

Dynamics of Perpetuation

The Politics of Keeping Highly Toxic Pesticides on the Market in Ecuador

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ABSTRACT

Based on reflective practice over 15 years in Ecuador, the authors examine the perpetuation of knowingly harmful public policy in highly toxic pesticides. They study how actors cooperate, collude, and collide in advancing certain technological agenda, even when against public interests. Ultimately, entrenchment of perspective opened up space for arrival of new social actors and competing activity and transition. In light of struggles for sustainability, the authors find neglected policy opportunities in the heterogeneity of peoples' daily practices and countermovements, leading to a call for further attention to the inherently incoherent, complex, and irresolvable human face of sociotechnical change.

KEYWORDS

agriculture/food policy, Ecuador, pesticides, practice, sociotechnical regimes



Introduction

Globally, highly toxic pesticides kill over 900,000 people each year—roughly the number of people who die from wars and homicides combined (Bertolote et al. 2006). Despite claims of agricultural scientists, development practitioners, and farmers themselves, ability to eliminate highly toxic pesticides has never been due to a lack of alternatives. In the Andes, for example, farmers have been growing pesticide-free potatoes for millennia, often with higher production per area and productivity than today (Sherwood 2009). But even if one does not accept that argument, safer, more specific, and lower toxicity products have been on the market for decades. Many influential corporations are keenly interested in promoting newer products, in particular since the patents on earlier pesticides have expired. Nevertheless, due largely to business interests in developing countries, the elimination of highly toxic pesticides has proven difficult and even, according to regulatory officials, “impossible” (BBC 2004).





Based on fifteen years of action-research with the International Potato Center (CIP) around pesticides and pest management (summarized in Sherwood 2009 and Paredes 2010), we examine the social face of agriculture policy in Ecuador to shed light on the subtle yet significant communicative processes involved in the perpetuation of public policy favoring the continued sale and distribution of highly toxic pesticides, followed by recent legislative measures for their elimination. We look at how different groups of actors both intellectually and organizationally build alliances and reposition themselves around ideals over technology and the future. In so doing, we address two pressing questions: Why and how does knowingly harmful public policy outlive its effective shelf life? What lessons does the intransigence of private and public interests hold for development policy aimed at enabling healthier, more productive, and sustainable futures?

Practice as Policy and Science as Social

In this article, we describe such socioenvironmental and sociotechnical assemblages of practice—regardless of intentionality—as “policy”. Adopting an interpretive policy analysis perspective (Schwartz-Shea and Yanow 2012), we view policy as a socially constituted course of action expressed not only in public bureaucracies, but also through peoples’ daily activity. Peoples’ practices emerge from routine and culture, but they also leave a space for creativity, self-expression, and self-determination. Thus, peoples’ practices can be viewed as a public expression of what is possible and what is desirable—effectively, a form of self-organized policy and governance (Bevir and Rhodes 2010).

Literature on sociotechnology (Latour 1987) reveals the *construct- edness* of scientific knowledge, challenging notions of science as monolithic and unified, objective, rigorous, and truth seeking. Scientific knowledge and technology emerges from a process of “heterogeneous engineering”, during which social, technical, and conceptual pieces become fitted together into products of equal heterogeneity. This involves humans networking with other humans as well as with materials. Thus, technology is not just an artifact, but also a simultaneous mixture of physical objects, human activity, and knowledge (i.e., the know-how to use and sustain technology). Ergo, objects such as pesticides take part in networks. As a result, technology becomes a matter of negotiation—endless jockeying of interests and reorganiza-



tions. Callon (1986) describes networking as the product of “translation,” involving interactive processes of:

1. Problematization: How to become indispensable.
2. *Interessement*: Identification and shaping of allies.
3. Enrollment: Strategies used to define and interrelate roles of different stakeholders.
4. Mobilization: Methods of intervention used to ensure representation.

Latour (1987) concentrates on the early stages of science in process. In contrast, we examine a ready-made product of science: synthetic pesticides. In this later stage of technological development, sociotechnical networks have become composed of identifiable organizations and faces that operate in elaborate governing structures or “sociotechnical regimes” that deliberately attempt to exert influence over the broader technoscience community.

Methods

The research is based reflective practice from 15 years of action research, as presented in Sherwood (2009) and Paredes (2010). We summarize the activity of two competing communities: a “pro-pesticide” versus a “pro-health” lobby.

“Pro-pesticide” refers to the dynamic set of individuals and organizations that came to collaborate in favor of modern farming based on expert knowledge and technology. Constituent identity hinged on the proliferation of market-oriented production, mechanized tillage, and agrochemicals, especially highly toxic insecticides containing active ingredients no longer protected by patent law and thus freely available for local reformulation and sale. Concern over this activity gave rise to a countermovement—the “pro-health” lobby—organized around interests in “agroecology” and “food sovereignty”. The involved actors questioned “safe use of pesticides” programs, while advocating for greater controls and market removal of the highly toxic pesticides.

