




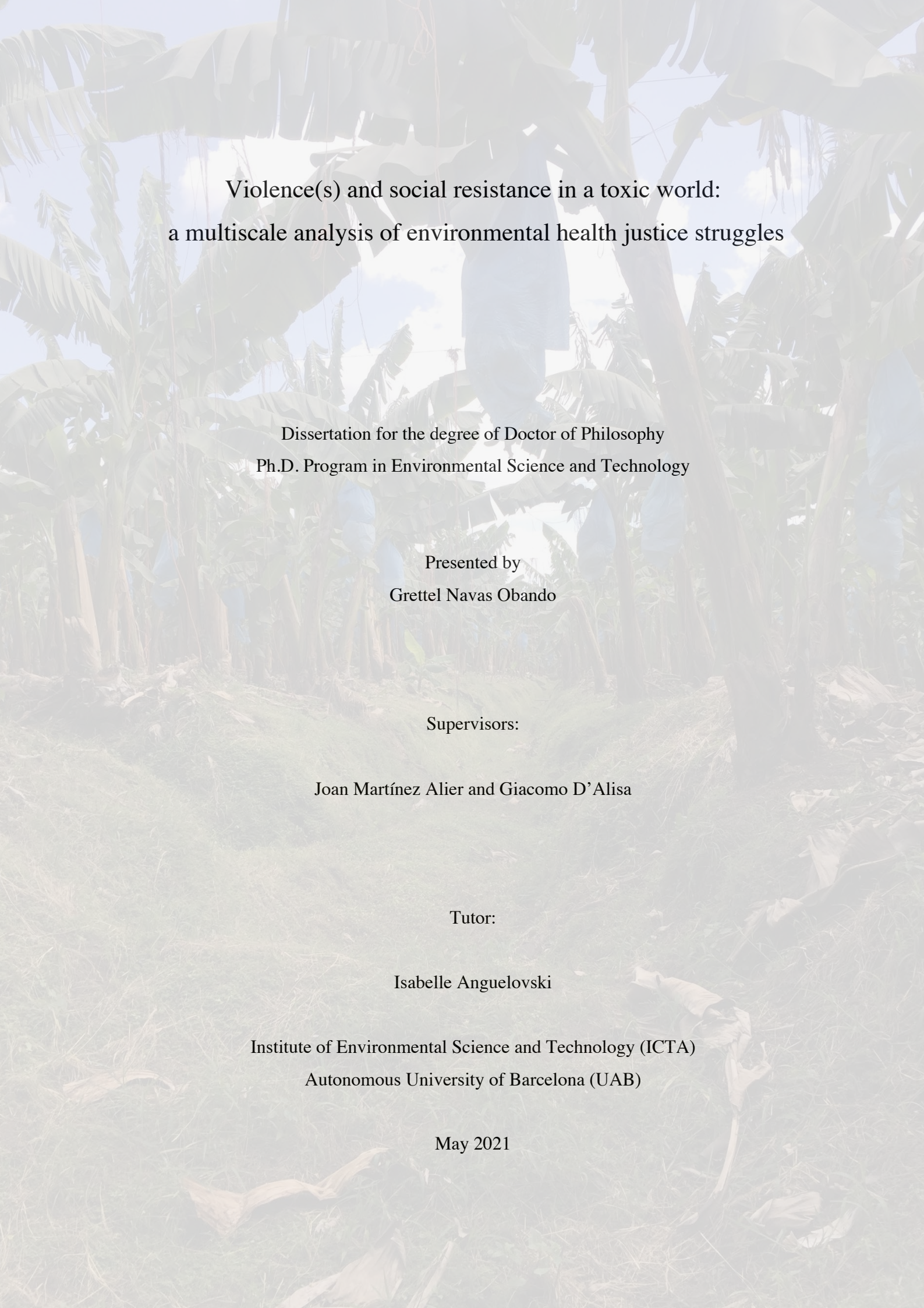


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Violence(s) and social resistance in a toxic world:
a multiscale analysis of environmental health justice struggles

Dissertation for the degree of Doctor of Philosophy
Ph.D. Program in Environmental Science and Technology

Presented by
Grettel Navas Obando

Supervisors:

Joan Martínez Alier and Giacomo D'Alisa

Tutor:

Isabelle Anguelovski

Institute of Environmental Science and Technology (ICTA)
Autonomous University of Barcelona (UAB)

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Cover: Banana plantation in Chinandega, Nicaragua. Photo credits: Grettel Navas

Preface

This doctoral dissertation is the result of four and a half years of research on environmental conflicts and their intersection with three main debates in socio-environmental studies: the study of violence(s), social resistance and environmental health. Using different scales of analysis (the local, the regional and the global), I focus on the local communities' social responses to safeguard nature, their lands, their bodies and healthy environments from extractive industries, industrial activities and akin toxic and unsustainable economic activities that threaten life on Earth.

The research interests presented here are academically and politically driven. Also, some of them have developed some years before I started the PhD program at the Institute of Environmental Science and Technology (ICTA), when I was a Master's Student in the Latin American Faculty of Social Sciences (FLACSO) in Ecuador—or even before, as a young undergraduate environmental activist in my home country, Costa Rica. Possibly, these interests began developing much earlier, informed by my being the granddaughter of an indigenous peasant who, since I was a little girl, taught me how to live with and within nature in a sustainable and respectful way: 'Without *milpa*¹ there are not tortillas, this is why we need to protect and take care of our land,' my grandfather used to say. Therefore, I am writing based on my personal and academic experiences.

Furthermore, the theoretical and methodological debates presented and discussed in this dissertation are rooted in the ENVJustice project, a wider research agenda based at ICTA and financed by the European Research Council (ERC grant No. 695446). The ENVJustice project is led by Professor Joan Martínez-Alier and in which around ten young scholars, including myself, participate with their own research interests under a broader theme: the study of the global environmental justice movement through a global database that we have created to aid in this very task: The Environmental Justice Atlas (www.ejatlas.org). My work contributes to this broader research agenda, including varying perspectives and debates. In particular,

¹ In Central America the term *milpa* refers to a small corn field.

proposing a comprehensive understanding of violence in environmental conflicts. Bringing debates about environmental health, and methodologically, showing the benefits of going beyond a case study analysis to a more global approach using what Leah Temper has defined as ‘statistical political ecology’.

Chapter I, introduces the context of the research and the common theoretical frames that guide the analysis. It also presents my motivations and the main research questions and the methodological approach of the study. Based on the Central American context, in Chapter II, I analyse the concept of violence in environmental conflicts and propose a wider conceptualization that I call ‘the multidimensional violence approach’. Then, in Chapter III, I invite the reader to travel with me to the banana fields in Nicaragua, province of Chinandega, to hear the voices of farmworkers exposed and affected by a highly toxic synthetic pesticide called Dibromochloropropane (DBCP) that was used to eradicate microscopic nematodes attacking the banana plant roots. In this chapter, I aimed at highlighting the women’s suffering and—through unpacking the local organization—I identify gendered inequalities that undermine women’s voices to be acknowledged as victims of DBCP. Then, in Chapter IV, I proceed with a global analysis of environmental conflicts in which human health has been severely affected by different forms of toxic pollution (i.e., air pollution, nuclear radiation, asbestos, heavy metals). By analysing a large number of environmental conflicts from the Environmental Justice Atlas, I aimed at opening a research agenda to analyse environmental conflicts when human health is being put at risk by toxic pollution, which according to my results, have specific particularities that require a more nuanced analysis. Finally, Chapter V presents the conceptual, empirical, and methodological contributions and implications, and last, I provide further lines of research that could be pursued to face the urgent challenge of building a more sustainable, just, and healthy world.

I hope you enjoy the reading as much as I enjoyed the writing.

Grettel Navas

Acknowledgements

No intellectual work is authored alone. In writing this dissertation I stand on many people's shoulders inside and outside academia. During the last four and a half years, I have encountered many colleagues and *compañeras y compañeros* with whom I have discussed these topics and from whom I have learned a great deal. I am afraid I will not mention them all, but every one of them is a little 'grain of sand' in this dissertation.

I am principally grateful to my two supervisors. To Joan Martínez-Alier for his guidance and support—but also for trusting in my work and motivating me in continuing it, from the FLACSO in Quito (when we first met in 2011) to ICTA in Barcelona. My gratitude is also extended to Giacomo D'Alisa, for his guidance, support and motivation in the most difficult times of this research. I am grateful as well to Isabelle Anguelovski for agreeing to be my tutor at ICTA, carefully reading my work and giving me substantial feedback—and also for being my fellow Barcelona half-marathon runner! Hopefully we can run again together.

Of course, I acknowledge economic support from the ENVJustice project (ERC grant No. 695446), which was fundamental in developing my research activities, including fieldwork in Central America and assistance in traveling to international conferences in the USA, the UK, and Europe. I strongly encourage the continuation of these funds and their accessibility to non-European students like me, for whom pursuing a Doctoral Programme in Europe would otherwise have been harder.

