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Environmental Injustice in Argentina: Struggles against Genetically Modified Soy

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This paper explores the unequal distribution of the environmental and social costs and benefits of the genetically modified (GM) soy model in Argentina and its impact on grievance formation and the emergence of contestation. In the 1990s, Argentina transitioned into a neoliberal agro-industrial model based on producing GM soy for export. Though celebrated as a success, the expansion of GM soy monocultures has brought widespread socio-ecological disruption. Various social actors have started to mobilize against the resulting environmental injustice. I focus on the peasant–indigenous movement in the north of the country, which is struggling for land rights, and the movements against agrochemical spraying in the central Pampas region. These groups, which are relatively powerless to control resources where they live, and that experience little or no benefit from GM soy production, nevertheless bear most of its social and ecological costs. These struggles link environmental and social well-being, becoming struggles for ecological sustainability as well as social justice and equity.

Keywords: soybeans, GMOs, Argentina, mobilization, environmental justice

INTRODUCTION

The turn of the twenty-first century has seen increasing numbers of socio-environmental conflicts in Latin America and across the global South, as people resist the many extractive projects promoted under the logic of neoliberalism by corporations and states around the world (Martínez-Alier 2014). Extractivism refers to the intensive extraction of natural resources, facilitated by scientific and technological developments, and the export of those goods with little or no value added. Latin American governments have promoted these commodity-exporting projects, often run by transnational agribusiness corporations, as models for socio-economic development (Gudynas 2014; Otero and Lapegna 2016).

Extractivism in Argentina takes the form of large-scale agro-industrial production of genetically modified (GM) soy for export (Cáceres 2015). GM soybeans were adopted in 1996 as a key accumulation strategy under the neoliberal restructuring of the 1990s and were furthered under the post-neoliberal Kirchner administrations (Torrado 2016). Argentina is the world's third-largest soy producer and exporter, after the United States (US) and Brazil. Soy and soy-derived exports represent close to a quarter of its foreign trade. One hundred per cent of the soy planted is GM, and with record harvests and profits each year, the soy model is widely celebrated as a success (Leguizamón 2014a).

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Yet the soybean boom has also brought widespread socio-ecological disruption. Since 1997, an average of 726,000 hectares has been added to soy production yearly. By 2015, 20 million hectares – 52 per cent of Argentine land under cultivation – was sown with GM soybeans (MAGyP 2015). This dramatic production growth has expanded the agrarian frontier of the Pampas agro-export region into the northern Chaco forest, driving deforestation and the violent displacement of many peasant and indigenous families. It has also expanded agrochemical use, increasing environmental and public health risks due to pesticide drift.

In this paper, I look at the movements that have organized to protest the negative consequences of the GM soy model and to resist environmental injustice in Argentina. Environmental justice (EJ) highlights power asymmetries in the distribution of and access to environmental and social 'goods' and 'bads' as these intersect with race, class and ethnicity (Mohai et al. 2009). In the US and Latin America, grassroots EJ movements have emerged as the powerless, who directly experience environmental hazards, have framed these as grievances and mobilized against them (Carruthers 2008).

Certainly, the issue is not black and white, and there are important nuances. First, not all communities that suffer from environmental hazards protest (Auyero and Swistun 2009; Lapegna 2016). Second, neither the distribution of costs and benefits nor the distribution of power in society is a zero-sum game. Interestingly, in Argentina the soy model is often depicted as a case of 'winners' and 'losers' (e.g. González Arzac 2009). This depiction highlights the significant cleavage created by the reorganization of Argentine agriculture, between a corporate-state elite that has benefited from soy production (Newell 2009) and those who are, in consequence, worse off, particularly small farmers, rural workers, and indigenous and peasant populations (Lapegna 2014). There is, however, a wide sector in between, particularly midsize farmers and landholders, who directly and indirectly benefit from soy production by leasing their land (Gras 2009). Yet researchers also note that agricultural production in Argentina is becoming more concentrated in the hands of large transnational agribusinesses, accelerating processes of accumulation by dispossession (Gras and Hernández 2014; Cáceres 2015; Leguizamón 2016). Therefore, while the spectrum from power to powerlessness is wide and varied, as the model intensifies, the grey areas darken, making this analysis more relevant.

