

**Regulatory Science and Social Movements.**  
**The Trial Against the Use of Agrochemicals in Ituzaingó**

Florencia Arancibia  
State University of New York Stony Brook  
florenciapaulaarancibia@gmail.com

**Abstract**

In August 2012 a transgenic soy producer and a spraying pilot were sentenced to three years of conditional prison for pollution and harm to public health in Cordoba, Argentina. The trial was initiated by the Mothers of Ituzaingó and other grassroots movements from Cordoba, as children exposed to glyphosate-base pesticide sprayings got sick in the surroundings of transgenic soy fields. This was the first case of pollution judged by Criminal Law in Latin America. Challenging the toxicological classification of glyphosate, the verdict became a turning point in the fight for stronger regulations of a “bio-technified” agriculture. Through in-depth interviews to social movements’ members, lawyers, and physicians participating in the trial, and the Prosecutor in charge, I suggest that the joint action of social movements and experts can sometimes have a strong leverage over “regulatory science” (Jasanoff, 1990). This paper is part of an ongoing research about how communities can have a voice in regulating technological risks to which are exposed.

**Introduction**

In a time when the regulations of new technologies are increasingly based on scientific advice, lay citizens have been progressively disempowered and left out of important decision making processes. Even in the face of scientific uncertainty regarding potential risks and political conflict, most of the times scientific advisory committees have the last word. The possibility of controlling, questioning or resisting the adoption of

new technologies through democratic means has been weakened. Frequently, this derived in severe health problems for vulnerable communities or/and environmental degradation. At the same time, however, new forms of citizen participation in the scientific arena and public-interest science are emerging, although with different degrees of influence (Moore et al., 2011). This paper focuses on this.

During the last twenty years biotechnology has radically transformed agriculture (James, 2007). Genetic engineering made it possible to design seeds with commercially desirable traits –like higher tolerance to herbicides- in order to maximize economic output and efficiency. While agrochemicals may indeed help raise productivity levels, great human health and environmental costs associated with their use have been denounced (Pellow, 2007). Experiments conducted by international scientists have revealed associations between agrochemical exposure and a range of reproductive health ailments, including miscarriages, birth defects, infertility, delayed pregnancies, and breast cancer (Benachour and Séralini, 2009; Marc et al., 2004; Richard, 2005).

In 1996, Argentina pioneered the adoption of genetically modified (GM) soy resistant to glyphosate-base herbicide (GBH). The country became the third largest global producer as the consumption of GBHs increased from 30 million liters in 1997 to 340 in 2013 (REDUAS, 2012). These changes altered socio-environmental dynamics and posed new regulatory challenges. Glyphosate was defined by SENASA as a product of “low toxicity” based on a classification by the World Health Organization, which only considers lethal damage. No epidemiological studies were conducted by the Ministry of Health in order to identify other non-lethal effects at different levels of exposure, and no restrictions were defined for GBHs commercialization and use in Argentina.

However, rural populations have increasingly experienced health problems -what they saw as a result of the excessive use of GBH-. Ignored by the government, they initiated a growing number of SMs in order to push for stronger regulations. At the same time, concerned scientists and rural physicians produced new clinical and epidemiological research proving that the use of pesticides had some toxic effects previously described by international experiments. In 2010, the national network Physicians of Fumigated Villages was created to challenge the official toxicological classification of GBHs, and request more protective regulations. In some provinces, SMs

were able to forge strong coalitions with experts, while in others it was not so easy. In this paper, I show how in the province of Cordoba the building of such coalitions led to the penal condemnation of a GM soy producer and a spraying pilot for pollution and harm to public health.

Using a case study, I focus on collective action between 1996 and 2012 aimed at changing “science-based” regulations for the commercialization and use of pesticides in the neighborhood of Ituzaingó Cordoba, Argentina. My hypothesis is that in order to be successful and promote some change, communities at risk must create and maintain grass root organizations; at the same time they have to develop some level of expertise and find allied scientists able to produce alternative scientific studies to oppose hegemonic regulatory science. In order to answer to these questions and evaluate my hypothesis, I combine in-depths interviews with archival analysis. Even though many scholars have analyzed social movements against GM crops in Latin America (Bravo, 2010; Fitting, 2011; Kinchy, 2006; Klepek, 2012; Newell, 2008; Otero, 2008; Pearson, 2012), as well as adaptation processes (Lapegna, 2014), conflicts regarding the regulation of pesticides which GM seeds are modified to resist, have been understudied.