Thanks should also go to my colleagues from the ENVJustice project for their support, feedback, motivation, partnership, and friendship. Special thanks go to Daniela Del Bene, Arnim Scheidel, Mariana Walter, Juan Liu, Ksenija Hanaček, Dalena Tran, Brototi Roy, Sofía Ávila, Eleonora Fanari, Bowen Gu, May Aye, Sara Mingorría, Yannick Deniau, Irmak Ertör, Irene Iniesta and Federico Demaria. I cannot leave ICTA without mentioning Marta Viana as well, who was in the 'backlines' of the ENVJustice project and, of course, all the staff who make administrative PhD students' lives easier. I am grateful to Cristina Durán, Isabel Lopera, Marta Borràs, Laura Sans and my dear friend Lola. Also appreciated is the assistance of Harper

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I am thankful to those who provided me comments in national and international conferences and seminars. To Mina Kleiche and David Dumoulin for being my supervisors as I performed research at the *Institut de Recherche pour le Développement* (IRD), Université de Paris and at the *Institut des Hautes Etudes de l'Amérique Latine*, Paris Sorbonne-Nouvelle in 2019. Additionally, to Linda Bhoukris and Malcom Ferdinand for their feedback and highly stimulating academic conversation in Paris. *Merci beaucoup.*

Naturally, I owe my thanks to those whom I interviewed during fieldwork, to those activists and environmental defenders for whom the simple act of continuing to live—defending their territories, livelihoods and bodies—is an act of resistance. Of particular importance to my research was the group ‘Afectados por el Nemaqón’ (victims of DBCP) in Nicaragua. I thank them for sharing their long struggle and their personal experiences of living in a violent, unequal and toxic world. To Hilario Calero, Melva Póveda, Don Narcizo, Don Anastacio, Doña Blanca, Doña Leonarda, Agapita, Irma Blandón and many others. ¡*Gracias!* In Managua, I also thank Giorgio Trucchi, Martha Beatriz Flores, Mónica López Baltodano and Pierre Merlet.

Last but not least, I thank my Mother, for her encouragement and love. This achievement is not mine but ours. Thank you for inspiring me. *Por enseñarme a volar con los pies en la Tierra. Por enseñarme a ser fuerte, sabiéndonos vulnerables.* To Nicolás, my love and best friend, with you, difficult challenges become easier to achieve. Thanks for your love, patience, support and motivation since the start of this PhD journey.

Abstract

The aim of this dissertation is to expand knowledge regarding environmental conflicts in the context of toxic pollution—a form of environmental pollution causing health harm to human and non-human beings, which is everywhere but often invisible. Organized into a compendium of three articles, each article presents a research question and a specific contribution. First, Chapter II expands what we understand as violence in environmental conflicts and proposes a multidimensional approach to bring to the debate and to make visible forms of violence as processes (rather than actions in time and space) that, as well as toxic contamination, exceed temporal, geographical and intergenerational scales. Second, Chapter III tackles the dimension of gender to reveal that the origin of—and methods used to gather—scientific evidence mediate the demographics recognized as victims of toxic pollution. Recognition of victimhood is also mediated by the ingrained gendered power relations within the environmental justice organizations. Third, Chapter IV leaps to a global analysis and identifies global trends in conflicts where effects to human health have been reported as a result of exposure to toxic pollution. We see different and clear trends; therefore, I argue that these conflicts, what I call ‘environmental health conflicts’, require a more nuanced framework to tackle their complexity and differences. One of these trends, for instance, is the key role of working-class communities as mobilizing groups; they are actors, however, who are almost forgotten by scholars in environmental conflicts.

Whereas Chapter III delves into ethnographic methods grounded in the case of banana farmworkers claiming reparations for health damages caused by the pesticide Dibromochloropropane (DBCP) in Nicaragua, Chapter II builds on 95 environmental conflicts in Central America, and Chapter IV uses a total of 3033 cases worldwide for analysis. For the last two chapters, I draw on data from the Environmental Justice Atlas (EJAtlas), the largest global sample available on environmental conflicts today.

In summary, this thesis offers theoretical contributions and highlights methodological implications to the study of environmental conflicts, environmental justice and political ecology. It advances what we understand as violence. It provides critical lenses to address de-gendered power relations within environmental justice organisations and aims at building

knowledge on a major and global issue that, although urgent, receives less attention in the global environmental agenda: the issue of an increasingly chemical-intensive agrarian and industrial world.

Resumen

El objetivo de esta tesis es ampliar el conocimiento de los conflictos ambientales en el contexto de la contaminación tóxica. Una forma de contaminación ambiental que causa daños a la salud humana y no humana, que está en todas partes, pero a menudo es invisible. Organizada en un compendio de tres artículos, cada artículo de esta disertación presenta una pregunta de investigación y una contribución específica. En primer lugar, el Capítulo II amplía lo que entendemos como violencia en los conflictos ambientales, y propone un enfoque multidimensional para traer al debate y visibilizar formas de violencia como procesos (más que hitos en el tiempo y espacio) que, como la contaminación tóxica, supera escalas temporales, geográficas e intergeneracionales. En segundo lugar, el Capítulo III aborda la dimensión de género para revelar que el origen y los métodos utilizados para recopilar la evidencia científica median la demografía reconocida como víctima de la contaminación tóxica. El reconocimiento de la victimización también está mediado por las arraigadas relaciones de poder de género dentro de las organizaciones de justicia ambiental. En tercer lugar, el Capítulo IV da un salto hacia un análisis global e identifica las tendencias en conflictos ambientales donde se han reportado efectos para la salud humana como resultado de la exposición a contaminación tóxica. Vemos tendencias diferentes y claras; por lo tanto, sostengo que estos "conflictos de salud ambiental", requieren un marco específico para abordar su complejidad y diferencias. Una de estas tendencias, por ejemplo, es el papel clave de las comunidades de la clase trabajadora como grupos movilizadores; son actores, sin embargo, casi olvidados por los estudiosos de los conflictos ambientales.

Mientras que el Capítulo III se base en métodos etnográficos mediante el estudio de caso de los trabajadores agrícolas bananeros que reclaman reparaciones por daños a la salud, causados por el pesticida Dibromocloropropano (DBCP) en Nicaragua, el Capítulo II se basa en 95 conflictos ambientales en Centroamérica y el Capítulo IV utiliza un total de 3033 casos en todo el mundo para su análisis. Para los dos últimos capítulos, me baso en datos del Atlas Global de Justicia Ambiental (EJAtlas), la muestra mundial más amplia y disponible sobre conflictos ambientales en la actualidad.

En resumen, esta investigación ofrece aportes teóricos y destaca implicaciones metodológicas para el estudio de los conflictos ambientales, la justicia ambiental y la ecología política. Avanza lo que entendemos como violencia. Proporciona lentes críticos para abordar las relaciones de poder dentro de las organizaciones de justicia ambiental y tiene como objetivo generar conocimiento sobre un problema importante y global que, aunque urgente, recibe menos atención en la agenda ambiental global: la cuestión de un mundo agrario e industrial, cada vez más intensivo en productos químicos.

Table of Contents

<i>List of figures</i>	<i>xvi</i>
<i>List of tables</i>	<i>xviii</i>
<i>Main acronyms and abbreviations</i>	<i>xix</i>
CHAPTER I	1
<i>Introduction</i>	1
1. A Toxic and uneven world	2
2. Motivation and research questions	4
3. Common conceptual frames	7
3.1 Environmental Justice	7
3.2 Political Ecology and the study of environmental conflicts	9
4. Methodological approach	12
4.1 Doing fieldwork in Central America and Nicaragua	13
4.2 The Global Atlas of Environmental Justice	16
5. Dissertation structure and chapter summary	19
<i>Chapter II</i>	21
<i>Paper 1: Violence in environmental conflicts: the need for a multidimensional approach</i>	21
Abstract	23
1. Introduction	24
2. Central American background: common traits and differences	25
3. Theoretical background: violence and environmental conflicts	29
4. Methodology	31
4.1 Methods used to gather information	32
4.2 Variables from the EJAtlas used to analyze information	33
5. How does violence manifest in environmental conflicts?	34
5.1 Direct violence	36
5.2 Traits of structural and cultural violence	37
5.3 Slow violence	39
5.4 Ecological violence	40
6. The need for a multidimensional violence approach	41
7. Conclusion	45
CHAPTER III	47

<i>Paper 2: Invisibles within the invisibles:</i>	47
<i>Aftermaths of a toxic pesticide among women and male banana plantation workers in Nicaragua</i>	47
Abstract	49
1. Introduction	50
2. Background	52
2.1 Banana production and working conditions	52
2.2 The toxic legacy of DBCP	54
2.3 The creation of a workers' movement	56
3. Conceptual framework	59
3.1 The challenge of undone science in environmental health justice struggles	59
3.2 Uneven power relations within political organisations	61
4. Methods	62
5. The role of scientific evidence in shaping responses to claim redress for DBCP-health-related aftermaths	63
6. The role of power relations among women and men farmworkers within the local organisation	68
7. Concluding discussion	73
CHAPTER IV	75
<i>Paper 3: Mobilisations from below in a Toxic World:</i>	75
<i>A global analysis of environmental health conflicts</i>	75
Abstract	77
1. Introduction	78
2. Theoretical background	81
2.1 The slow violence of toxic pollution and environmental conflicts	81
2.2 The role of working-class communities in environmental justice struggles	82
3. Methodology	84
3.1 The Environmental Justice Atlas	84
3.2 Data collection and analysis	85
4. Relocation of hazards among geographies and timescales: the zones and bodies of sacrifice	86
4.1 Categories of conflicts	86
4.2 Subcategories of conflict	88
4.3 Population type	89
4.4 Commodities involved	90
4.5 Project status: toxicities beyond temporal scales	92
5. Actors mobilising in environmental conflicts	94
5.1 The key role of the working-class communities in environmental health struggles	94
5.2 Toxic pollution beyond the working place	96

5.3	Collective mobilisations and alliances among group mobilising _____	97
6.	Temporalities of social mobilisation and success rates in environmental health conflicts	98
6.1	When does the mobilization begins? _____	98
6.2	Success rates _____	101
7.	Concluding discussion _____	102
CHAPTER V _____		105
<i>Conclusions and further research agenda _____</i>		105
1.	General contributions and conclusions _____	107
1.1	Conceptual contributions _____	107
1.2	Methodological implications _____	110
1.3	Empirical contributions _____	112
2.	Further research agendas _____	114
<i>References _____</i>		118
<i>List of interviews _____</i>		136
<i>List of cases from Environmental Justice Atlas _____</i>		137
<i>ANNEX: Other academic achievements obtained during the PhD project _____</i>		143

List of figures

Chapter I

Figure 1.1 Research methods by scale of analysis

Chapter II

Figure 2.1 Galtung's triangle of violence

Figure 2.2 Environmental conflicts per country by type of conflict and intensity level

Figure 2.3 The multidimensional violence approach

Chapter III

Fig. 3.1 Map of Nicaragua

Figure 3.2 Demonstration in front of the US embassy in Managua

Figure 3.3 Assembly of workers in Matagalpa

Chapter IV

Figure 4.1 Environmental conflicts registered in the EJAtlas (n=3030).