In Argentina, struggles against extractivism are particularly visible relative to mining. While not as widespread, resistance against the GM soy model is also growing. The aim of this paper is to document these struggles against dispossession. Based on data that I collected between 2011 and 2015 through interviews,[1] archival research and secondary data, I explore the unequal distribution of the environmental and social costs and benefits of the GM soy model in Argentina and its impact on grievance formation and the emergence of contestation. In particular, I examine: (1) the peasant–indigenous movement, mostly in northern Argentina, which contests GM biotechnology as part of a broader struggle against neoliberal globalization ('anti-neoliberalism'); and (2) 'citizen assemblies' in defence of health and life, mostly in the central Pampas region, triggered by the spread of agrochemical-induced illnesses ('anti-agrotoxics'). These groups are relatively powerless to control resources where they live and reap little or no benefit from local GM soy production, while bearing most of its socio-ecological costs. Table 1 summarizes the main characteristics of these two types of movements.

The contexts of resistance for these movements are very different and thus it is important to emphasize them. In agricultural production a primary distinction is made between the Pampas region and the rest of Argentina. The central flatlands of the Pampas have historically relied on capitalized

[1] Interviews took place between 2011–12 and 2015 with members of MOCASE-VC, Paren de Fumigar Córdoba, Paren de Fumigarnos Santa Fe, Asamblea UAC Buenos Aires, Basta de Fumigarnos Las Palmas – La Leonesa, Madres de Barrrio Ituzaingó, Asamblea Malvinas Lucha por la Vida, and researchers Norma Giarracca and Miguel Teubal (Universidad de Buenos Aires), Cecilia Canevari (Universidad de Santiago del Estero) and Mauricio Berger and Cecilia Carrizo (Universidad de Córdoba).

Table 1. Anti-GM soy social movements in Argentina

	Anti-neoliberalism	*Anti-agrotoxics*
Main actors	Peasants and indigenous populations	'Citizens', 'neighbours': peri-urban and rural inhabitants not living off rural production
Site of struggle/ ecoregion	Chaco (north)	Pampas (central)
Main grievance	Forced and violent evictions; anti-GM as part of a wider struggle against neoliberalism	Health effects of agrochemical spraying ('agrotoxics')
Main goal	Gain control over land and territory	'Stop Spraying': regulate agrochemical use
Scope	Local, with transnational connections (*La Vía Campesina*)	Local, with some regional and national alliances

family farming oriented to the export market; this ecosystem was razed for agro-industrial production early on. Eighty-seven per cent of soy production takes place in the Pampas region, in Buenos Aires, Entre Ríos, Santa Fe, Córdoba and La Pampa provinces (MAGyP 2015). In the rest of the country, food is produced mostly for domestic consumption. The Chaco is a dry forest, rapidly being deforested for soy production, inhabited mostly by peasants and indigenous peoples. Unlike the Pampas, the soil in the Chaco is not suitable for large-scale industrial farming.

This work contributes to research on the emergence of anti-GM movements in the global South (Scoones 2008; Gutiérrez Escobar and Fitting 2016) as well as to efforts to link the literatures on environmentalism in the North and South (Carruthers 2008; Martínez-Alier 2014). I argue that bringing these literatures together is significant for rethinking issues of power, dynamics of technological and agrarian change, and ecological sustainability.