For data, we draw on critical events in Ecuador that took place between 1999 and 2010, as recorded through project documents, letters, published studies, and media coverage, as well as personal notes and correspondence. For additional information, we hired an independent research team to conduct interviews with key informants that were

recorded and transcribed. We also use raw data from the production of the British Broadcasting Company's (BBC) series, *Dying to Make a Living*.¹

Problematization: Staking Claim to Truth

Callon (1986: 196) describes the solutions proposed as “obligatory passage points,” when an actor or groups of actors “seek to become indispensable in the drama by defining the problems.” For decades, the agrochemical industry has advocated the safe use of pesticides, based on judicious handling of products and the use of personal protective equipment, as the appropriate public response to pesticide-induced health concerns. Jansen (2000: 14) highlights the industry's central arguments: (1) pesticides are indispensable for feeding growing populations and enabling farmers to escape poverty; (2) experts extensively test and approve pesticides for the public; (3) the industry has developed effective safe use programs. In Ecuador, the pro-pesticide lobby organized around a similar problematization, with the addition that farmers (users) and not industry (creators and producers) were ultimately responsible for poisonings.

Indispensability of Pesticides

Carbofuran is the number one selling insecticide in the world for years, and we are proud that it was one of the tools in the green revolution that helped feed the world's people.

—Jonathan, Director of Global Regulatory Affairs, FMC, Philadelphia

In December 2003, members from the Pesticide Action Network in Ecuador interrupted a joint Food Machinery Corporation (FMC, Phi)-Ecuadorian National Institute for Agricultural Research (INIAP) conference on “correct stewardship of carbofuran” that included FMC's public relations and pesticide safety experts from Brazil and the United States, as well as over 30 high-level representatives from companies and research institutions—the international leaders of the pro-pesticide alliance. The response, as articulated by Jonathan, FMC's Director of Global Regulatory Affairs, is instructive: “If you have real information about intoxications, please convey that to us ... Our purpose is to get the benefit of insecticides use for farmers and try to avoid the risks, because the real purpose of insecticides and pesticides is to help feed the starving people of the world.”



Rather than acknowledge the harmful neurological effects of carbofuran, the pro-pesticide alliance explained that “unintentional death” due to carbofuran was rare.² By suggesting that the protest was based on “unreal” information, it alleged that the “seeming good intentions” of the protestors were actually antifarmer and against the interests of the poor. In so doing, the alliance positioned industry on the side of the impoverished and, hence, ardently committed to defend the indispensability of pesticides, including highly toxic pesticides.

Trust the Experts

Furadan ... is registered in more than 80 countries for over 30 years. ... Today it is one of the most studied products. We have over 20,500 bibliographic citations. In universities you will commonly find over 1,500.

—Flavia, FMC regional safe use of pesticides expert

After the protestors left, the pro-pesticide audience apologized to Jonathan, calling the interruption “rude” and a “violation,” typical of the behavior of “the radicals we have to deal with in Ecuador.” One representative stood up and said that rather than resort to such “violence,” the protestors should solicit a “public space for dialogue ... where they could present their studies and practical alternatives for helping the poor.”

In reference to the concerns raised by the protesters, Sherwood asked Jonathan:

We are finding a large percentage of rural populations neurologically affected. We believe this is due to continual exposure to insecticides ... We find metabolites of carbofuran on clothing, in the home, in dust in bedrooms, the kitchen ... People are continually exposed to carbofuran, which makes them chronically ill.

Jonathan answered:

Neurological effects and pesticide use is a very difficult connection to make. What you have is correlations. Correlations can be very dangerous and very misleading ... The most humorous example of the problems with correlations that I can think of is this: we know that the birth rate is going down in Sweden. And we also notice that the stork population is going down. And then we conclude, therefore, that storks deliver babies.

Sherwood responded, “As you say, explaining cause and effect is tough, but we do have control populations, strong statistical designs ... These are studies that have been published in distinguished academic journals in the United States, Canada, and Europe.” Before moving

on to another person, Jonathan provided one last comment: “Science is about being open to error and reconfirming results and having the scientific community comment on them ... So I hope you can send me those references, so that I can follow up on those.”

The pro-pesticide alliance challenged the validity of information and then, when confronted by scientific claims of legitimacy, passed on onus of proof to the public, while placing industry in the position of awarding the final decision over policy. It expressed sympathy and then invited competing positions to “stay in contact” and “keep them informed.” In the meanwhile, the pro-pesticide alliance offered a pathway forward: continued, but safe, use of carbofuran. Ultimately, the industry argued for trust in the experts, and in the meantime, the highly toxic pesticides should be deemed innocent until proven guilty.

Safe Use of Pesticides

With backpack sprayers and fumigators in poor condition, without any protection or consideration for the harm to their health or the environment caused by non-adequate application methods, the farmers go out every morning to their jobs, without worry about the problems they cause.

—CropLife (n.d.a., 2001)

After learning about the International Potato Center’s pesticide research findings, the industry’s representative in Ecuador concluded that

the study shows that farmers recognize the dangers associated with the use of these products, but the local attitude is that pesticides can be tolerated by the strongest people. This fact clearly demonstrates that what exists is a lack of awareness in the safe use and management of these products.³

The proscribed policy became “capacity-building,” summarized as “an aggressive educational and training campaign on safe use and management of phytosanitary products and Integrated Pest Management (IPM).”