Figure 4.1a Geographical coverage of environmental conflicts.

Figure 4.1b Types of conflicts and coverage.

Figure 4.1c Percentage of cases with visible health impacts linked to toxic pollution and the rest of the cases from the EJAtlas

Figure 4.2 Percentage of cases reporting visible health impacts (EHC) with cases non reporting visible health impacts (n=3033) by category of conflict

Figure 4.3a Percentage of cases reporting visible health impacts by subcategory of conflict (n=2100). Note that subcategory of conflict are non-excluding variables.

Figure 4.3b Percentage of cases reporting visible health impacts by subcategory of conflict (n=4826). Note that subcategories of conflict are non-excluding variables.

Figure 4.4 Percentage of cases reporting visible health impacts (EHC) with cases non reporting visible health impacts (n=3033) by project status.

Figure 4.5 Percentage of cases reporting visible health impacts (EHC) with cases non reporting visible health impacts (n=3033) by reaction phase.

Figure 4.6 Percentage of cases reporting visible health impacts (EHC) with cases non reporting visible health impacts (n=3033) by success rate.

List of tables

Chapter I

Table 1.1 EJAtlas dataform

Table 1.2 Structure of the dissertation

Chapter II

Table 2.1 Social and economic indicators in Central American countries

Table 2.2 Variables from the EJAtlas according to type of violence

Chapter IV

Table 4.1 Percentage of EHC by commodity involved (n=1157). Note that commodities are non-excluding variables.

Table 4.2 Percentage of group mobilising in EHC vs. non EHC (n=3033). These are non-excluding variables, and more than one group can mobilise in each conflict.

Main acronyms and abbreviations

EJAtlas: Environmental Justice Atlas

EDCs: Ecological Distribution Conflicts

EHCs: Environmental Health Conflicts

WCE: Working Class Environmentalism

EJOs: Environmental Justice Organisations

DBCP: Dibromochloropropane

DDT: Dicloro difenil tricloroetano

DES: Diethylstilbestrol

POPs: Persistent Organic Pollutants

MeHg: Methylmercury

PCBs: Polychlorinated Biphenyls

UFCo: United Fruit Company

INFONAC: National Institute of Promotion

EPA: The US Environmental Protection Agency

ASOTRAEXDAN: Association of Workers and Ex-Workers injured by ‘Nemagón’ and ‘Fumazone’

Km: Kilometres

$\mu\text{g/dL}$: Micrograms per deciliter

ha: Hectares

CHAPTER I

Introduction

1. A Toxic and uneven world

We live in a toxic world (Boudia and Jas 2019), and what harms nature harms humans as well (Carson 1962; Horton and Lo, 2015). In 1962, the marine biologist Rachel Carson issued an alert regarding the extent to which chemical-intensive agricultural systems induced a consistent and continuous imperceptible poisoning for all living beings. In her book ‘The Silent Spring’ she shows that it was not a sporadic dose of poison which unintentionally was leaked into human’s food but a persistent and continuous poisoning of the whole food chain (Carson 1962). Almost 60 years after this publication was released, her words resonate with more power than ever.

Today, thousands of chemical substances, not only persistent pesticides but heavy metals, PCBs, POPs, lead, asbestos which are used, produced, and disposed by industrial and agrarian activities have been found in the water we drink, in the food we eat, and in the air we breathe (Robin, 2011; Guillem-Llobat and Nieto-Galan, 2020)—a major global problem that needs to be tackled on many fronts and scales.

However, besides being a global and environmental health challenge, pollution is a matter of social and environmental justice (Bullard 2005). According to the ‘The Lancet Commission on pollution and health’, pollution is the largest environmental cause of diseases and premature death in the world (Landrigan et al., 2018). Nevertheless, from the total of pollution-induced deaths, 92% occur in the global south (Landrigan et al., 2018). Another example of this unequal burden is that from the total of 200,000 people dying every year because of acute and chronic pesticide-effects, 99% occur in Asia, Africa and Latin America, mostly farmworkers (Rodrigues and Christiani 2012; Faber 2020; Shattuck 2021). Therefore, as Rachel Carson alerted us many years ago, we are all exposed to pollution, but she did not alert us to the fact that we are not all exposed in the same way, to the same pollutants, levels and length of exposure (Agard-Jones, 2013; Guthman and Brown, 2016; Harrison, 2011; Romero et al., 2017).

As political ecologists remind us, health opportunities and disease inequalities are deeply embedded in specific political, economic, ecological and social systems (Connolly et al., 2017;

D'Alisa et al., 2018; King, 2010; Mayer, 2000; Turshen, 1977). Furthermore, chemical geographers, social epidemiologists and environmental justice scholars have noted the fact that social differences of race, class, gender, migratory situation or the intersection of these are key social drivers of how toxic pollution is unevenly lived and survived (Breilh, 2008; Brown, 2007; Bullard, 1990; Krieger, 2011; Tilt, 2013).

In the title of this dissertation, I allude to Soraya Boudia and Nathalie Jas's definition of Toxic World which refers to "the materiality of *slow violence* in all living beings, which affects the poorest and most deprived of rights" (Boudia and Jas 2019:10). As noted, in their definition, they invoke Rob Nixon's notion of 'slow violence' which involves a long process characterised by little or invisible short-term impacts but with devastating long-term and irreparable effects (Nixon, 2011).

Nevertheless, the 'poorest and the most deprived of rights' (in Boudia and Jas' words)—namely, the racialized, the indigenous, the impoverished, the discriminated, the workers, the women—are not merely victims of a Toxic World but often organize and mobilise to protest against pollution. It is a battle for survival to protect their environments and bodies from present and future hazards. Therefore, 'ecological distribution conflicts' arise (Martínez Alier and O'Connor 1996).

Given this context, the overall aim of this thesis is to better understand how people organize and protest against toxic pollution and consequently, its health effects. And how through the embodied experience of harm, sooner or later, they make slow violence visible to demand political action. Therefore, this thesis is not about toxic pollution per se (or chemically speaking) but about how people organise and resist it, the challenges they face and the outcomes they reach.

Presented as a compendium of three independent research papers, each one of the chapters has its own research questions, conceptual frames, methodological tools and scale of analysis. Chapter II is grounded in the Central American context and opens a discussion of what constitutes violence in environmental conflicts and proposes what I call the 'multidimensional violence approach' in which the violence of toxic pollution is included. Chapter III delves into

a case study analysis featuring a pesticide-contaminated area in the province of Chinandega in Nicaragua, and I show how female and male farmworkers live differently in the aftermath of slow violence and its recognition. Last, Chapter IV leaps towards a global analysis, tackling 3033 environmental conflicts around the world, and I identify specific patterns when comparing conflicts over toxic pollution with those that are not; I suggest calling these conflicts ‘environmental health conflicts’. Methodologically, while Chapter III is based on the use of ethnographic methods and fieldwork, Chapters II and IV are based on environmental conflicts gathered in the Environmental Justice Atlas (EJAtlas), a unique database of past and ongoing environmental conflicts worldwide (Temper et al., 2015).

As follows, I present my motivation and research questions tackled in each one of these chapters. I then expose the two main common conceptual frames used throughout the manuscript: 1) Political Ecology and the study of Environmental Conflicts, and 2) Environmental Justice. Next, I present an overview of the qualitative and quantitative methods used: I explain the Environmental Justice Atlas (EJAtlas hereafter) as a source of data and the ‘statistical political ecology’ (Temper, 2014) as a research tool, I explain why I chose Central America and Nicaragua to perform my fieldwork in, as well as my positionality within this research. And last, I give an overview of the rest of the structure of the manuscript.

2. Motivation and research questions

Violence is a recurring pattern in the suppression of social resistance (Doran, 2017). It is often used as a strategy to silence and intimidate people who organise to resist the exploitation and destruction of the natural world (Barbosa and Roriz, 2021; Del Bene et al., 2018; Le Billon and Lujala, 2020). Activists, human rights defenders and environmental defenders, in particular, are among the targets of violence (Front Line Defenders, 2020; Global Witness 2020). In 2020, at least 331 human rights defenders were murdered. Two-thirds of those murdered worked to protect environmental, land and indigenous peoples’ rights (Front Line Defenders, 2020).