PEASANT–INDIGENOUS PEOPLES VERSUS NEOLIBERALISM

Most of the peasant and indigenous families in Argentina live in the north, in the provinces of Salta, Jujuy, Tucumán, Chaco, Santiago del Estero, Formosa and Misiones. Many of these families have organized to claim land rights, a claim that has grown louder and stronger with the expansion of GM soy into their territory (Domínguez 2009). As the members of MOCASE-VC, the peasant movement of Santiago del Estero, state:

> We live this, the encroachment of the frontier of agribusiness, of soy, of GM crops … It's a permanent threat to [our] territory, to the lands of peasant–indigenous communities: the environmental pollution from the products of the technological package that come with transgenic crops, the threat to biodiversity, the loss of our seeds, the criminalization of our struggles to defend the territory. (Interview with MOCASE-VC members, August 2011)

The protests of peasant and indigenous families against GM soy are inscribed within a broader claim for access to and control over their territory and its natural wealth. The struggle for land parallels the emergence of a peasant–indigenous identity and their organization as a movement (Teubal 2009).

The *Movimiento Campesino de Santiago del Estero* (MOCASE) is the largest and most important peasant movement in Argentina (Lapegna 2013). Peasant organization in Santiago del Estero started in the late 1970s in response to forced evictions by agribusinesses. In the 1990s, at the height of Argentina's neoliberal restructuring, the movement organized as MOCASE. In 2003, the movement split into MOCASE/PSA, a faction closer to the government, and MOCASE-VC, allied with the

transnational peasant movement *La Vía Campesina* (Barbetta 2005). The core of MOCASE-VC's agenda is the struggle for land, a claim protected under the *Ley Veinteañal*, which grants property rights to anyone who has lived and worked on a plot for more than 20 years. Indigenous peoples also claim property rights based on their ancestral rights as native peoples.

The expansion of GM soy into peasant–indigenous territories has meant *desmontes*, the toppling or burning down of the forest to make room for large-scale industrial agriculture. Since the 1970s, the agrarian frontier of soybean production has expanded beyond the Pampas region into *el monte*, the northern Chaco dry forest. The Chaco is one of the largest forest ecosystems remaining in Latin America and one of the most active deforestation frontiers in the world. Driven mainly by soybean expansion, between 1972 and 2011, 2.7 million hectares of the Chaco were deforested, 64 per cent of them since the introduction of GM biotechnology in 1997 (Gasparri et al. 2013, appendix).

Deforestation brings ecological losses, threating biodiversity (Pengue 2005). Deforestation is also a major source of carbon emissions and thus contributes to climate change (Gasparri et al. 2008). Deforestation brings social losses as well. Peasants and indigenous peoples manage the forest as a commons; it provides wood for home cooking and sale (as charcoal) and areas where domestic animals graze. Many locals have also historically been employed as loggers. For indigenous peoples, the forest is a source of livelihood but also a locus of culture and identity. *Nos arrebatan la tierra y la identidad* – 'They take from us our land and our identity', interviewees told me. Here, social and environmental grievances align, as claims for environmental protection intertwine with claims to identity, dignity and sovereignty.

The MOCASE-VC members I interviewed described the violent forced evictions that accompany deforestations, with bulldozers flattening homes and paramilitary forces threatening and even killing peasant leaders (see also Lapegna 2013). The affected smallholders are relatively powerless to resist agribusiness. By 2013, the 224 documented land conflicts covering 2.8 million hectares in the northern Chaco region had affected close to 18,000 peasant and indigenous families, almost half of which hold 50 hectares or less (REDAF 2013, 42–3).

For MOCASE-VC, therefore, the primary and most urgent goal is *que las familias se queden en su tierra* – 'that families remain on their land'. To defend peasant territory, the movement engages in various forms of collective action, from direct action resisting forced evictions to legal actions securing families' land rights. MOCASE-VC also actively pursues an alternative agrarian model for local development. This involves the use of agro-ecological methods and the creation of a fair trade network for peasant production. These projects are important alternatives that reshape society–ecosystem dynamics beyond the logic of extractivism.

