those products).

c. Threatened Species Assessment

The most glaring omission of the Department of State Report is the complete failure to comply with the Congressional request for "an assessment of potential impacts of the spray program on threatened species, including in Colombia's national parks." At this time, this assessment is entirely unrealized; not a single test has been conducted and no program to address the question has been developed. Even more problematic is that in the DoS report to Congress, the Department of State sustains that "threatened species" should be understood to mean threatened amphibians.³³ Congress never limited "threatened species" to amphibians, and the language of the bill implies that the team should have been looking at *all* threatened species.³⁴ Even the language used in the title of the DoS report, "Risk Posed to Colombia's Amphibians and Threatened Species" makes clear that the report should cover both amphibians and other threatened species.

IV. The DoS Report to Congress Inappropriately Includes Information on Issues Outside the Scope of the Congressional Mandate

Despite the fact that DoS has failed to deliver the information required by Congress, the scope of the study was inappropriately expanded in an attempt to assess the environmental effects of coca cultivation and other human activities in comparison to the effects of glyphosate spraying.

The U.S. Congress did not ask for an assessment of the impacts of coca production or the effects of other pesticides on amphibians. Though cultivation of coca and poppy plants also causes environmental impacts, the required studies were to focus on the additional risk generated by the spraying program, not on the environmental impacts of coca cultivation in general. Nevertheless, the Interim Report and the DoS Report to Congress repeatedly insist that other pesticides used in coca cultivation are more harmful to the environment than the spray mixture, thus somehow attempting to justify the implementation of the spraying program, even though the risks of that program are not known.

It is curious to see this new focus, given that prior to the submission of the Interim Report the lead scientist of the CICAD team insisted that the team would not consider issues outside the Congressional mandate.³⁵ Nevertheless, the entire second half of the report addresses the effects of other pesticides and human activities on frogs.³⁶ It is also noteworthy that while the packet of documents submitted to Congress did not include any studies conducted on the toxicity of

³² Interim Report, Table 1, E1, p. 4.

³³ Report to Congress, p. 4.

³⁴ Senate Report 109-96.

³⁵ Summary of Interviews between Betsy Marsh (AIDA), and Dr. Keith R Solomon (Lead Scientist of the Scientific Advisory Team to CICAD), February 6 and March 6, 2006.

³⁶ Interim Report, p. 8.

glyphosate herbicides to amphibians (the issue Congress asked be addressed), it did include a lengthy and apparently unpublished study that compares the effects of pesticides used for cultivation with the effects of Roundup.³⁷ This distracts attention from the main focus of the research and the Congressional mandate: the potential impact of the spraying program on Colombian biodiversity. There is no argument that chemicals used in coca cultivation or habitat destruction may not also be harmful to amphibians, but that is not the point of discussion.

In addition to being irrelevant to the Congressional mandate, the comparative risk analysis presented by the CICAD team was poorly executed and thus not reliable. For example, the list of studies related to the spray eradication program in Colombia includes a test of the “[t]oxicity of pesticides used by coca growers to amphibians and the effects of habitat alteration on amphibians.”³⁸ According to the Interim Report, this study was completed in only 1.5 months – not nearly enough time to yield reliable results, nor to obtain the necessary information to accurately determine quantities, types, or methods of use of pesticides employed by Colombian coca growers. Thus, it is not possible that an even remotely accurate assessment of comparative risk was conducted.

Contributing to the unreliability of the comparative risk assessment is the failure to consider other relevant factors. **Any accurate evaluation of the comparative impacts of coca cultivation and spraying must consider the contribution that the spraying program has with respect to relocation, cultivation, and dispersal of coca growing activities.** Current and historical data indicate that aerial eradication of illicit crops simply causes the displacement of illicit crops to more remote areas of Colombia and the region.³⁹ Growing crops multiple times in various locations because crops are destroyed by spraying, will clearly mean the use of greater quantities of dangerous chemicals by coca growers than would be used if crops were grown only once and did not need to be moved. Thus, even if one considers the impacts of chemicals used by coca growers, the spraying program – by causing crop displacement – will only increase this risk. To accurately present the harmful effects of coca cultivation, this major contributing factor must be acknowledged.