In response to controversy created by the CIP-led research, the international pesticide industry consortium, CropLife, financed the Scarecrow training program. The stated goal of the campaign was

to change the mentality of adults through their children and to form tomorrow’s farmers with information on the Correct Use of Products for Crop Protection and Integrated Pest Management, in such a way that children were trained to recognize the most important local pests and insects, diseases and weeds in the area as well as the risks associated with the poor uses and abuse of products.³



The pro-pesticide alliance did not confront the health effects head-on; rather, it redefined the problem as farmers' "misuse" of pesticides, which eventually became translated into a call for Safe Use of Pesticides and Integrated Pest Management. In practice, this primarily meant the promotion of personal protective equipment. Nevertheless, the CIP studies showed that nonusers, principally women and children, were nearly as affected as those who applied pesticides, demonstrating that protective equipment would not prevent exposure (that was, unless women and children wore protective equipment continually throughout their lives). We found, however, that such facts had little effect on belief creation and policy.

Interessement: Proliferation of Pesticide Technology

Interessement refers to ways in which an actor defining a problem establishes linkages with stakeholders—that is, those with a vested interest in the situation or a certain outcome. The industry's training program was based on a slide show and graphic manual for grade schools. It included drawing contests and written tests where awards were given to the best performers. In addition, FMC and Bayer—the companies responsible for inventing the two highly toxic products, carbofuran and methamidophos, behind the public health epidemic—arrived with their own respective safe use programs. FMC's educational campaign focused on "rational and adequate use of carbofuran." Similar to Scarecrow, its approach aimed at reaching parents through children in grade school. Meanwhile, Bayer employed AgroVida, a long-standing educational campaign developed in Central America. All three programs provided standard training in safe use as well as heavy investments in public relations material, such as school bags for children as well as T-shirts and baseball caps for parents.

In late 2001, Bayer CropScience invited Sherwood to participate in the inauguration of AgroVida, which included officials from the Ministry of Agriculture, INIAP, the United Nations Food and Agriculture Organization (FAO), and the German embassy and took place at a five-star hotel in the capital. Bayer's training specialist presented data demonstrating that Bayer had trained tens of thousands of farmers in safe use, claiming measurable impact in about 20 percent of participants. When questioned over reaching only a small percentage of all farmers, he admitted that his work was "only a grain of sand on the beach" when considering the millions of people exposed to

pesticides every day in Latin America. Nevertheless, he pointed out, “AgroVida is a clear demonstration of Bayer’s commitment to small farmers.” Ultimately, safe use was less about actually protecting the rural populations from pesticide toxins and more about demonstrating an interest in protecting farmers.

Aggressive Sales

A pesticide salesman explained that in the early days, sales depended on having a useful product and being a good friend to farmers (interview, 22 January 2004):

To sell you need to make friends, to be able to talk and tell jokes. I could entertain, just like I am entertaining you here tonight. The people would never leave when I started to talk. Once I was in a car accident, all the farmers came to visit me in the hospital and buy products off of me. I sold 149,000 Sucres; it was my best sales year ever.

By the late 1980s, however, competition grew, and the number of people needing to sell their products increased. In some instances, vendors were forced to promote older products of questionable value. As a result, being friendly was no longer enough, so vendors resorted to more aggressive means of reaching their targets (interview, 22 January 2004):

They told us we had to push bad products; I had to meet my quotas even when we knew that what we were selling was no longer of any use ... So, how was I going to sell useless products? ... We started buying pigs to roast and gave out hats and T-shirts, and gave away backpack sprayers ... I’ve organized more fiestas than all of Carchi [Province] put together.

The vendor privately admitted that companies promoted overuse of highly toxic pesticides through high application rates: “In the US it [carbofuran] says the dose is 500 cm/ha [for potatoes]. Go look for a bottle. What happens in Ecuador? In Ecuador, we put four to six liters/ha.” When asked who was responsible for pesticide problems, he responded (interview, 22 January 2004):

The same salespeople are responsible. Sure they worry about burning a farmer’s field, but they worry more about not selling that liter. So they know the farmer only needs 400 ml to cover his field, but if I sell him a liter that shouldn’t burn his field, and I will have nailed another liter of product. Everyone wins—he cures his problem and I sell my liter.



Companies encourage heightened sales through financial rewards and other incentives (interview, 22 January 2004):

I did so well that they sent me to Cartagena as the best salesman. Colombia was the destiny when you won an award, because Dow and Novartis were in Colombia. Three times I was selected the best vendor at the national level. ... I gave my life to the company. I spent the day in the store and the nights in the communities trying to convince the people to buy my products. The job was motivating. The more you worked, the more you earned.

In practice, product sales were less about helping farmers to solve problems and improve production than wealth extraction for salespeople and their companies.