In sum, for MOCASE-VC, as for other peasant–indigenous movements in Latin America, resistance against GM biotechnology emerges out of a struggle to protect and defend livelihoods in the face of dispossession caused by implementation of neoliberal programmes across the region. GM biotechnology is described as merely the 'gear of an economic model' based on extractivism. Hence MOCASE-VC denounces agro-industry as a whole, alongside other extractive activities such as mining and forestry. Anti-GM contestation is part of a wider struggle for local – versus corporate and extra-local – control over natural resource use and decision-making.[2]

NEIGHBOURS VERSUS AGROTOXICS

The most widely used agrochemical in Argentina and around the world is glyphosate, a broad-spectrum herbicide, developed and commercialized by Monsanto under the 'Roundup' trademark

[2] Note that this is the perspective that the movement's leaders promulgate in public discourse. Research shows that peasant and indigenous peoples across the global South have much more nuanced and complicated relationships to GM biotechnology in their everyday life; for example, for Argentina, see Lapegna (2014); for Mexico, Fitting (2011); and for India, Roy (2015).

(GRR 2006; Cressey 2015). It is used as part of a 'technological package' alongside no-tillage machinery and Monsanto's Roundup Ready™ soybean seeds (engineered to tolerate Roundup spraying).

A primary argument for introducing herbicide-resistant GM crops in Argentina was that they would reduce the use of more toxic agrochemicals. In fact, GM soy did lessen agrochemical use when it was first introduced in 1996 (Trigo 2011). Over time, however, as the area under GM soy production increased and weeds began to develop glyphosate resistance, the total volume of agrochemical use, especially of glyphosate, has increased (Catacora-Vargas et al. 2012). Glyphosate-resistant weeds force farmers into a 'pesticide treadmill' of applying increasing volumes of glyphosate, spraying more often and combining glyphosate with more toxic herbicides, such as 2,4-D, dicamba, paraquat, atrazine and endosulfan (Binimelis et al. 2009). As a result, glyphosate use by Argentine farmers rose from 821,000 kilograms in 1996, when only 6 per cent of the soybeans planted were GM, to 88,000,000 kilograms in 2014, applied over an area of 20 million hectares of GM soy (Benbrook 2016, appendix 1).

The dramatic expansion of glyphosate use worldwide has heightened risks of ecological and health impacts (Benbrook 2016). Laboratory studies show that glyphosate and Roundup formulations have endocrine-disrupting effects on rats and rat embryos, leading to chronic kidney and liver deficiencies and severe malformations (Paganelli et al. 2010; Séralini et al. 2014). Argentine physicians have documented increased rates of miscarriages and congenital birth defects among mothers with a history of direct exposure to pesticides across the country (REDUAS 2010). In 2015, the World Health Organization reclassified glyphosate as 'probably carcinogenic' (Cressey 2015).

In consequence, in Argentina and around the world, experts and laypeople alike are organizing to contest the health and environmental hazards caused by pesticide drift (Arancibia 2013; see also Ezquerro-Cañete 2016). In Argentina, a group of mothers living in the Ituzaingó Anexo neighbourhood, on the outskirts of the provincial capital of Córdoba, were among the first to organize against glyphosate spraying. Since then, several groups across the country have joined in the demands to 'Stop Spraying'. In Malvinas Argentinas, a town near Barrio Ituzaingó, local inhabitants, already affected by crop spraying on surrounding farms, have organized to stop Monsanto from building a GM seed factory in their town. Their struggles are described next.

The Mothers of Barrio Ituzaingó Anexo

> In our case, human rights have been violated so what we are demanding is for our right to health, to life, and to a healthy environment, which is, if you think about it, a right everyone should have, but we don't have it right now. The right to life is non-transferable; thus, violating this right, which is a human right, harms us all. They have trampled on what's most sacred to people. They've sprayed us from airplanes; they didn't care about people. No one cared to say, 'Don't [spray there], there's a neighbourhood nearby' … No, if people didn't come out, if we didn't come out to fight, they would be still doing the same thing. They stopped because we fought. We organised first because we had to defend ourselves from something that was harming us. (Mother from Barrio Ituzaingó, quoted in Carrizo and Berger 2009, 13, my translation)

The Mothers of Ituzaingó Anexo was among the first organized opposition to glyphosate spraying in Argentina. Ituzaingó Anexo, a working-class neighbourhood on the industrial margin of Córdoba City, is surrounded by soy farms. The organization started in 2002, as mothers noticed that many of their children and grandchildren in the neighbourhood were sick or dying. In a population of 5,000, the Mothers identified more than 200 cases of cancer, as well as respiratory and skin diseases, miscarriages and birth defects.