While researchers have addressed this problem within the study of environmental conflicts (cf. Scheidel et al., 2020), literature has predominantly focused on violence in its direct and physical forms: murders, violent targeting, criminalization, intimidation, persecution or

judicialization (Butt et al., 2019; Del Bene et al., 2018; Esguerra-Muelle et al., 2019; Le Billon and Lujala, 2020; Neyra 2020; Scheidel et al., 2020; Tran et al., 2020)

The reason why scholars focus particularly on this form of direct violence is understandable and evident. Firstly, the problem remains a global concern in which governments, corporate actors and international organisations have fallen short in giving the very urgent responses needed (Ghazoul and Kleinschroth 2018). In other words, despite the efforts of scholars, NGO's and grassroots organisations in documenting the brutal violence and rendering it visible in the public eye, the problem persists, and more worryingly, increases in magnitude (Global Witness 2020). Secondly, there is a practical reason, methodologically, for scholars' focus on this topic: the episodes of direct violence are measurable in time and space (i.e., number of environmental defenders murdered in one country) and hence easier to track (Scheidel et al., 2020).

But why and how violence occurs is much more complex (de Haan, 2009). Also, violence is a contested concept, and its definition continues to evolve (de Haan, 2009; Sveinsdóttir, Aguilar-Støen and Bull, 2021). Within this context, in Chapter II, I seek to expand the debate of what constitutes violence and harm in environmental conflicts, guided by the following question: *How do different forms of violence appear and overlap in environmental conflicts?*

Grounded in the Central American context—one of the most violent regions for environmental defenders, according to Global Witness reports—Chapter II analyses 95 environmental conflicts from the EJAtlas. The result, is the proposal of what I call ‘the multidimensional violence approach’ (Navas et al., 2018:658). The ‘multidimensional violence approach’ highlights the fact that, although the murder of environmental defenders is the highest and the most visible expression of direct violence, other forms encompassing structural, cultural, ecological and slow violence also appear and overlap; also, one form can lead to another. My aim in proposing this approach is to establish a more complex and complete way of accounting for the different expressions of violence, including the slow violence of toxic pollution within the study of environmental conflicts.

One main observation from the study is that violence is not only a response to social resistance; social resistance is likewise organised in response to violence—particularly, to long-term and

often invisible processes of what Nixon calls ‘slow violence’. Namely, “a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all” [...] He continues... “a different kind of violence, a violence that is neither spectacular nor instantaneous, but rather incremental and accretive, its calamitous repercussions playing out across a range of temporal scales” (Nixon 2011: 2). Within these lenses, I understand toxic pollution and its health aftermaths as form of violence.

Chapter III adopts a local approach based on the case study analysis. For years, the toxic pesticide Dibromochloropropane (DBCP) used on the banana plantations during the 1970s and 1980s resulted in significant ailments affecting workers and their children (i.e., infertility, miscarriages, cancer, new-borns with malformation, skin rashes, visual problems). However, what materialised as ‘slow violence’ (the noxious health effects of DBCP in this case) was unevenly recognised for male and female farmworkers. The conflict was mediated by a gendered dimension of ‘evidentiary politics’ and as a problem of what is call ‘undone science’ (Frickel et al., 2009; Arancibia and Motta 2018). Namely, “research that are left unfunded, incomplete, or generally ignored but that social movements or civil society organizations often identify as worthy of more research” (Frickel et al., 2009:2). Specifically, despite both women and men reporting health effects from being exposed to DBCP, what was counted as harm to claim redress in judicial courts was male infertility, a health outcome proved to be linked to DBCP in the US during the late 1970s (Whorton 1979).

Therefore, the embodied experience of harm reported by farmworkers and their relatives was reduced to a single ailment (infertility) suffered in a particular body (male bodies). In this particular case, I was interested in understanding how the ‘evidence’ shaped the workers’ struggle or, to the contrary, if the social struggle was aimed at shaping the evidence. For instance, did workers mobilise to include more ailments beyond infertility? How did women participate in the struggle? How would their ailments be tackled by the workers’ organisation? To address these issues, one general question and two sub-questions were raised in Chapter III: i) *Why, in a contaminated pesticide area, are some bodies acknowledged as victims while others are not?* And ii) *how was what counts as ‘evidence’ shaped by the struggle, or vice versa?* And iii) *how, in the process, was the women’s lived experience of harm rendered*

visible/invisible? My results implicate a gendered dimension of ‘slow violence’ because its visibility/invisibility is sometimes lived differently among male and female workers. In this particular case, this difference manifested as a lack of knowledge (or ‘undone science’) to better understand how DBCP affected women’s bodies, but also as the gendered power dynamics within the workers’ organisation which failed to push for making the ‘undone science done’.

Aiming to go beyond the analysis of dynamics at local scales, Chapter IV tackles a global perspective through a ‘statistical political ecology’ analysis (Temper 2014). It compares a global sample of 3033 environmental conflicts among those reporting visible human health impacts linked to toxic pollution (n=1157) with those environmental conflicts that do not report those impacts (n=1876). *Do they follow different patterns? To what extent are these patterns different or similar? Who are the main actors mobilising? When do they mobilise? What are the main economic activities and commodities involved?* Chapter IV contributes to the study of environmental conflicts, opening a research agenda on ‘environmental health conflicts’ bringing debates about temporal and spatial scales of toxic pollution, the key role of working-class communities, and the human body’s role as a site of social and environmental struggle. To address the questions presented above, I use particularly two main conceptual frames that I present as follows.

3. Common conceptual frames

Being a compilation of three independent papers, each one of the chapters presents and discusses its particular theoretical frame and specific concepts. This is why here I will briefly present the main conceptual frames that inform the overall analysis: Environmental Justice and Political Ecology and the study of Environmental Conflicts.

3.1 Environmental Justice

Environmental Justice (EJ) scholars bring the discussion on social justice and equity to environmental studies, unravelling the unequal distributions of environmental costs and benefits of economic activities (Brulle and Pellow 2006; Martinez-Alier et al., 2015; Mohai et al., 2009).

Since the foundation of EJ as a field of research, scholars have focused on how health risks and environmental hazards are not placed randomly but target historically vulnerable and racialized communities (Bullard 1990; Bullard and Wright 1993). Two major events in the US gave birth to the field. In 1987, urban residents from Love Canal (New York) organised to address increasing rates of leukaemia associated with the dumping of toxic chemicals near their community (Gibbs 1992). Afterwards, in 1982 in Warren County (North Carolina), black communities mobilised against the placement of a landfill to deposit PCB-contaminated soil (Pezzullo 2001). At that time, the concept ‘environmental racism’ was coined to expose the institutionalised racism and the unequal protection of environmental and health policies among citizens, showing the disproportionate burden that black communities were facing in Warren County and all over the US (Bullard 1990).

A leap towards a global analysis (Pellow 2007), new debates over decoloniality or the persistence of colonial values (Álvarez and Coolsaet 2018; Rodríguez and Inturias 2018, Rodríguez 2020), ethnicity, gender, class and their intersection, are also found to be drivers of environmental injustices (Buckingham and Kulcur 2009; Sundberg 2008, Ulloa 2017). The former debates have enriched the field in the past decades, and today, EJ is still growing as a field of research and as a global movement both in the North and South (Agyeman 2016, Schroeder et al. 2008; MartínezAlier et al., 2016).

Furthermore, scholars in EJ had shown how women are often at the frontlines of EJ struggles against environmental and health hazards (Rocheleau et al. 1996; DiChiro 1998; Sze 2004). Yet, gender as a cross-category is still relatively seldom addressed in the literature (Buckingham and Kulcur 2009). Race/ethnicity and class/income remain the focus of EJ studies. Based on the feminist discussion of “intersectionality”, Buckingham and Kulcur (2009, 677) call for a fair-gender approach in which “gender, as well as other structures of injustice, are identified and recognized at all scales.” As specific examples show, there are public health debates about toxic substances that tend to be gendered biased (Sze 2006; Wesseling 2003; London et al. 2002).

For instance, Sze’s work on Diethylstilbestrol (DES), an oestrogen treating menopausal symptoms and miscarriage prevention, demonstrates that even when medicated women

reported severe illnesses, DES was only banned when ailments in men consuming DES-fed poultry emerged (Sze 2006). Also, in Central America, the underreported number of women's acute pesticide poisoning cases is often linked to the fact that women's roles in agriculture are often invisible (Wesseling 2003; Frank 2016; Mora 2017). Therefore, the call to study social categories such as race/ethnicity and class/income, including gender inequalities, is imperative in environment and health-related matters.

This manuscript is largely informed by the Environmental Justice field, particularly in its explanation of how zones and bodies of sacrifice are constantly threatened to expand capital accumulation through the expansion of ecologically destructive and polluting activities (Bolados and Sánchez 2017; Lerner 2010). One key element arising in Chapter III is the intersection of different social categories (class and gender) that make some bodies count and others do not count as victims of toxic pollution within the same environmental justice organisation. Therefore, my results join the feminist discussions for a more critique perspective to unveil how local organisations often produce and reproduce internal power dynamics that can perpetuate environmental injustice (Buckingham and Kulcur 2009; Pellow 2017).

3.2 Political Ecology and the study of environmental conflicts

Political Ecology studies the interactions between society and nature and argues that environmental problems are not isolated but part of a larger societal, political and economic context (Wolf 1972; Blaikie and Brookfield, 1987; Bryant 1992). Therefore, for Political Ecologists, natural environments are not simply 'natural' but a result of historical—and often colonial—power relations (Alimonda 2011, 2017; Ferdinand 2019, Robbins 2012).