Rejecting Hygiene Norms

In addition to the difficulty of reaching more than a small percentage of farmers with training, diverse international organizations, including the FAO, the United States Agency for International Development (USAID), the World Bank, and Novartis, concluded that safe use campaigns—the cornerstone of both industry and government-led policies—are ineffective, especially when dealing with highly toxic neurotoxins (Atkin and Leisinger 2000). Through focusing on managing the effects (i.e., exposure) rather than the fundamental cause (highly toxic pesticides in the environment), safe use programs may please policy makers, but they do little to prevent intoxications in rural communities.

The CIP-led research found that farmers regarded protective equipment as uncomfortable and “suffocating” in warm weather, leading to the classic problem of compliance associated with individually oriented exposure reduction approaches (Cole et al. 2007). Even when protective equipment was used, product isolation was deemed difficult to impossible where production fields and housing were closely connected and exposure inevitable. Informed by such realities, the occupational health literature (Plog et al. 2002) as well as long-term industry studies (Atkin and Leisinger 2000) concur that the most promising means of addressing pesticide exposure is one single measure: eliminating the most toxic compounds from the environment. Despite such overwhelming evidence, the industry proved extremely effective at keeping highly toxic pesticides in the hands of farmers, achieved through processes of enrollment.

Enrollment

The internal processes of coercion and collusion associated with alliance building are not explained by *interessement*. Enrollment involves “the group of multilateral negotiations, trials of strength and tricks that accompany the *interessement* and enable them to succeed” (Callon 1995: 211). During enrollment actors “inscribe” interests into new symbols with mutually acceptable meaning, thereby making them socially mobile. Initially, the industry in Ecuador proposed a collaboration with INIAP’s IPM program, which centered on Farmer Field Schools (FFS). The head of INIAP’s Carchi Provincial Office, Joel, was a staunch advocate of field schools in IPM as a means to pesticide use reduction. (By request, names for INIAP and MAG staff were changed. This convention was applied to “Joel” and “Vicente,” as well as “Maria.”) He was not against receiving funds from CropLife, as long as INIAP could maintain a degree of independence and run the project “technically,” meaning field schools as a means of pesticide use reduction and in particular the elimination of the highly toxic pesticides. After learning about Joel’s position, CropLife’s representative said that he could not finance a project that promoted pesticide use reduction. As an alternative, he proposed that the industry complement field school training with safe use training. Appreciating the conflict between safe use programs as pesticide use promotion and field schools as pesticide use reduction, Joel concluded: “INIAP will never work with CropLife in Carchi.” Nevertheless, when Joel accepted a two-year leave of absence to enter a graduate program, the door opened for new INIAP leadership and policy change.

Shaping the State

All the specialists we consulted, including in the Ministry of Agriculture, sustained that less toxic pesticides were equally effective [as the more toxic products]; and as a result, they argued that the country should not wait to prohibit the importation of products classified as extremely dangerous.

—Rodolfo Asar, *Día a Día* television program

Government officials maintained a public narrative against highly toxic pesticides and in favor of public health. In private, however, we encountered another reality.

The BBC (2004) met with Carlos Navas, the head of Pesticide Product Registration and Regulation at the Ministry of Agriculture, to



ask him one question: “Does Ecuador need these dangerous [red label] chemicals or should they just be banned?” Navas answered:

We need scientific support to conduct studies in order to complete the forms for prohibiting the importation or manufacture of certain products. As well, we need substitutes for certain pesticides. And when alternatives become available, then we can replace the product and ban the use of dangerous pesticides, but there is no possibility of doing that without new or different products.

While CropLife refused to finance field schools because of their emphasis on pesticide use reduction, it was eager to link up with field schools as a result of the methodology’s growing popularity in the country. By the end of 2002, the head of INIAP’s Highland Extension Program, Vicente, joined forces with the pro-pesticide alliance. Despite knowledge of Joel’s position, Vicente explained, “We need the resources.”⁴

CropLife invited Vicente to prestigious international meetings on the safe use of pesticides in the United States and elsewhere, where he learned about other public-private partnerships, such as the FAO’s collaboration with CropLife and the International Fund for Agricultural Development (IFAD) (CropLife 2001). In its 2002 annual report, CropLife (2002) proudly highlighted its “strategic alliance” with INIAP as an “innovative public-private partnership.” The central objective of the CropLife-INIAP partnership was “to promote the importance of correct use of Crop Protection Products (CPP) and Integrated Pest Management” as well as “to train farmers, housewives, and extensionists in CPP and IPM.”⁵ The public-private partnership employed CropLife’s Scarecrow approach of training primary school teachers and children so that they would “grow up with clearer criteria with respect to using pesticides.”