The Mothers have worked long and hard to prove links between agrochemical spraying and the poisoning of their community (Carrizo and Berger 2009, 2012). They started by raising awareness among their neighbours, explicitly denouncing the spraying of *agrotóxicos* (agrotoxics) as a health risk. A main means of protest is rallies at the provincial courthouse downtown, where they march with their sick children and family members, their mouths covered by surgical masks, in a performance that recalls the struggles of the Mothers of Plaza de Mayo. A key demand is enforcement of local ordinances that prohibit spraying within 2,500 metres (about 1.5 miles) of settled areas. In a historic move, they filed suit against a soy producer and a crop duster for wilful environmental pollution.

In collaboration with experts, the Mothers have developed a 'popular epidemiology' to demonstrate the links between illnesses and agrochemicals (Arancibia 2013). Laboratory tests have revealed the presence of endosulfan in the water supply and agrochemical residue in local residents' bodies. Neighbourhood surveys show an unusually high prevalence of pathologies, including anaemia, lymphoma, leukaemia and cancer, clustered within a few blocks (Carrizo and Berger 2009). The mapping of patterns of human disease is a major epidemiological and toxicological method and means of protest also employed by environmental health movements in the US (McCormick 2015).

Stop Spraying

In 2006, in solidarity with the Mothers of Barrio Ituzaingó, a Buenos Aires-based group of academics and activists named *Grupo de Reflexión Rural* (GRR) organized a campaign against agrochemical spraying. This campaign, called *Paren de Fumigar* – 'Stop Spraying' – was summarized in the report *Pueblos Fumigados* (GRR 2006), which gathered the experiences and demands of affected residents in the Pampas.

The GRR campaign sought to survey the crop-sprayed towns and to organize them under one umbrella, coordinating efforts and resources. Their efforts revealed the extent of the problem, a key to framing the issue as a social problem in other towns. At a pivotal 2008 meeting in Colonia Caroya, Córdoba, the GRR-coordinated campaign coalesced into a collective of different chapters. While there are exchanges among groups and assemblies (by email, list-serves and meetings) there still is no national network in place. There are, however, alliances with other groups organizing around socio-environmental struggles under the Union of Citizen Assemblies (UAC) umbrella.

The majority of Argentinian rural towns remain quiescent, even when agrochemical drift is perceived as a hazard (Leguizamón 2014b; Lapegna 2016). Yet 'Sprayed Towns' organizations are emerging in rural towns across the provinces of Córdoba, Santa Fe, Entre Ríos and Buenos Aires, where soy fields abound. Vocal protests have also occurred in the northern province of Chaco, in particular in the towns of La Leonesa and Las Palmas.

In contrast to the peasant–indigenous movement leaders, members of 'Stop Spraying' are not rural labourers or farmers, and although many live in rural areas near farms, they typically do not profit directly from agriculture. During my fieldwork, I met teachers, students, lawyers, physicians, housewives and service-sector employees. They self-identify as *vecinos* (neighbours), who are *auto-convocadxs* (self-organized), a statement designed to distance them from political parties or affiliations and from any agenda except the defence of their children's health and lives. This grassroots pattern of self-organized assemblies of residents concerned about health is also characteristic of symbolic EJ struggles in the US, such as Love Canal (Levine 1982).

Malvinas Argentinas Says 'No to Monsanto'

In June 2012, the year the Mothers of Ituzaingó started their historic lawsuit, President Cristina Fernández de Kirchner announced a new Monsanto investment in Argentina: the construction of

a GM seed corn factory, the second-largest in Latin America. The plant was to be located in the rural town of Malvinas Argentinas, 20 miles away from Ituzaingó.