Broadly defined as the 'politicization of the ecology' (Leff 2004) or as an alternative to 'apolitical' ecology (Robbins 2012), the field inquires how power relations shape, make and remake societal relation with nature to tackle the complex socio-natural phenomena in which environmental injustices are embedded (Blaikie and Brookfield 1987; Peluso and Watts 2001; Robbins 2012).

Furthermore, Political Ecologists contest the idea that environmental conflicts are a result of the scarcity of natural goods (Homer-Dixon 1999), instead attributing said conflicts to the unequal power relations regarding the control and access of nature. For instance, in ‘La Maldición de la Abundancia’ (*The curse of the abundance*), Alberto Acosta observes that not scarcity but abundance of natural goods in Ecuador breeds extraction, social and environmental exploitation, contamination, and conflict (Acosta 2009).

Hence, to study environmental conflicts from a political ecology perspective, prior questions must be addressed: Who owns what? –first asked by Eric Wolf in his essay ‘Ownership and Political Ecology in 1972– but also, Which political and economic forces drive decision making about nature? What causes environmental degradation and pollution? Who benefits, and who pays for it? How does social organising ‘from below’ react to it?

However, beyond the notion of conflicts over the access of land (Blaikie and Brookfield 1987) or more broadly ‘environment’ (Bryant 1992). One main characteristic in the study of environmental conflicts is the notion of ‘ecological distribution’, namely “the social, spatial and temporal asymmetries in access to natural resources or the burdens of pollution (whether traded or not)” (Martínez Alier 1995b:71). From this perspective, the ‘ecological distribution conflicts’ (Martínez Alier 1995b; Martínez-Alier and O’Connor 1996) shed light on the unfair distribution of environmental ‘goods’ (i.e., access to clean air or water, access to green zones) and ‘bads’ (i.e., toxic pollution and consequently the health outcomes occasioned).

In the same vein, ‘valuation contests’ are another important feature of ‘ecological distribution conflicts’. This means that they cannot be understood only in the mainstream economic framework of monetary compensation for ‘externalities’. The social actors involved in such conflicts often express their grievances with different “valuation languages” (Martinez-Alier 2002). For instance, how much does a sacred land cost? How much money will a family be willing to accept living in a toxic environment with high probabilities of threatening their children’s health? Possibly, there is no amount of money acceptable. In sum, this thesis adopts a Political Ecology approach to study the ecological distribution conflicts that emerge in response of the production of toxic environments. Namely the ‘bads’ of economic activities.

However, one common tendency in the study of environmental conflicts—and Political Ecology as well—is a generalized oversight of worker communities (León 2021). My findings, particularly in Chapter IV, dialogue with the lenses of ‘Working-class environmentalism’ (Bell 2020; Keil 1994; Barca and Leonardi 2016; White 1996), reviving the discussion on the key role that working-class communities play within the study of environmental conflicts, particularly in having their bodies and their ways of life traversed by a complex contradiction between work and health.

Finally, it is important to note that Political Ecology is far from a homogenous field (Battenburry 2018). While in its first stages it focused on exploring land degradation and land-use practices in the rural and so-called ‘third’ world (Blaikie and Brookfield, 1987), the recent decades have seen a proliferation of the field incorporating new research agendas and methodological practices (Bridge et al., 2015). Furthermore, different political, cultural and economic experiences have shaped the ways in which the field is practised and taught (both within and outside academia) (Martín and Larsimont 2016). For instance, the acknowledgement of regional differences has led to the foundation of the ‘Latin American Political Ecology’ (LAPE), sustained by a working group supported by the Latin American Council of Social Sciences (CLACSO) and in which I am an active member. Also established were the ‘*Écologie Politique*’ in the Francophone world, although shyly discussed in academia (Gautier 2012; Déleage and Chartier 2012), and lastly, the ‘Anglo-Saxon Political Ecology’, the most well-known—or at least much more mentioned and practised in the academic world. This thesis dialogues with LAPE and the Anglo-Saxon PE.

For instance, one particular aspect of LAPE is the importance of researchers’ positionality (Alimonda et al., 2017). Although there might be some exceptions, a common path of scholars interrogating the causes of environmental and social inequalities is to be engaged with the community from which (and with whom) they build knowledge. Consequently, having one foot in academia and one foot in activism and advocacy is not uncommon among scholars of Political Ecology. I was no exception to this trend during my own writing process.

4. Methodological approach

This dissertation combines a set of qualitative and quantitative methodologies at different scales of analysis. The combination of ethnographic methods in Nicaragua, as well as descriptive statistics based on the EJAtlas, provided me with a better understanding to tackle my research questions.

One main methodological aim in this dissertation is to go beyond the case study analysis—as is commonly done in the field of Political Ecology—wherein, in hand with other scholars (Del Bene et al., 2018; Scheidel et al., 2020; Temper et al., 2020 particularly but also many others) I reveal the benefits in addressing regional and global scales based on the EJAtlas. Chapter IV in particular uses a “statistical political ecology”, defined by Leah Temper as: “A method for analysing the global and interlinked aspects of localized environmental struggles, that allows going beyond dynamics at local scales to understand crucial processes and relations generating environmental inequalities at broader regional, national, and global scales” (Temper 2014: 180).

As the different methodologies are thoroughly explained in each one of the chapters, in the next Figure 1, I briefly mention the methods used to gather and analyse data according to the scale of analysis.

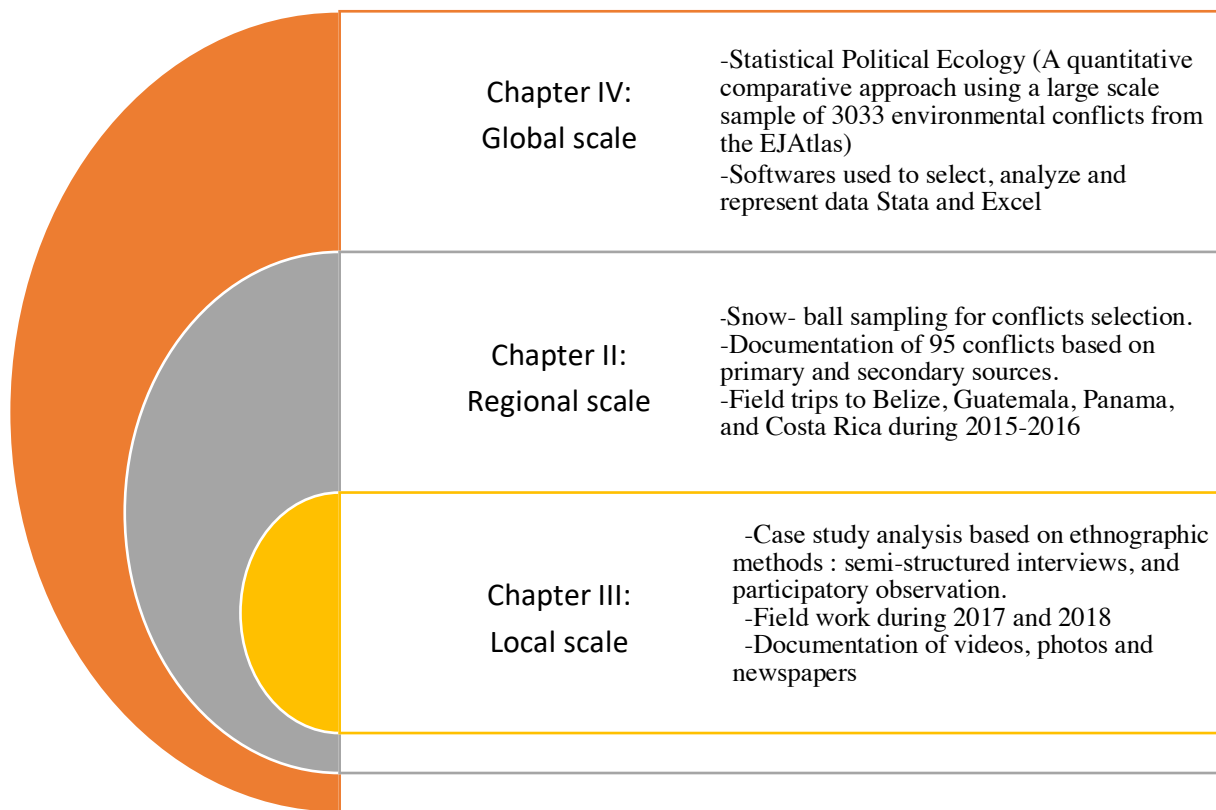


Figure 1.1 Research methods by scale of analysis

4.1 Doing fieldwork in Central America and Nicaragua

Why Central America?

Central America is the main territory on which this thesis speaks. Two of the three chapters are grounded on environmental conflicts in the region. It is where I was born and raised, the region to which I had travelled so many times and where my family continue to live. However, familiarity is not a sufficient argument for choosing a region in which to carry out scientific research. Hence the question: Why Central America?

First, and despite it being an understudied region compared to the rest of Latin American countries, Central America has much to offer to the studies of Political Ecology and Environmental Justice. Though small, compared to its neighbours Mexico and Colombia, it is

a very heterogeneous region. Its different political economy regarding land tenure reforms, conservation programs, political stability (and instability) provide some answers on how environmental conflicts develop as they do today (Sveinsdóttir et al., 2021; Vandermeer and Perfecto, 1998; Wayland and Kuniholm 2015). For instance, while Honduras and Guatemala are (per capita) the most violent countries for environmental defenders in the world, according to Global Witness, Costa Rica barely appears in their lists.