## **The struggles**

### **Madres de Ituzaingó: Making the invisible visible**

One of the first attempts at challenging the science-based regulations for agrochemical commercialization and use in Argentina involved a group of mothers from a suburban neighborhood bordering soybean farms in the city of Cordoba, who came to be called the Mothers of Ituzaingó. They started to talk about illnesses associated with glyphosate at the beginning of the decade (2000s), while trying to change local regulations for its use in close proximity to their houses.

The mothers identified an unusual increase in local cancer rates and associated it with the rise in the use of agrochemicals. Their struggle started at the end of 2001 when one woman, Sofia, was puzzled by the fact that many women in the village began wearing headscarves and many children were using chinstraps. For almost four months, she went door to door with other mothers collecting data on medical diagnoses, writing a list and

drawing a map showing the location of each ill person. The mothers presented the list and the map to the Provincial Ministry of Health and requested official studies of soil, air and water. As more mothers started to join the group, they met regularly and organized demonstrations. After a local TV channel showed one of the many demonstrations in the streets of Ituzaingó, the Provincial Ministry of Health received the group of mothers and promised to conduct an interdisciplinary environmental study on 150 cases; the study was carried out immediately. However, according to the mothers, not all the cases were fully investigated by the official study.

Helped by human rights lawyers and the Foundation for Environment Protection (FUNAM), the mothers presented their individual cases (38 penal complaints) to the legal federal court at the end of 2002, asking for a restriction of agrochemical spraying in residential areas in the Province. They also presented a petition to the local city authorities (Consejo Deliberante de la Municipalidad de Córdoba) to ban the spraying of agrochemicals close to their houses. A municipal ordinance was issued declaring a health emergency in their neighborhood and prohibiting spraying within 2500 meters of Ituzaingó's urban areas until the health emergency situation was suspended. In 2004, a Provincial Law (9164) for regulating the use of agrochemicals passed, establishing a 500 m. limit for the use of some agrochemicals (glyphosate not included).

However, farmers did not obey the provincial law or the municipal ordinance. After the mothers complained, the government promised to establish 24-hour police surveillance, but according to the mothers "the police have always been absent." Having found no redress among local political authorities, the mothers decided to go further: ask for protection in the judicial system and address national political authorities.

In order to prove the existence of these illnesses, they decided to conduct their own independent survey with the help of local physicians. This was the first attempt to develop new counter-hegemonic scientific evidence through popular epidemiology, in which scientific data is produced by the victims of diseases (Brown and Mikkelsen, 1990). The report, published in 2005, demonstrated about 200 cases of cancer among 5000 inhabitants (Grupo Madres de Córdoba, 2005). The report ended with a declaration from the mothers: "Our low social status makes us endorse multiple factors of degradation and environmental pollution that directly affect our human rights. It is the

same image in most villages surrounding soybean crops fields. (...) The best protective and supportive mechanisms for soybean complex are subtle dynamics of concealment and invisibility. Hence, our effort is to make the invisible visible. In the context of obscene profits from record exports and evasion of taxes (“retenciones”), we will show the tragic consequences of this model of hunger and death. (...) Spraying with glyphosate, endosulfan, paraquat and other poisons has become the constant threat of many Argentines. How does the State care for its citizens when the children are killed in cold blood in the villages across the country? Who controls these technological packages? Who controls biotechnology?” (Grupo Madres de Córdoba, 2005).

The provincial Ministry of Health wanted physicians from a provincial hospital to test the results of the report. Despite the fact that the physicians sent by the Ministry considered the numbers in the report accurate, the Ministry of Health said that there was not enough evidence of causal association between the development of diseases and the use of agrochemicals. In 2004 the mothers travelled to the capital city, Buenos Aires, to address the National Ministries of Human Rights, Environment, and Health. There, they contacted national deputies to design and present to the National Congress a National Law to ban spraying in any area within 2500 m. of urban areas surrounding farms across the country. In Buenos Aires the mothers were also able to contact and build solidarity networks with other organizations that got involved in their struggle targeting national authorities.

To summarize, because the local regulations that the mothers wanted to change were based on regulatory science (Jasanoff, 1990), the first step in their struggle was to challenge it. In this way, the mothers had to get involved in expert issues and promoted the development of a popular epidemiology (Brown and Mikkelsen, 1990).

Their struggle was mainly played at the local level –their main goal was to prevent the spraying of glyphosate over and in the proximities of their houses- but their initiative had interesting consequences at the national level. Even if the mothers did not reach their local goal until many years later (helped by confluent factors and the mobilization of other social movements and experts), building counter-hegemonic epidemiological data in order to press political authorities turned to be an innovative and powerful contentious performance (Tilly, 2008). Rural physicians and other social movements in different

locations across the country emulated it later; and the data produced by all of them became a useful tool for influencing public opinion and promoting changes in provincial and national regulations on the use of glyphosate.