Citing the work of the International Food Policy Research Institute (IFPRI 2004), the director general of INIAP subsequently informed CIP that the organization had ample justification for working with the pesticide industry, emphasizing that he personally supported the agreement. By then, an industry representative had moved into the INIAP office in northern Ecuador. Despite the obvious inconsistencies with INIAP’s earlier research findings concluding that highly toxic pesticides must be eliminated (Cole et al. 2007), CropLife and INIAP had agreed to work together on safe use, thereby assuring government approval for the highly toxic pesticides. Such industry tactics of enrollment were common in other countries.⁶

In 2004, the FAO financed a project that ignored the studies on the problematic nature of safe use programs for pesticides and the priority of eliminating highly toxic pesticides.⁷ Maria, a toxicologist from the Ecuadorian Ministry of Agriculture (MAG) who was on public record for demanding the regulatory removal of highly toxic pesticides, was placed in charge of the project. Following an industry-financed sabbatical in Switzerland, her position shifted to safe use. The objectives were to train MAG staff in the International Code of Conduct on the Distribution and Use of Pesticides, the registry of products, and laboratory skills in testing for pesticide residuals in food. The project sought to improve the registry of pesticides through quality control of agricultural products using pesticide residuals on commodities as its indicator. It did not take into account socioeconomic exposure conditions and the resulting health effects on rural populations. Its environmental studies were limited to the design of a national system of monitoring pesticide use and a database of registered agrochemicals. The project produced technical recommendations for the Ecuadorian government on the fulfillment of the FAO's International Code of Conduct. Through this initiative, the FAO's position in Ecuador became indistinguishable from that of CropLife, thereby providing the pro-pesticide alliance international sanction for its activity in Ecuador.

Countermovements

The government says it does not have the research or the resources to take action on the most toxic pesticides, and the chemical companies say they cannot control how products are used in the field. So, it seems that the farmers will have to take measures to help themselves.

—Euan McIlwraith, *Dying to Make a Living*, BBC World Service Program

During the late 1990s, the increasingly obvious interrelations between pesticide poisonings, modernity, and disease generated a pesticide-induced public health epidemic, which in turn provided new imperatives for scientists regarding how to make visible and track pesticide-induced risks to people's health and well-being (Yanggen et al. 2004). When research made explicit this reality (for example, through quantitative measurement of neurological damages due to chronic pesticide exposure), an unfolding class of local and foreign brokers working as individuals and as civil society organizations and sharing concern over the vulnerability of this modernization pathway began a process of claims against the sociotechnical regime. This growing opposition became organized around new values, in particular "agroecology" and "food



sovereignty”, centering discourse on the health and environmental costs born by industry and by the citizenry (Colectivo Agrario 2009).

Growing public concern over a pesticide-induced epidemic combined with explicit approval of MAG, INIAP, and the FAO of the pesticide industry’s agenda raised questions over the ability of officials to fulfill their public mandate. In November 2003, peasant leaders wrote a letter to Ecuador’s President Gutierrez demanding northern Ecuador be declared a zone of “agricultural and economic emergency.” They sought controls over “unfair” importation of potatoes and milk from Colombia and demanded technical assistance, machinery, inputs, seed, and credit. Faced with falling potato prices, growing pest problems, and increasingly aware of the health effects of pesticides, entire communities descended from the mountainsides to the Pan-American Highway in protest. On 5 December, they gave the president 24 hours to answer their concerns, threatening indefinite closure of northern Ecuador. Several days later, thousands of farmers blocked the Pan-American Highway, the single artery connecting Ecuador to Colombia. The strike grew to nearly 10,000 participants, effectively ending commerce between Ecuador and Colombia for a month.⁸

A subsecretary of the Ministry of Agriculture, assigned the task of quelling the protest, said it was impossible to negotiate: “The farmers seemed to be angry about everything.”⁹ In the end, the government offered to donate several tractors, but according to one of the leaders, little else was accomplished.¹⁰ The Pan-American Highway remained closed for another week, until rains came and the participants returned to their communities for planting season.

Following the strike, community organizers from the Humanist Movement arrived in northern Ecuador with the intention of blocking CropLife’s and INIAP’s efforts to recruit municipalities onto the safe use agenda. Together with field school graduates, the Ecuadorian non-governmental organization, EcoPar, a multi-stakeholder network of public, non-governmental and community-based organizations based in the El Angle micro-watershed, the Carchi Consortium, and the Network of Community-Based Natural Resource Management (MACRENA), they sought to expose the contradictions of public collaboration with the pesticide industry and to block the proposed safe use campaigns. Through dozens of in-depth workshops in communities and stakeholder meetings with municipalities, local understanding of the pesticide crisis deepened. Subsequent activities in the municipalities of Montúfar, Espejo, and Mira led to a boycott of the proposed

CropLife-INIAP activity¹¹ as well as two municipal ordinances against the sale of highly toxic pesticides.¹²

At the national level, news of INIAP's collaboration with CropLife arrived at the National Coordinator of Ecological Agriculture (CEA), a network of over 150 nongovernmental and community-based organizations, including the Pesticide Action Network (PAN-Ecuador). Following a series of meetings in March and April of 2004, CEA and PAN-Ecuador sent a position statement to INIAP's director general.¹³ The letter highlighted the World Bank's and the industry's own conclusions (as found in Atkin and Leisinger 2000) on the safe use of pesticides: "The promotion of safe use of highly toxic pesticides is at best irresponsible." The letter cited the previous INIAP and CIP research, emphasizing, "INIAP should play a more proactive role in research for the elimination of highly toxic pesticides." Furthermore, it questioned INIAP's collaboration with the industry: "There exists a conflict of interest between the commercial priorities of the pesticide industry and the public mandate of INIAP." The letter closed by demanding that INIAP "terminate its contract with CropLife" and that it "focus its research on decreasing dependencies on pesticides and especially the elimination of highly toxic products." Subsequently, 60 representatives of organizations from the coast, the highlands, and the Amazon produced a "Declaration of Active Non-complicity in the Use of Highly Toxic and Dangerous Pesticides," calling for (CEA, 2004):