Furthermore, the region is also of geopolitical and regional environmental interest. It connects the 'Americas' for fauna transit through the Mesoamerican Biological Corridor, for commodities transit, but also to narcotraffickers (Blume, 2021). Narcotraffickers as new actors are increasing demands for territory control, which increases the unequal access and use of natural resources, and of course, environmental conflicts and violence (Tellman et al., 2020). On a positive note, the fact that it is a small region has benefited the network and alliances among environmental justice organisations in striving toward a common goal. For instance, the Movimiento Mesoamericano contra el Modelo extractivo Minero (M4) [Mesoamerican Movement against the Extractive Mining Model] or Red Centroamericana de Mujeres Rurales, Indígenas y Campesinas [Central American Network of Rural, Indigenous and Peasant Women] are two examples of organisations positioning not only against the extractive industries in their own countries but in the whole region. However, despite its numerous environmental conflicts, mostly related to the extraction of minerals, production of (hydroelectric) energy demand and the expansion of monocultures (such as palm oil, sugar cane, bananas, pineapples) research in the region has been done within a specific country or commodity. This thesis, Chapter II in particular, provides an empirical contribution, being the first systematic analysis of environmental conflicts in the region accounting for different typologies of conflicts.

Another reason supporting my choice of Central America is that, before starting the PhD, I worked as an environmental consultant in Fundación Neotrópica, an environmental NGO in Costa Rica. In my capacity as an environmental consultant, I was tasked with cataloguing environmental conflicts in Central America in the EJAtlas. In doing so, I contacted environmental justice experts throughout the region to ask which environmental conflicts in their countries were more relevant to include in the global database. In many cases, I had them

fill out the dataforms. To gather information about some conflicts, many interviews and informal conversations, as well as field trips to Belize, Guatemala, Panama, and Costa Rica during 2015 and 2016 were carried out. In some ways, my fieldwork started before the PhD.

Why Nicaragua?

Although the toxic pesticide DBCP was also used on the banana plantations in Honduras, Panamá, Guatemala and Costa Rica, I decided to do fieldwork in Nicaragua for two main reasons. First, although a weakened organisation, Movimiento Nacional de Afectados por el Nemagón [National Movement of Affected by Nemagón (DBCP's marketing brand)], it remains very active. They continue to do monthly assemblies and remain in negotiations with the government and companies to accomplish their goals. Therefore, first contact to the leader and members of the movement for further interviews and fieldwork was easy to establish. Secondly, the pollution caused by DBCP was a clear example of environmental injustice even within the Central American region, as in Nicaragua the pesticide continued to be used many years after it was banned in the USA and in other countries. For instance, when the pesticide was banned in Costa Rica, the remaining stock was exported to Nicaragua and Honduras (Bohme 2015).

As with many other social researchers, my positionality impacted the data gathering process in Nicaragua. Being a Central American and native Spanish speaker facilitated communication. However, being a woman played a twofold role: on the one hand, it was helpful to gain easier access to women's experiences and facilitated their openness to talk about their physical and emotional ailments linked to DBCP. On the other hand, men—with one exception—were not that open regarding their condition of infertility.

Lastly, not being Nicaraguan made it easier to gather information, since I was not seen as an internal political threat to the government. By the time I was performing fieldwork, there was an internal political crisis in the country, and sensitive environmental conflicts such as the construction of the great grand canal (Fuchs and Navas 2016), mining projects (Sánchez 2016) and the increasing rates of kidney disease among sugarcane plantation workers in Chichigalpa

(Clark et al., 2016) were among the critical conflicts in which obstacles were posed by the government to researchers.

DBCP is an ‘old’ conflict with little active social organising nowadays; therefore, doing research about this case did not represent a threat for current government and private actors’ interests as the previous examples mentioned do. Still, I did not escape from obstacles and intimidation. In January 2018, while conducting some interviews with farmworkers in a public zone (a table in a park), the national police took two photographs of me. They asked me and my companions to show our research materials (photos, videos, recordings and notes). Fortunately, they did not confiscate them. When I asked why the photos were taken, I did not receive an answer. Fortunately, I did not have more episodes like that one. Due to this experience, I decided to conduct the upcoming interviews in a more private space.

In this thesis, fieldwork and ethnographic methods were carried out mainly for Chapter III in the province of Chinandega. For two of the chapters (II and IV) I based my analysis on the EJAtlas, a global database of environmental conflicts which I briefly explain as follows and in more detail in Chapter IV.

4.2 The Global Atlas of Environmental Justice

The EJAtlas is a project aimed at putting together in a unique database a large, expert-elicited number of past and ongoing environmental conflicts worldwide (Temper et al., 2015). It is inspired by country and regional maps reporting local struggles such as the Latin American Observatory of Mining Conflicts in Latin America (OCMAL), the Brazilian map of Environmental Justice and Health launched by the FIOCRUZ in Rio de Janeiro (da Rocha et al., 2018), as well as other akin ‘counter-mapping’ efforts elsewhere.

The EJAtlas is presented in an open-access online archive (www.ejatl.org) under the Creative Commons license. It is hosted at the Institute of Environmental Science and Technology (ICTA) at the Autonomous University of Barcelona (UAB). To date, the EJAtlas has being financed by two European research projects: EU FP7 “EJOLT” and ERC advanced grant “Envjustice”, and one grant from the International Social Science Council’s (ISSC)

Transformations to Sustainability programme “ACKnowl-EJ”. The database will be funded at least until December 2022 with funds of the recent Balzan Prize awarded to Joan Martinez-Alier in 2020.

Besides the funds listed above, the EJAtlas is also possible because of the hundreds of collaborators who have entered cases as part of their research interests and activism. As previously mentioned, I have myself collaborated with the EJAtlas, entering cases from Central America during 2014-2015 working as an environmental consultant. Since late 2016, I continued collaborating under the PhD research grant within the ENVJustice project.

The EJAtlas is the result of multiple voices from different backgrounds (scholars, activists, NGO's, grassroots organisations) that unite as a unique voice to denounce environmental injustice worldwide. To guarantee reliability, all cases are documented from published sources, and a core team based at UAB revises the accuracy of the information before posting each case online.

The EJAtlas is an activist-driven tool but is valuable for scientific research as well. Its standardized data form [Table 1], collecting quantitative and qualitative variables of each one of the conflicts, allows us to do comparative analysis of such a large number of cases across different geographic, cultural, political, and economic settings.

One special issue in Sustainability Science (cf. Temper et al., 2018) and many other independent publications have been published, positioning the database as a source for studies performed in statistical political ecology and for the study of the global environmental justice movement (Dell'Angelo et al., 2021; Le Billon and Lujala, 2020; Martinez-Alier et al., 2016; Scheidel et al., 2020; Scheidel et al., 2018; Temper et al., 2020; Temper et al., 2018).

Table 1.1 Ejatlas dataform to fill a case in the EJAtlas

Basic Data	<ul style="list-style-type: none"> ▪ Name of the conflict ▪ Location (country, province, city/town, georeferenced area and accuracy of location) ▪ Project area (ha) ▪ Type of population involved (urban, semi-urban, rural)
Source of conflict	<ul style="list-style-type: none"> ▪ Category of conflict (or 1st level) including ten main excluding variables (i.e. Industrial, Nuclear, Mining) ▪ Type of conflict (or 2nd level) including around 50 main non-excluding subcategories of conflicts (i.e., chemical industries, nuclear waste storage, mineral processing) ▪ Commodities involved ▪ Qualitative description of the conflict (500 to 2000 words)
Project details and Actors	<ul style="list-style-type: none"> ▪ Project details (tons of mineral extracted per year, kwh of electricity) ▪ Companies' names, state enterprises and governmental actors involved ▪ Level of investment and international and finance institutions ▪ Number of affected populations ▪ Name of the Environmental Justice Organizations involved
Conflict and Mobilization	<ul style="list-style-type: none"> ▪ Intensity of the conflict (Latent, Low, Medium, High) ▪ Reaction phase (Latent, Preventive, In reaction, For reparations) ▪ Groups mobilising ▪ Forms of mobilisation ▪ Start/end date of the conflict
Impacts (reported, potential or no data)	<ul style="list-style-type: none"> ▪ Environmental impacts ▪ Health impacts ▪ Socioeconomic impacts
Outcomes	<ul style="list-style-type: none"> ▪ Status of the project: proposed, planned, under construction, in operation, stopped ▪ Development of alternatives from environmental justice movements ▪ Success/No Success for EJ and an open box to explain the answer ▪ Conflict outcomes and response (i.e., compensation, murders of environmental defenders)
Sources and materials	<ul style="list-style-type: none"> ▪ Includes all references used to gather data ▪ Additional comments about the conflict ▪ Photos & cultural expressions
Meta information	<ul style="list-style-type: none"> ▪ Headline text ▪ Contributor (name, organization, contact)

Source: The author based on Temper 2015 and ejatlas dataform available at www.ejatlas.org

5. Dissertation structure and chapter summary

After this introduction, the following chapters (II, III and IV) present the ‘stand-alone’ research papers. Chapter II is entitled ‘Violence in environmental conflicts: the need for a multidimensional approach’, and it was published in *Sustainability Science* in 2018. It is co-authored with Dr. Sara Mingorría, a researcher from ICTA-UAB, and Dr. Bernardo Aguilar, former executive director of Fundación Neotrópica. As first author, I led the data gathering, data analysis, the design and writing of the first draft manuscript, and my co-authors supported me in the final writing process and revisions before submission and final publication.