### **“Stop the Spraying”**

One of the groups that the mothers met in their trip to Buenos Aires was Grupo de Reflexion Rural (GRR). GRR was founded in the mid-nineties by intellectuals from different disciplines (social sciences, agronomy, and economics) as a space to debate the impacts of global capitalism in the country. From ecological and critical perspectives, the group opposed the agricultural model based on the export of transgenic commodities as a new form of “dependency.” GRR supported the Madres de Ituzaingó’s national campaign against pesticide use in urban populations in 2005 and founded a campaign called Stop the Spraying. The campaign was supported by other social and environmental NGOs such as the Center for the Protection of Nature (CEPRONAT) of the city of Santa Fe, and several others of the Provinces of Buenos Aires, Cordoba and Entre Rios as well as Union of Citizen Assemblies (UAC). The aim of the Stop the Spraying campaign was to promote the organization of neighbors in soy-surrounded areas across the country in order to resist the new agro-productive system that, according to GRR, was causing severe health and social problems. It is interesting to notice that this campaign aimed not only at changing the science-based regulations on the use of agrochemicals but also at resisting the complete agricultural model of the bioeconomy. GRR criticized the idea that introducing biotechnology in agriculture would lead to further national development and growth. They said that their fight was not for a simple ban in the use of agrochemicals, but for the foundation of a new agrarian model of production based on agro-ecological principles.

One of the first steps of the national campaign was to build new counter-hegemonic scientific evidence. As the group of mothers has already done, GRR collected data regarding the associated illnesses in a collaborative effort between rural neighbors and experts; just as the mothers had done, GRR was constructing a popular epidemiology. But this time, the research covered many provinces (Buenos Aires, Santa Fe, Entre Ríos, Córdoba) and included data from patients, medical records, as well as

studies on soil and water. As a result, in January 2009 the book *Fumigated Peoples* was published. The book was presented in September 2009 at the second *Fumigated Peoples* meeting organized by UAC at San Lorenzo, Province of Santa Fe. The book did not follow an academic format, and was designed to be available in non-expert bookshops so it could reach a massive public audience. Also, the empirical studies were used to support GRR's legal demands that the National Supreme Court suspend the use and marketing of agrochemical products across the country. The petition also requested that certain national institutions be incriminated as the "drivers and / or supporters" of agribusiness: SENASA, the National Institute of Agricultural Technology (INTA) and the Ministry of Agriculture.

To summarize, the Stop the Spraying campaign changed the level of struggle in three different ways: 1. the political scope was wider (the claim was a radical change of the agrarian productive system, not only challenging regulatory frameworks); 2. the geographic reach was broader (different villages across the country were included); 3. many experts got involved (for example, rural physicians). In terms of outcomes, even if the campaign did not accomplish its main goal yet, it produced a lot of empirical counter-hegemonic data, built a national advocacy network and helped legal actions carried on by GRR and later on by different actors across the country. The main accomplishment was to develop strong links between experts and local communities as well as among local communities spread across the country. This became an important tool for supporting and coordinating the mobilization of small and isolated rural communities.

### **The experiment on embryos**

In April 2009, the front page of an Argentine popular newspaper published new experimental findings by Dr. Andrés Carrasco proving that glyphosate causes malformations in embryos. Interviewed by the newspaper, the embryologist from the National Commission of Science and Technology (CONICET) and head of the Molecular Embryology Lab at University of Buenos Aires provided technical details, and said that further studies should be conducted immediately to analyze other damages caused by glyphosate while precautionary regulations should ban or at least strongly limit its use in populated areas surrounding soy fields. In the interview, he publicly complained about

the complacency of the global scientific system with private corporations: "Science is urged by powerful economic interests, and not by the quest for truth and the welfare of the people" (Aranda, 2009). The same results were published by an international journal of toxicology (Paganelli, Gnazzo, Acosta, López and Carrasco, 2010) one year later.

Even if Carrasco's findings were not the first experimental results on detrimental effects of glyphosate on public health, previous experiments published in scientific journals in English or French were pretty inaccessible for lay populations in rural Argentina. In contrast, Carrasco tried to make his findings easily accessible to as many people as possible. The fact that the experiment was conducted by an Argentine physician from a national university, and that it was published in Spanish in an oral interview for a massive national newspaper made a difference. Despite the fact that Carrasco was not a member of the groups organizing the Stop the Spraying campaign, his actions were in some ways complementary with it. His research agenda was influenced by the ongoing scientific-political disputes around glyphosate: "I thought that I definitely should do something about this after reading the Madres' problems" (Interview, 2009).