- Information campaigns on the human health and environmental affects of highly toxic pesticides.
- Boycotts on produce, such as tomatoes, potatoes, and bananas, that do not include guarantees that they were produced free of applications of highly toxic pesticides.
- Product labeling of foods that have been produced with highly toxic pesticides.
- Forbidding MAG, INIAP, the Ministry of Education, municipalities, provincial governments, and other publically-funded agricultural training programs to collaborate with industry-led safe use campaigns; instead, they should support campaigns centering on the reduction of the use of pesticides and, in particular, highly toxic pesticides.
- Linkages between Ecuador and similar initiatives elsewhere in Latin America, Europe, and the United States for the elimination of dangerous pesticides.



The days of public-private collaboration in favor of highly toxic pesticides appeared numbered.

Mobilization: Determining Harmful Technology

Let's work together.

—Bayer Corporation (1997) slogan

“Mobilization” involves displacement or the making of previously static entities mobile for the purposes of social continuation or change (Callon 1995: 217). The ineffectiveness of safe use of pesticides was already established, so the issue appeared to be one of eliminating highly toxic pesticides. The pro-health lobby provided substantial quantitative and qualitative evidence supporting the viability of alternatives, such as farmer field schools in IPM. Nevertheless, the policy in Ecuador effectively continued to be: the highly toxic pesticides essentially *could not* be banned, so let's work together. How did this occur?

Expert Black Boxing: Torero of Truth

We understand that there are people who approach pesticides with a different ideology and we accept that ... I know how fond people in Ecuador are of bullfights, but sometimes it is difficult for me to know whether I am the bull or the torero.

—Jonathan, director of Global Regulatory Affairs, FMC

Latour (1987) views scientists as “entrepreneurs” capable of indiscriminately pursuing political and economic objectives. Focusing on the early stages of the scientific process, he describes how scientists create oversimplified abstractions or “black boxes” around their activity, which in turn become the means of enrolling new actors around common agenda and into increasingly influential networks. The experience in Ecuador demonstrates how such activity occurred with pesticides as a ready-made agricultural technology. For many, pesticides have become a mythical black box—that is, what people come to rely on but do not question. They effectively control the unwanted environmental products of industrial-era agriculture (pests). They legitimize new practices and rule systems (on purchase, application, mixing), requiring new mediating roles (e.g., agricultural researchers, extensionists, and agrochemical salespeople) as knowledge brokers.

The disposition of science in the agrochemical industry and a national research institution to ignore growing contradictions over the

“goods” and “bads” of technology shows that more important than adherence to research claims is the motivation to create new truths that are in line with evolving institutional purposes. The black boxes that bolster pesticide technology effectively blind farmers and the public to the past as well as alternative farming realities. Farmers have prioritized the proscribed corrective inputs (basic purchasing and application knowledge) and outputs (quick, convenient ways to kill pests) deemed necessary for economy and security. Over time, communities of people and natural systems have coevolved to the point where farming is now dependent on external actors and their technology, thereby charting an indelible pathway for the future: more of the same.

Co-option of Symbols

The industry in Latin America has long drawn on a tactic of framing the pesticide problem as one of “perception” and “radical ideals” of urban-based environmentalists, rather than one of substance (Murray and Taylor 2000; Jansen 2008). One means of achieving this in Ecuador is through reinterpretation of experience and translation of meaning.

For example, during an INIAP and CropLife–organized course for university students, Arturo, a CropLife training specialist, drew out the basic chemical formula for water on a whiteboard and asked the class, “What are the dangers of this chemical?” Assuming that the formula belonged to a chemical pesticide, people in the class volunteered responses, such as, “It kills beneficial insects” and, “It pollutes water.” Arturo said that despite the beliefs of “radicals” and “ecologists” in Ecuador, this formula was responsible for life, and that no one in the classroom would be there if it did not exist. He explained that the formula was for water, leading to his conclusion: “Chemical pesticides, like water, are essential for life.”

Following a CropLife course on Integrated Pest Management and the Correct Use of Crop Protection Products, a field school graduate said that “we were asked to promote safe use of pesticides, but no one talked about the reduction of pesticide use”—the central tenet of IPM.¹⁴ Devoid of an emphasis on pesticide use reduction, INIAP and CropLife essentially used the term IPM outside of its pre-established designs and purposes and appeared as the champions of the prestigious symbol of IPM.

Outside of IPM, CropLife and INIAP began to freely utilize the concept of farmer field schools. In 2004 CropLife cofinanced an INIAP-



led impact study on farmer field schools (Barrera et al. 2004), suggesting that the industry was responsible for their contributions. CropLife then financed a greatly reduced version of field school methodology that consisted of five, two-day sessions focusing on safe use (Sherwood et al. 2012). Compared to the 400-hour course that had become the standard in Ecuador, these field schools did not include essential processes of the methodology, such as learning plots, agroecosystem analysis, and open-ended experiments. In the hands of the pro-pesticide alliance, the farmer field schools were transformed to the point that they no longer represented a serious threat to the pro-pesticide alliance.