The Interim Report also briefly and inaccurately comments on other issues in the attempt to produce a comparative risk analysis. For example, the Interim Report comments on the *indirect* effects of pesticides used in coca cultivation,⁴⁰ without assessing the indirect effects of the spraying program and the spray mixture itself (the mixture the team was asked to study). The Interim Report also presents a very superficial discussion of the reasons for the global decline in amphibian populations.⁴¹ Again, the team was not asked to address this issue, but rather to focus on the impact on amphibians from one particular factor – the spraying program.

³⁷ Brain, Richard A. Hazards of glyphosate, other pesticides, and other human activities to amphibians, (unpublished), (May 30, 2006).

³⁸ Interim Report, Table 1, T2, p. 1.

³⁹ Rocio Moreno-Sanchez et al. “An Econometric Analysis of Coca Eradication Policy in Colombia,” World Development Vol. 31, No. 2; Graham Farrell, “A global empirical review of drug crop eradication and United Nations’ crop substitution and alternative development strategies,” Journal of Drug Issues, Spring 1998 Vol. 28, Issue 2; United Nations Office on Drug Control and Crime, Andean Coca Surveys, 2001-2004; Betsy Marsh, Latin American Working Group, “Going to Extremes,” March 2004.

⁴⁰ Interim Report, p. 9.

⁴¹ Interim Report, p. 9-10.

V. Important Impacts of the Spraying Program Remain Unaddressed

Even if the mandated reporting requirements had been met by this DoS report to Congress, many significant concerns related to the aerial spraying have not been addressed, and merit Congressional attention. As described previously, any complete assessment of the impact of aerial spraying in Colombia requires a thorough study of the increased deforestation and habitat destruction resulting from illicit crop displacement caused by the spraying. To accurately account for the total impact of the program, every reference to the detrimental environmental impacts of coca cultivation must acknowledge and consider the impact of the spraying program with respect to increasing the areas affected by coca and poppy cultivation. A complete assessment must also include an evaluation of the *cumulative* risk to biodiversity and habitat destruction posed by the spraying program, including all types of endemic and threatened species (not only amphibians). Finally, a comprehensive look at the *cumulative* direct and indirect human health impacts of the spraying mixture is necessary.⁴²

VI. Conclusion

As is evident from this critique, the CICAD Interim Report and the DoS Report fail to answer the questions posed by Congress regarding the impacts of the spraying mixture to the Colombian environment. Instead, the reports present a great deal of irrelevant data and anecdotal evidence. While the Congressional mandate has not been met, and the information supplied is presented in a misleading manner, a thorough examination of the limited data gathered so far does suggest that the spraying may be quite harmful to the Colombian environment, particularly amphibian species. Further and more well informed studies are needed to draw concrete conclusions about the impacts of the spray mixture, but the potential for severe environmental harm that the mixture poses is serious enough to warrant an immediate halt to the spraying while better and safer alternatives are sought.

⁴² The CICAD team proposes one human health study in this Interim Report (“Human health effects of eradication spraying using the ‘comet’ assay on human lymphocytes”). The study, however, is poorly focused, given that past experience suggests that human health impact studies should examine short-term impacts. (According to documents included in previous DoS reports to Congress, there are supposedly no long-term human health risks or impacts that are likely to result from exposure to the spray mixture (*See, e.g.,* Response from EPA Assistant Administrator Johnson to Secretary of State, August 19, 2002). On the other hand, there is significant anecdotal evidence from communities, and evidence from U.S. studies, suggesting that exposure to glyphosate herbicides can cause numerous short-term symptoms such as skin rashes, vomiting, and nausea.) While human health studies were not part of the Congressional mandate, well-conceived human health studies are a very important component to an assessment of the environmental effects of a pesticide. Poorly focused human health studies, such as the one proposed by the CICAD team in this report, undermine the importance of carrying out well-designed and appropriately targeted health studies.