Residents of Malvinas Argentinas, the poorest city in Córdoba province, who were already suffering the effects of nearby crop spraying, decided to organize and say 'No to Monsanto' and to the installation of a toxic facility in their town. What started as a coalition of neighbours in mid-2012 developed over a year into a blockade/occupation that is ongoing as of September 2015 and has halted Monsanto's construction plans.

CONCLUSION

The expansion of GM soy in Argentina is celebrated as an agricultural boom. Yet the soy boom has also brought negative social and ecological consequences. Bulldozers are razing the northern Chaco forest to make room for soy, devastating ecosystems and violently displacing local populations, while crop dusters spray toxic agrochemicals over towns bordering soy farms, endangering community members' health. This paper highlights how the costs and benefits of the GM soy model have been very unequally distributed, with the poor and powerless bearing a disproportionally higher burden of the costs of GM soy production.

I have focused on the movements that have emerged to contest environmental injustice resulting from the GM soy model in Argentina. Specifically, I have looked at how peasants and indigenous peoples in northern Argentina are mobilizing to defend their territorial rights against usurpation by agribusiness. I have also looked at the 'anti-agro-toxics' movement of neighbours' assemblies mobilizing against agrochemical drift, fighting for their right to live in a healthy environment. While these two movements have different constituencies and demands, protecting lives and livelihoods is a common cause that unites them. In this respect, because these two apparently different social movements fuse environmental concerns with social justice struggles, one can analyse them as types of EJ movements of the global South.

The struggle is highly unequal, with peasants confronting bulldozers, mothers and students standing up to Monsanto. This does not make their struggle less urgent. On the contrary: large extractive development projects only expand and accelerate socio-ecological disruption. EJ theory highlights how local populations – those who bear the impact on the ground and in their lives – are the most likely actors to organize for social and environmental justice. Relative to the issue of sustainability, local communities are key to maintaining the society–ecosystem dialogue (Gould 2006). This is the promise in EJ movements. By joining environmental well-being with social well-being, the struggles for social justice and equity also become struggles for ecological sustainability.

REFERENCES

Arancibia, F., 2013. 'Challenging the Bioeconomy: The Dynamics of Collective Action in Argentina'. *Technology in Society*, 35 (2): 79–92.

Auyero, J. and D.A. Swistun, 2009. *Flammable: Environmental Suffering in an Argentine Shantytown*. Oxford: Oxford University Press.

Barbetta, P., 2005. 'El movimiento campesino de Santiago del Estero: luchas y sentidos en torno a la problemática de la tierra'. In *El campo argentino en la encrucijada*, eds N. Giarracca and M. Teubal, 423–48. Buenos Aires: Alianza Editorial.

Benbrook, C.M., 2016. 'Trends in Glyphosate Herbicide Use in the United States and Globally'. *Environmental Sciences Europe*, 28 (3). DOI: 10.1186/s12302-016-0070-0

Binimelis, R., W. Pengue and I. Monterroso, 2009. '"Transgenic Treadmill": Responses to the Emergence and Spread of Glyphosate-Resistant Johnsongrass in Argentina'. *Geoforum*, 40 (4): 623–33.

Cáceres, D.M., 2015. 'Accumulation by Dispossession and Socio-Environmental Conflicts Caused by the Expansion of Agribusiness in Argentina'. *Journal of Agrarian Change*, 15 (1): 116–47.

Carrizo, C. and M. Berger, 2009. *Estado incivil y ciudadanos sin estado: paradojas del ejercicio de derechos en cuestiones ambientales*. Unquillo, Córdoba: Narvaja Editor.

Carrizo, C. and M. Berger, 2012. 'Citizens; Rights and Environmental Genocide'. *Environmental Justice*, 5 (2): 105–10.

Carruthers, D.V., ed, 2008. *Environmental Justice in Latin America: Problems, Promise, and Practice*. Cambridge, MA: The MIT Press.