The first public response to the results came from government officials. In a TV show, the Minister of Science and Technology of Argentina underestimated the embryologist's claims and argued that his results should not be considered more than a private communication of preliminary data on a work in progress instead of proven scientific evidence of a study commissioned by CONICET. He questioned the scientific validity of the results, due to the fact that they were first published in a massive newspaper instead of a scientific journal. He also defended the use of glyphosate-based herbicides and highlighted that the Ministry of Agriculture approved its use a long time ago "based on worldwide experiences" (Baraño in Huergo, 2009). It is interesting to see that this criticism is being uttered on a TV show. The importance of media as an arena for debate for all parties involved in the regulatory science controversy is clear. And this proves that when social movements of lay people step into these types of expert debates, they force a de-facto democratization of the decision-making processes (regardless of the success they obtain in their claims of change).

Right after the Minister's TV appearance, more than 600 intellectuals and scientists, as well as international NGOs and Indigenous movements produced a manifest supporting

Carrasco and demanding a real detachment of science from lucrative interests and international corporations. The same day, the National Peasant Movement Via Campesina Indígena issued a statement supporting Carrasco.

Three days after the results of the experiment were published, the Environmental Lawyers Association filed an appeal before the Supreme Court requesting the suspension of commercialization, sale and application of glyphosate in the entire country based on the new experiment as well as previous national scientific studies. They placed responsibility on the national executive government, as well as the provincial governments of Buenos Aires, Cordoba, and Santa Fe; they also pointed to Monsanto. The appeal was based on the precautionary principle stipulated by Article 4 of National Environmental Law (“the absence of scientific proof or information should not be used as a reason for postponing effective measures to prevent environmental degradation.”) and article 14 of the National Constitution.

In August 2010 physicians from the rural villages in GM soy-producing provinces held a meeting at the School of Medical Sciences in the province of Cordoba. It was the first time that a national university hosted an official conference on such topic as agrochemicals and public health. Molecular biologists, geneticists, epidemiologists, endocrinologists, and other experts like Carrasco presented empirical data on this issue. This meeting was the founding moment of a social movement exclusively composed by experts. The University Network for Public Health and Environment-Physicians of Fumigated Villages became a formal network of physicians and experts that worked together towards a shared goal: “to link, coordinate and enhance scientific research, health care, epidemiological analysis and the promotion and defense of the right to collective health, performed by different teams working in 10 different provinces of Argentina”. With more than twenty professionals actively involved, the movement created a webpage to communicate national and international scientific news on issues related to the use of agrochemicals as well as publish collective statements on concrete national policies regarding agrarian biotechnology. They published the report of their first meeting as a book and organized a Second Meeting the year after at the National University of Rosario, in another GM soy producer region.

In May 2010, the forest engineer Claudio Lowy supported by the National Ecological Action Network, the Union of Civil Assemblies, Red Alternativas a los Plaguicidas en América Latina (RAPAL) and the Association of Environmental Lawyers, among others, sent a request to the Ombudsman's office with 10,000 signatures asking intervention to change the toxicological methodology for the classification of agrochemicals. For the first time, the struggle questioned what apparently only experts in toxicology could question: the scientific methodology used to determine the risk of chemicals use on human health. For the first time, social movements and NGOs directly targeted the local and global organizations producing the regulatory science for the bioeconomy: the World Health Organization and SENASA . Finally, the Ombudsman agreed with the request and formally solicited a change in the toxicological methodology to the National Ministry of Agriculture. As the Ministry did not take any concrete action, the Environmental Association Lawyers filed a new lawsuit in 2011 against the executive government. The lawsuit demanded an urgent change in the toxicological classification of agrochemicals as well as the declaration of a national state of health emergency, based on the scientific data of the report published by the University Network for Public Health and Environment-Physicians of Fumigated Villages.