Chapter III, entitled ‘Invisibles within the invisibles: Aftermaths of a toxic pesticide among female and male banana plantation workers in Nicaragua’, is based on a case-study analysis of pesticide contamination on the banana plantations in Nicaragua, and it is written individually. This paper was resubmitted to the *Journal of Peasant Studies* in April 2021. Here I presented the version incorporating most of the three anonymous reviewers’ comments and suggestions, which undoubtedly were very helpful to improve the paper. Finally, Chapter IV, ‘Mobilisations from below in a Toxic World: A global analysis of environmental health conflicts’, is co-authored with my two supervisors, Dr. Joan Martínez-Alier, from ICTA-UAB, and Dr. Giacomo D’Alisa, from CES-University of Coimbra. This paper is accepted to be resubmitted in *Global Environmental Change*. As first author, I led the design, data analysis and preparation of the first draft of the study, and my two supervisors contributed equally to the writing and editing of the manuscript for the final submission. Finally, Chapter V presents the main conclusions and further research agendas.

Furthermore, to avoid redundancies, I present at the end all references, including a list of interviews and the list of cases used from the EJAtlas. Lastly, during the last four years I have collaborated with colleagues as a co-author in four research papers and three book chapters, most of them already published or pending publication. Because these collaborations, as well as other academic activities, have greatly increased my knowledge and experience in the ‘academic life’, I detail all these activities under the label “Other academic achievements obtained during the PhD project” in Annex.

Table 1.2 Structure of the dissertation

Chapters	Chapter 1	Chapter 2	Chapter 3	Chapter 4	Chapter 5
Title	Introduction	Violence in environmental conflicts: the need for a multidimensional approach	Invisibles within the invisibles: Aftermaths of a toxic pesticide among women and male banana plantation workers in Nicaragua	Mobilisations from below in a Toxic World: A global analysis of environmental health conflicts	General Discussion, conclusions and further research
Objectives	Present the scientific relevance and main research questions	Expand the notion of violence in environmental conflicts	Study the role of the scientific evidence and gender power relations in a pesticide contaminated area to understand how these relations shape 'victimhood' of toxic pollution.	Compare a sample of conflicts reporting visible human health impacts linked to toxic pollution with conflicts that do not.	Present key theoretical, empirical and methodological findings of this research.
Main Research Questions		How different forms of violence appear and overlap in environmental conflicts?	Why in a pesticide contaminated area certain bodies are acknowledged as victims and suitable for compensation while other bodies don't? How the scientific evidence and gendered power relation shape the local organising strategies to claim justice?	Are environmental conflicts over human health impacts different from other environmental conflicts?	Presents potential research agendas to render the 'Toxic World' visible
Methodology and methods	Literature Review	Qualitative: Documentation of conflicts base on primary and secondary sources: Snow- ball sampling, interviews, documentation, field trips to Belize, Guatemala, Panama, and Costa Rica.	Qualitative: Case study analysis based on ethnographic methods: semi-structured interviews, and participatory observation. documentation of videos, photos and newspapers. Fieldwork in Nicaragua	Quantitative: 'Statistical Political Ecology' using a large scale sample of 3033 cases from the EJAtlas. Softwares used to select, analyze and represent data Stata and Excel	n/a
Theoretical Contribution	Presents the gaps in the literature	We propose the Multidimensional violence to tackle different forms of violence in EDC	Implications for a better understanding on environmental conflicts over toxic pollution at a local scale.	When human health is deemed to be affected by toxic pollution, environmental conflicts follow different patterns requiring a nuanced and specific approach to understand them.	Proposes new research agendas
Level of analysis	n/a	Regional: Central America	Local: Chinandega, Nicaragua	Global	n/a
Status of publication and journal	n/a	Published Sustainability Science	Resubmitted Journal of Peasant Studies	Revise and Resubmit Global Environmental Change	n/a

Chapter II

Paper 1: Violence in environmental conflicts: the need for a multidimensional approach

An early version of this chapter is published in *Sustainability Science* as:

Navas, G., Mingorria, S. and Aguilar-González, B. Violence in environmental conflicts: the need for a multidimensional approach. *Sustain. Sci.* **13**, 649–660 (2018). DOI: 10.1007/s11625-018-0551-8

“Nos matan por defender la vida”²

[We are murdered for defending life]



In the photo: Jehry Rivera, indigenous Bröran in Térraba, Southern Costa Rica. Killed in February 2020 for defending indigenous land rights. Photo credits: Hugo Navas Obando.

² A slogan frequently used by environmental defenders in Latin America to protest against the high levels of violence they experience in defending the environment.

Violence in environmental conflicts: the need for a multidimensional approach

Abstract

Although studies on environmental conflicts have engaged with the subject of violence, a multidimensional approach has been lacking. Using data from 95 environmental conflicts in Central America, we show how different forms of violence appear and overlap. We focus on direct, structural, cultural, slow, and ecological forms of violence. Results suggest that the common understanding of violence in environmental conflicts as a direct event in time and space is only the tip of the iceberg and that violence can reach not only environmental defenders, but also communities, nature, and the sustainability of their relations.

Keywords: multidimensional violence, resistance, environmental conflict, EJAtlas, Central America.

1. Introduction

Grassroot organizations and individuals protest and denounce situations of social and environmental damages leading to environmental conflicts (or ecological distribution conflicts) (Martinez-Alier 1995a, 2002). In their struggles to save water and land, their livelihoods, their future, and the future of the next generations, many of them are threatened, wounded, killed, criminalized, and forced to leave their communities (Edelman and León 2013; Aguilar-Støen 2015; Mingorría 2017; Rasch 2017).

Global Witness, an international organization working on environmental abuses and human rights since 1993, has highlighted that during 2015, more than three environmental defenders³ were assassinated every week around the world (Global Witness 2016). In most cases, culprits escape unpunished (Global Witness 2014, 2016). Concerned with this, and aiming to move beyond their analysis, in this article, we look at how different forms of violence appear and overlap in environmental conflicts; our objective is to propose a wider conception of violence, in which we consider not only its visible forms, but also violence as unseen processes, whose effect reaches beyond humans.

To do so, we use a database of 95 environmental conflicts⁴ from seven Central American countries (Guatemala, Belize, Honduras, El Salvador, Nicaragua, Costa Rica, and Panama) from the Environmental Justice Atlas database. Central America hosts important biological and cultural diversity, and due to its geological formation, it represents a biological corridor between North and South America with only 0.1% of the world's land mass yet 7% of the world's biodiversity. The region has a population of 47,667,000 inhabitants (2016), around 80 indigenous and afro descendant groups and 60 different languages.

Central America is relevant for studies on violence in environmental conflicts. First, Global Witness (2016) already identified the region as one of the most violent around the world for

³ Environmental defenders are people who take peaceful action to protect land or environmental rights, whether in their own personal capacity or professionally (Global Witness 2017). It can refer to any person (or group of people) who defends human and environmental rights, including constitutional rights to a clean and healthy environment, when the exercise of such rights is being endangered.

⁴Due to the large sample size, these conflicts give a reliable picture of the environmental conflicts in the region. But, with a growing number of cases, some results might change.

environmental defenders. Second, an analysis of the whole region using data for the seven countries as we do here is still lacking. Third, because it is a socially, politically, and economically heterogeneous region in which diverse characteristics such as a complex history of war and peace play a role in current environmental struggles (Wayland and Kuniholm 2015). Furthermore, the presence of environmental racism is related to the percentage of indigenous population in each country, for instance, while in Guatemala, 60% of the total population is indigenous, and in Costa Rica, the percentage is around 2%. Finally, because this heterogeneity reinforces the idea that just because violence is not visible, it does not mean that a country does not experience violence, thus necessitating a multidimensional violence approach.

The article is divided as follows. Section 2 briefly describes Central America's socio-economic background. Section 3 presents a theoretical background on violence and environmental conflicts. Section 4 describes the EJAtlas as a tool to analyse environmental conflicts, and the methods used to gather and analyse how violence appear in these conflicts. Based on regional tendencies and local examples, Sect. 5 synthesizes and discusses the main findings in how different forms of violence appear and overlap. In Sect. 6, we insist on the need for a multidimensional violence approach to address the study of environmental conflicts and in which violence is defined as an action or a process that appears in visible and unseen forms against humans, nature, and the sustainability of their relations. Moreover, we show how violence is not always a response against resistance, but that resistance can also be organized in response to a long-term process of violence. In Sect. 7, we lay out our conclusions.

2. Central American background: common traits and differences

Latin American history is marked by the plunder of raw materials, inequality, power asymmetries, and violence (Acosta 2009; Bebbington and Bury 2013; Machado 2014; Svampa 2013), and Central America is not an exception. The legacy of colonial and neo-colonial relations, the peace and war historical traits, the external and political influence of the United States of America (Faber 1992), China as a new economic actor in the region (Urcuyo 2014; McKay et al. 2016), and the increase of drug trafficking routes (McSweeney

et al. 2014) are some of the current realities that superpose with extractive industries, pollution, environmental conflicts, and violence.

The establishment of the United Fruit Company (UFCo) in 1899 marks the beginning of an era of neo-colonial relations. Through the International Railways of Central America (IRCA), the company controlled commercial routes and productive lands in Guatemala, Costa Rica, Honduras, and Nicaragua. These countries were nicknamed “Banana Republics”⁵, a pejorative concept to describe poor, small, dependent, and politically unstable nations. For decades, the UFCO promoted enclave economies and influenced governmental decisions for its own benefit (Bucheli 2008).