Catacora-Vargas, G., P. Galeano, S.Z. Agapito-Tenfen, D. Aranda, T. Palau and R.O. Nodari, 2012. *Soybean Production in the Southern Cone of the Americas: Update on Land and Pesticide Use*. Cochabamba, Bolivia: Virmegraf.

Cressey, D., 2015. 'Widely Used Herbicide Linked to Cancer'. *Nature News*, 24 March.

Domínguez, D.I., 2009. La lucha por la tierra en Argentina en los albores del siglo XXI: la recreación del campesinado y de los pueblos originarios. PhD dissertation, Universidad de Buenos Aires.

Ezquerro-Cañete, A., 2016. 'Poisoned, Dispossessed and Excluded: A Critique of the Neoliberal Soy Regime in Paraguay'. *Journal of Agrarian Change* this issue. DOI: 10.1111/joac.12164

Fitting, E., 2011. *The Struggle for Maize: Campesinos, Workers, and Transgenic Corn in the Mexican Countryside*. Durham, NC: Duke University Press.

Gasparri, N.I., H.R. Grau and J. Gutiérrez Angonese, 2013. 'Linkages between Soybean and Neotropical Deforestation: Coupling and Transient Decoupling Dynamics in a Multi-Decadal Analysis'. *Global Environmental Change*, 23 (6): 1605–14.

Gasparri, N.I., H.R. Grau and E. Manghi, 2008. 'Carbon Pools and Emissions from Deforestation in Extra-Tropical Forests of Northern Argentina between 1900 and 2005'. *Ecosystems*, 11 (8): 1247–61.

González Arzac, R., 2009. *¡Adentro! Millonarios, chacareros y perdedores en la nueva Argentina rural*. Marea: Buenos Aires.

Gould, K.A., 2006. 'Promoting Sustainability'. In *Public Sociologies Reader*, eds J.R. Blau and K.E. Iyall Smith, 213–30. Lanham, MD: Rowman & Littlefield.

Gras, C., 2009. 'Changing Patterns in Family Farming: The Case of the Pampa Region, Argentina'. *Journal of Agrarian Change*, 9 (3): 345–64.

Gras, C. and V.A. Hernández, 2014. 'Agribusiness and Large-Scale Farming: Capitalist Globalisation in Argentine Agriculture'. *Canadian Journal of Development Studies*, 35 (3): 339–57.

GRR (Grupo de Reflexión Rural), 2006. Pueblos fumigados: informe sobre la problemática del uso de plaguicidas en las principales provincias sojeras de la Argentina, http://www.grupodereflexionrural.com/trabajos/Plaguicidas%20en%20la%20Argentina.pdf (accessed 20 February 2016).

Gudynas, E., 2014. 'Conflictos y extractivismos: conceptos, contenidos y dinámicas'. *DECURSOS, Revista en Ciencias Sociales*, 27–8: 79–115.

Gutiérrez Escobar, L.M. and E. Fitting, 2016. 'The *Red de Semillas Libres*: Contesting Biohegemony in Colombia'. *Journal of Agrarian Change* this issue. DOI: 10.1111/joac.12161

Lapegna, P., 2013. 'The Expansion of Transgenic Soybeans and the Killing of Indigenous Peasants in Argentina'. *Societies Without Borders*, 8 (2): 291–308.

Lapegna, P., 2014. 'Transgénicos, agroquímicos y campesinas/os en Argentina: escalas globales y locales, dinámicas de resistencia y adaptación'. In *La dieta neoliberal*, ed G. Otero, 229–48. México, DF: Universidad Autónoma Metropolitana.

Lapegna, P., 2016. 'Genetically Modified Soybeans, Agrochemical Exposure, and Everyday Forms of Peasant Collaboration in Argentina'. *The Journal of Peasant Studies*, 43 (2): 517–36.

Leguizamón, A., 2014a. 'Modifying Argentina: GM Soy and Socio-Environmental Change'. *Geoforum*, 53: 149–60.