### **Some outcomes of an open-ended process**

In December 2009, for the first time, a provincial justice in Cordoba banned the spraying of glyphosate in the vicinity of populated areas in Ituzaingó (500 m., 1500 m. for aerial spraying), establishing it as a criminal offense of willful pollution to the environment and to public health. Then, in August 2012 a GM soy producer and a pesticide-spraying pilot from Ituzaingó were sentenced to three years of conditional prison, considering pesticide spraying in urban areas as a “criminal offense” based on the National Hazardous Waste Law, punished with 5 to 10 years of prison. This was the first case of pollution judged by Criminal Law in Latin America, and it became a strong legal background for future similar complaints in Argentina. At the same time, the penal condemnation had an important political influence over the regulatory system of the Province of Cordoba. After the trial, new municipal ordinances limiting the use of pesticides were enacted across various rural towns and villages of Cordoba. Today the

province of Cordoba shows the higher number of municipal ordinances enacted to restrict the use of pesticides (with, in average, the wider pesticide-free zones ).

It is important to note that this successful outcome was obtained only at the local level. Of course, the ruling became a powerful legal precedent for further complaints and a tool for other local struggles in the same province. But it is up to local populations to fight for that and initiate their own legal procedure. At the national level, fewer goals were accomplished. On the one hand, the national government created a special an interdisciplinary committee of experts (Committee of Ethics in Science and Technology, 2009), which released a public report reviewing available scientific evidence on health effects of glyphosate and justifying current regulations. The results of the report were not positive for the activists. On the other hand, despite the recommendation from the National Ombudsman, there has yet to be a change in the toxicological classification of glyphosate used by SENASA that would acknowledge the many health effects. Finally, despite the existence of different law projects, there is still no national law limiting the use of agrochemicals in the entire country.

## **Discussion**

This case study focused on the dynamics of bottom-up initiatives to change the science-based regulatory frameworks for the use of pesticides. We can see how complex struggles become in that boundary zone between basic science and policy--regulatory science--where all the different parties mentioned above can interact and clash, and where every issue always has to be tackled on two fronts at once (lay/expert, facts/rights, science/law, etc.).

My research questions dealt with the possibilities for at risk populations to participate in the regulation of biotechnology in agriculture. Current science-based regulations present social movements with a dilemma: they must choose between either promoting broader basis for regulatory policy (opening a social, political and/or cultural debate), or entering a complex field of contention, in which expertise is a requirement to have a legitimized voice (Moore et al, in press). The literature presented three different ways in which social movements can get involved in science and technology issues: social movements of lay people trying to intervene from “outside” scientific institutions,

allied groups of scientists and lay people trying to intervene both from “inside” and “outside” institutions, scientists and experts trying to change the rules of knowledge production from “inside” scientific institutions. By reconstructing the trajectory of different challenges to current regulatory frameworks by social movements, I found that not one but all three types of collective action were in play. The case of Cordoba showed that sometimes a single type of collective action might not be enough. Rather, the interplay among the three of them is a prerequisite for any change. Around Argentina, the intertwined types of actions converged in a mutually empowering dynamic. Rural populations had to get together and create grassroots organizations able to mobilize other people in order to express their claims and exercise some sort of leverage on government institutions: Madres de Ituzaingó were the first, followed by many local groups of Stop the Spraying and Union of Popular Assemblies. These organizations had to be quite strong in order to survive long periods of time, as legislative processes tend to be relatively slow. But organization was not enough. Going back to the dilemma presented by Moore et al. (in press), accepting the scientism of regulatory policy was the only option for social movements to be heard. Hence, new ways of acting had to be developed as traditional repertoires of actions (like demonstrations, road blockage, and rallies) were not enough. They had to legitimize their claims scientifically, from the beginning, they engaged in popular epidemiology (Brown and Mikkelsen, 1990) and built partnerships with local physicians. At the same time, experts from Argentina and abroad took independent initiatives in order to express from “inside” scientific institutions their own disagreement with the scientific basis of current regulations. They created new research lines and projects as well as published new results challenging existing studies that determine the WHO’s toxicological classification of agrochemicals. Many of them also participated in national and international collective networks of professionals, coordinating their actions with grassroots social movements: engaging in popular epidemiology; working towards the spread of scientific results; helping environmental lawyers include scientific data in lawsuits; and giving public speeches in demonstrations and conferences across the country. Some of them even became active members of grassroots social movements. In fact, the action of experts alone might have had little

impact without the local mobilization of grassroots social movements pressing the government authorities.

### **Conclusion**

The positive local outcomes in Cordoba resulted from the complex coordination of local, national and global collective efforts of lay people and experts. Many things had to be lined up in order to produce local changes in regulations: a finding done with an experimental-animal model and some epidemiological or clinical evidence; both testimony from experts and the affected lay people; people mobilized in the streets, experts mobilized in global professional settings; and legal procedures in the provincial and national Courts. Different targets had to be addressed at the same time: public/politicians were one relevant audience, but also professionals (doctors), expert regulators as well as basic scientists at multiple locales.

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