Entrenchment through Regulation

In San Gabriel, there is not a single technician who sells agrochemical products—just Pancho Leon [the owner of a store], who is never around. He puts cute girls in miniskirts at the counter to attend to his customers.

—Ecuadorian potato farmer

In his study on the continued use of highly toxic pesticides in Central America, Jansen (2000: 16) found that through opposing all opposition to pesticides and the development of complex regulations, “[t]he industry can successfully build upon a set of internationally accepted criteria for regulation, which practically exclude the possibility to ban most of these pesticides.” In Ecuador, the regulation states that highly toxic pesticides can only be purchased with a prescription from a licensed agronomist. Nevertheless, the investigative television program, *Día a Día*, found that “[u]nfortunately, this is just one more regulation that is not fulfilled in our country; even a small child could purchase these products freely” (*Día a Día* 2001).

In response to the claim that carbofuran did not represent a risk for farmers, a CIP social scientist asked Jonathan, FMC’s director of Global Regulatory Affairs, “How do you calculate the risk? What do you factor in? Because, the calculus would change from country to country ... For example, in Ecuador the socioeconomic exposure conditions are very different than those in the United States, and, if you included that factor, it could lead you to a very different outcome.” In his response, Jonathan buried the question in the details of regulatory complexities and framed the concern as a government policy matter and not the responsibility of the pesticide industry. He added, “We [the industry] cannot be responsible for the flaws in a country’s regulatory system.”



When challenged over concerns over the continued sale and distribution of highly toxic pesticides, the pro-pesticide alliance frequently referred to their compliance with the FAO's International Code of Conduct. In practice, the International Code of Conduct legitimizes the actions of authorities and strengthens the idea that the industry is not responsible for the consequences of its products.

States legitimize the "externalities" of technologies through their system of civilized controls and regulations. Nevertheless, the actual lifeworld of a regulatory agency is not just composed of its civilized mechanisms of control, but also the unwritten outcomes of what it sanctions. Through its regulatory system, Ecuador granted permission to pesticide companies to introduce toxins into the environment. The contamination of the environment and the poisoning of its public are, in essence, shadow effects. The sociotechnical regime achieves this by means of reference to established norms and the sanction of regulatory agencies. The shadow effects of technology regulation are not mere "externalities" of the system, but intrinsic elements of it. In summary, it is technology linked to the notion of effective regulation that forms the basis of power. In this way, the image of regulation against harmful technologies becomes complicit in sustaining the continuation of harmful technology.

The Reflex

Growing understanding that public-private collaborations violated the public trust led to diverse forms of questioning: television documentaries, newspaper articles, encounters during events, street protests, and boycotts. As a result, the social cost of keeping the highly toxic pesticides on the market climbed. Faced by the threat of shifting public opinion, some members of the pro-pesticide alliance began to take a softer position on the highly toxic pesticides. For example, Carlos Garcia, the Andean regional head of sales for the largest distributor of pesticides in the country, AGRIPAC, publicly stated that his company was ready to replace highly toxic pesticides (El Comercio, 2002). Furthermore, during an informal conversation a high-level Bayer representative from Europe stated, "The industry has known for years that the highly toxics must go. My company already has stopped selling them back home. But our colleagues in the South are going to continue to sell them until it is either no longer profitable or politically viable to do so."¹⁵



In Ecuador, the politics of risk definition became extremely important for continuity and transition. Even in the presence of seemingly objective science, there were no facts outside the interpretation based on context, position, perspective, and interest, as well as the power to define and advocate a position.

Although the pro-pesticide network enrolled a heterogeneity of components (technical devices, statements, inscriptions, embodied skills, and social groups) that rendered it forceful, its activity inevitably produced a reflex that made it vulnerable to further processes of translation. Beck et al. (1994) argue that a society that endlessly spins off technologically induced risks eventually undermines the legitimacy of its institutions, leading to the emergence of new social forms. In other words, the “bads” of risk society produce backlash, in this case both environmental and social. At the time of the close of this research, this growing group of actors, in conjunction with the increasingly visible effects of ecological disturbance, appeared to be gaining momentum. The fact that certain industry representatives became willing to publicly acknowledge the inevitability of a shift with regard to the sale and distribution of highly toxic pesticides suggested that proposals for change were less radical than previously thought.