Leguizamón, A., 2014b. Roundup Ready Nation: The Political Ecology of Genetically Modified Soy in Argentina. PhD dissertation, Graduate Center, City University of New York.

Leguizamón, A., 2016. 'Disappearing Nature? Agribusiness, Biotechnology, and Distance in Argentine Soybean Production'. *The Journal of Peasant Studies*, 43 (2): 313–30.

Levine, A., 1982. *Love Canal: Science, Politics, and People*. Lanham, MD: Lexington Books.

McCormick, S., 2015. 'The Sociology of Environmental Health'. In *Twenty Lessons in Environmental Sociology*, eds K.A. Gould and T.L. Lewis, 179–90. New York: Oxford University Press.

MAGyP (Ministerio de Agricultura, Ganadería y Pesca), 2015. 'Sistema integrado de información agropecuaria', http://www.siia.gov.ar/series (accessed 24 September 2015).

Martínez-Alier, J., 2014. 'The Environmentalism of the Poor'. *Geoforum*, 54: 239–41.

Mohai, P., D.N. Pellow and J.T. Roberts, 2009. 'Environmental Justice'. *Annual Review of Environment and Resources*, 34: 405–30.

Newell, P., 2009. 'Bio-Hegemony: The Political Economy of Agricultural Biotechnology in Argentina'. *Journal of Latin American Studies*, 41: 27–57.

Otero, G. and P. Lapegna, 2016. 'Transgenic Crops in Latin America: Expropriation, Negative Value and the State'. *Journal of Agrarian Change* this issue. DOI: 10.1111/joac.12159

Paganelli, A., V. Gnazzo, H. Acosta, S.L. López and A.E. Carrasco, 2010. 'Glyphosate-Based Herbicides Produce Teratogenic Effects on Vertebrates by Impairing Retinoic Acid Signaling'. *Chemical Research in Toxicology*, 23 (10): 1586–95.

Pengue, W.A., 2005. 'Transgenic Crops in Argentina: The Ecological and Social Debt'. *Bulletin of Science, Technology & Society*, 25 (4): 314–22.

REDAF (Red Agroforestal Chaco Argentina), 2013. *Conflictos sobre la tenencia de tierra y ambientales en la región del Chaco Argentino: tercer informe*. Reconquista, Santa Fe: REDAF.

REDUAS (Red Universitaria de Ambiente y Salud), 2010. Primer encuentro nacional de medicxs de pueblos fumigados, http://www.reduas.com.ar/informe-encuentro-medicos-pueblos-fumigados/ (accessed 20 February 2016).

Roy, D., 2015. 'Contesting Corporate Transgenic Crops in a Semi-Peripheral Context: The Case of the Anti-GM Movement in India'. *Journal of World-Systems Research*, 21 (1): 88–105.

Scoones, I., 2008. 'Mobilizing against GM Crops in India, South Africa and Brazil'. *Journal of Agrarian Change*, 8 (2): 315–44.

Séralini, G.E., E. Clair, R. Mesnage, S. Gress, N. Defarge, M. Malatesta, D. Hennequin and J.S. de Vendômois, 2014. 'Republished Study: Long-Term Toxicity of a Roundup Herbicide and a Roundup-Tolerant Genetically Modified Maize'. *Environmental Sciences Europe*, 26 (1): 1–17.

Teubal, M., 2009. 'Agrarian Reform and Social Movements in the Age of Globalization'. *Latin American Perspectives*, 36 (4): 9–20.

Torrado, M., 2016. 'Food Regime Analysis in a Post-Neoliberal Era: Argentina and the Expansion of Transgenic Soybeans'. *Journal of Agrarian Change* this issue. DOI: 10.1111/joac.12158

Trigo, E.J., 2011. Fifteen Years of Genetically Modified Crops in Argentine Agriculture, www.argenbio.org/adc/uploads/15_years_Executive_summary_of_GM_crops_in_Argentina.pdf (accessed 20 February 2016).