With the social stage set for the regulatory removal of highly toxic pesticides, in 2007 a former countermovement activist in Carchi, who had become a government official in the Ministry of Agriculture, proposed an amendment to the regulation on highly toxic pesticides.¹⁶ Rather than work through the Ministry of Agriculture, which continued to be under heavy influence by the pesticide alliance, he worked through the National Commission on Health and Environmental and Ecological Protection, a congressionally mandated, interministerial group. In particular, he engaged representatives from the Ministry of Health, where concern over pesticide poisonings was less controversial. On 9 July 2009, the National Assembly approved a provision canceling the registry of World Health Organization Category I pesticides, “prohibiting the manufacture, formulation, importation, sale, and use” of highly toxic pesticides.¹⁷

Conclusions: Dynamics of Perpetuation

The tenacity of pesticide technology rested on the success of scientists and agronomists as entrepreneurs, indiscriminately mixing economic, political, natural, and cultural claims to truth. Effectiveness



depended on capacity to strengthen networks through “black boxing” pesticides, singling out options promoting safe use and integrated pest management, and thereby shaping perspectives, positions, and agenda to the point where pesticides became not just useful but “essential”—for food, well-being, and even survival. Upon becoming overly consolidated and rigid in administration, content, and activity, however, the pro-pesticide network grew vulnerable to competing interests. As a result of the networking success of activists working in social movements, nongovernmental organizations, and government, an increasingly influential subpolitical force emerged around ideals of “agroecology” and “food sovereignty”. In fact, members of the pro-health alliance managed to insert groundbreaking policy in Ecuador’s 2008 constitution as well as previously “impossible” legislation: the elimination of highly toxic pesticides. Ironically, it appeared that the extraordinary success of the pro-pesticide network, followed by institutional entrenchment around its own belief system, provided the preconditions for institutional demise and transition.

What lessons does the perpetuation of public policy around harmful technology hold for the transition toward a healthier, more sustainable futures? Not unlike work in obesity, which has come to dominate global health concerns (Prentice 2006), public efforts to address pesticide health concerns focus on controlling technology and its unwanted consequences. After 15 years of addressing pesticide concerns, we conclude that overcoming political intransigence around technology requires a public policy that considers the social activity of science itself. In practice, policy involves the communicative and organizational activity of people operating as individuals and in groups, such as Ecuador’s formalized scientific communities and industry as well as its less formal, subpolitical (though increasingly institutionalized) food countermovements. This experience shows how different social realities coexist, intersect, and interact over knowledge and technology, in turn revealing how societies are discursively heterogeneous and incoherent.

Regarding the role of experts in policy making, in the context of health and environmental crises, science stands to make a valuable contribution in making visible existing potentialities. As Law (2011) argues, scientists need to look for gaps and subaltern realities, requiring engagement with and upon difference, to make a difference. Instead of acting on notions of norm and commonality (“best practice”), we also need to start looking for possibilities in social deviances and



disjunctions. As Paredes (2010) found with pesticide health concerns in Ecuador and Marsh et al. (2004) found in a broader context, seemingly intractable problems can be addressed through searching out the rich diversity of peoples' practices in distinct situations, places, and contexts.



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Notes

1. Lynne Mennie and Euan McIlwraith of the BBC World Service conducted these interviews from 7 to 14 September 2003.

2. In fact, recent research has found that access to acutely toxic pesticides in rural communities is indeed associated with high suicide rates (Bertolote et al. 2006).

3. Letter to the International Potato Center, received from the president of the APSCA, 28 May 2001.

4. Personal communication.

5. Sources at INIAP in Carchi said that due to criticisms over safe use of pesticides, it had decided to use the term "Uso Correcto de los Productos para la Protección de Cultivos" (in English, "Correct Use of Crop Protection Products"). Nevertheless, the change did not include a rethinking in training content, other than a linkage with IPM. Later, the director of INIAP stated, "We know and understand the interinstitutional politics against the 'indiscriminate' use of pesticides. Our institutional policy is adequate use of the same [pesticides], according to established schemes that you know very well."



6. See, for example, Bayer's evocations of IPM and farmer field schools in *Courier* magazine in the 1997 special issue. In 2007, Bayer would employ essentially the same tactics in Peru.

7. In April 2004, the FAO financed a one-year, \$230,000 project entitled, "Support to the Application of the Specifications of the International Code of Conduct in the Registry and Control of Pesticides" in collaboration with MAG-SESA (FAO/TCP/ECU/2903).

8. Personal communication with Juan Carlos Landázuri, president of the Centro Agrícola of Montúfar, 12 December 2001.

9. Personal communication with Fausto Merino, Subsecretary for the Highlands and Amazon, Ministry of Agriculture, 12 January 2002.

10. Personal communication, Juan Carlos Landázuri, Director of the Montufar Farmers' Bureau, 12 December 2001.

11. Personal communication with the Project Expert of the Ecuadorian non-governmental organization EcoPar, who also acted as the technical advisor to the Environmental Unit for the Municipality of San Gabriel, 11 August 2005.

12. Personal communication with the president of Grupo Randi-Randi, 11 August 2005.

13. Letter to the director general of INIAP, from the Ecuadorian Coordinator of Agroecology (CEA) and the Pesticide Action Network, 17 May 2004.

14. Personal communication, 10 April 2003.

15. Personal communication with a representative of Bayer CropScience, Agro-Vida Inauguration, 19 October 2001.

16. Personal communications with the director of the Instituto Nacional de Capacitación Campesina, Ministry of Agriculture, June through December 2007.

17. Article 1, Chapter 29, Registro Nacional, No. 224, 29 June 2010, Quito, Ecuador.

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