In much more recent times, geopolitical programs and trade agreements continue to threaten communities at a local level (Grandia 2006). For instance, the Central American Electrical Interconnection System (SIEPAC) under “Mesoamerica Project” (2008) for energy exportation has had an effect on the increase of hydroelectric dam projects (Stenzel 2006). In Guatemala, indigenous Maya-Q’eqchi have protested against the Xalalá dam (EJAtlas 2016a) claiming for the protection of the sacred mountains that it would flood. In Belize, local communities have been concerned about the loss of biodiversity in the Macal River due to the Chalillo dam (EJAtlas 2016b). These two cases—recorded in the EJAtlas—are part of SIEPAC. By ignoring the sacredness of the indigenous environment and failing to recognize local demands, governments have supported these projects under the idea of “national interest” and “development” (EJAtlas 2016a, b).

Furthermore, since the signature of diplomatic relations with Costa Rica in 2007, China has kept an eye on the region. One of its interests is to have access to both Atlantic and Pacific oceans for commerce route expansion (Urcuyo 2014). Though investments in extractive, energy, and transport industries, China capitals, go to Central America sources, sometimes without considering environmental, labour, and social conditions (McKay et al. 2016). Key examples on the EJAtlas are Sinohydro’s presence which is becoming common in

⁵ The term was first mention in the novel “Cabbages and Kings” (Henry 1904) to describe the imaginary country of Anchuria inspired by the author’s experiences in Honduras.

hydroelectric dam conflicts (EJAtlas 2014a, 2017a) and the interoceanic Gran Canal in Nicaragua (EJAtlas 2014b).

Moreover, the region is also strategic for drug traffickers, since it connects producers (South America) to consumers (North America), and to increase terrestrial routes, the illegal activity has led to “narco-deforestation” (McSweeney et al. 2014). Trafficking has a relation with extractive industries and environmental damage, since in some cases, traffickers incorporate the illegal income into the legal economy through the investment on lands for cattle, timber, and oil palm plantations (McSweeney et al. 2014).

Despite commonalities across countries, Central America is a very heterogeneous region. The consequences of its peace and war history and the gaps between relevant social and economic indicators between countries are some examples of this diversity. During the 1960s and 1990s, some countries were marked as the confrontation stage of popular movements, armed struggles, and repressive regimes (Brockett 2005). Civil war in Guatemala (1960–1995), El Salvador (1979–1992), and Nicaragua (1962–1990) which resulted in 255,000 deaths and thousands of people forcibly disappeared are notorious examples. The strongest guerrilla in El Salvador was called “Farabundo Martí” from the name of the leader of an insurrection in 1932 that ended with tens of thousands of peasant victims, while in Guatemala, the memory of the failed land reform against UFCO because of a military coup in 1954 sponsored by the United States was still fresh. In the wars of the 1960s and 1970s, the victims were mostly from rural areas, affecting indigenous and peasant livelihoods (Kay 2001; Azpuru 1999). Some environmental conflicts mapped on the EJAtlas date from the civil war. In 1982, to make possible the construction of the Chixoy Dam in Guatemala, the army and paramilitary forces murdered 444 indigenous Mayan people, the majority of them women and children, these facts were later known as the Río Negro massacre (EJAtlas 2015a). The *Esquipulas* Peace Agreement signed in 1987 was followed by a proliferation of extractive industries. In post-war Guatemala, the government opened the country to mining concessions (Wayland and Kuniholm 2015). In this scenario of open violence and war, Costa Rica was an exception; its history of peace and democracy began in 1948 when the government of José María Figueres Ferrer abolished the army. During this

later period, Panama had a military government until the US briefly invaded the country in 1989 and Belize was still part of the British Empire until it reached its independence in 1981.

Overall, Central America's economy is based in the primary sector (export of raw materials) which is consistent with other Latin American countries. However, Panama's and Costa Rica's economies are based on the third sector (services economy). The next table 2.1 [Social and economic indicators in the Central American countries] shows the region's heterogeneity from a quantitative point of view, we social and economic indicators per country.

Table 2.1 Social and economic indicators in Central American countries. Source: data from the Economist (2016) and Jahan (2016)

	World Rank Human Development Index (HDI)	Population living below the income poverty line, PPP \$1.90 a day (%)	Democracy Index (from 0 to 10) (2016)	Homicide rate (per 100,000 people)
Belize	103	n.a	n.a	34.4
Costa Rica	66	1.6	7.88	10.0
El Salvador	117	3	6.64	64.2
Guatemala	125	9.3	5.92	31.2
Honduras	130	16	5.92	74.6
Nicaragua	124	6.2	4.81	11.5
Panamá	60	3.8	7.13	17.4

As shown in Table 2.1, Costa Rica and Panama have the highest Human Development Index in the region and Guatemala and Honduras the lowest. Costa Rica and Panama have the smallest percentage of population living the below income poverty line and (again) Guatemala and Honduras the highest. A gap can also be seen regarding poverty: while CR has 1.6% of its pop living below the poverty line, the value reaches 16% in the case of Honduras. The Democracy Index is higher in Costa Rica (7.88) and Panama (7.13) and lower in Nicaragua (4.81). The homicide rate is higher in Honduras (74.6) and in El Salvador (64.2) and lower in Costa Rica (10) and Nicaragua (11.5). This accounts for a very heterogeneous region.

Overall, the so-called 'Northern Triangle' [Triángulo del Norte] including, Guatemala, Honduras, and El Salvador has been seen as one of the most violent regions in the world with a combination of strong elites, inequality, and weak institutions (Bull 2014; Van Bronkhorst and Demombynes 2010). These indicators may also be considered a reflection

of violence. The next section closely examines different theoretical approaches on the phenomenon and concept of violence.

3. Theoretical background: violence and environmental conflicts

Why and how violence emerges has been addressed by scholars from different disciplines. For Peace and Conflict studies, there is a “triangle” from which violence can start. As shown in figure 2.1 [Galtung’s triangle of violence] the first corner is direct violence, defined as an event in time and space that is brutal and visible, where perpetrators are human beings (a homicide, for example) (Galtung 1969;1990). The second corner is structural violence. It refers to a process that occurs when social structures undermine individual wellbeing, especially towards discriminated groups as a result of social inequalities and institutional failings such as corruption or poverty (Galtung 1969). This form is less visible than the former and there is no one directly to be blamed except for the entire political and economic structure. The last form is cultural violence, and it indicates the use of cultural elements (religion, ideology, language, science, and technology) to legitimize structural and direct forms of violence. The Xalalà and Chalillo dam projects in Guatemala and Belize in the name of “development” and “national interest” are two key examples of this form of violence (EJAtlas 2016a, b).

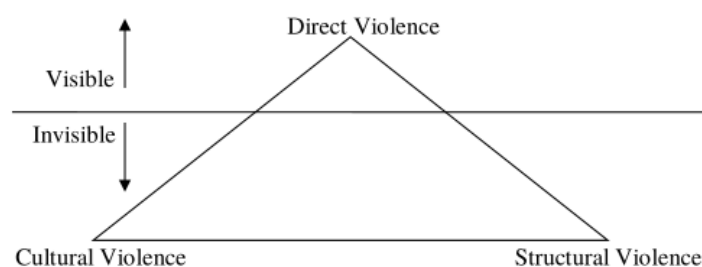


Figure 2.1. Galtung’s triangle of violence

As with Galtung, Rob Nixon was also concerned in expanding the concept of what constitutes violence (beyond its direct form). Moreover, like structural violence, his concept of “slow violence” refers to a process rather than an action. However, it differentiates as it

poses questions of “time, movement and change” (Nixon 2011:11). Specifically, slow violence refers to a delayed destruction dispersed across time and space that is incremental, accumulative, and exponential (Nixon 2011). This is the case of climate change, deforestation, and ocean acidification. The persistent accumulated toxic effects on human health because of pollution from heavy metals in open cast mining contexts, or because of the use of damaging chemicals such as pesticides and herbicides are also examples.

However, one main challenge is that slow violence can remain unseen until its accumulative impacts become visible; that is why (and contrary to direct violence), it is difficult for the victims to identify it, to protest and resist against it as I will analyse further in Chapter IV of this thesis. Slow violence is similar to the concept of “slow murder”, a term used to describe the health effects of heavy urban traffic pollution in Delhi or the effects of spreading endosulfán in cashew plantations in Kerala. “Slow murder” is a concept that the Centre for Sciences and Environment in India has used for many years (Narain 2007). Endosulfan would of course “slowly murder” both humans and other “innocent” biological entities apart from those targeted. Coincidentally, this term was also used many years before by banana plantations workers in Nicaragua to refer to the nematocide *Dibromochloropropane* or DBCP, the case study analysed in Chapter III.

When referring to slow violence, Nixon indicates to a delayed destruction and its environmental aftermaths—using deforestation among other examples— but he mostly focuses on the impact of slow violence on poor and supposedly disposable people. Because of that, we find it relevant to bring into the debate the concept of “ecological violence”, a term aiming to make the violence against the biophysical world and its interrelations visible (Watts 2001). Cases of “ecocide”, a word coined to “denounce the environmental destructions and potential damage of the spraying of the Agent Orange in Vietnam” (Zierler 2011) is an example. Moreover, the “non-focused” deaths or “deaths by indirection” (Carson 1962) to describe how the biocides (instead of insecticides) were poisoning not only enemy insects, but other insects and all forms of life.

As Nixon and Galtung pointed out, there is an issue of inequality, as these forms of violence commonly have an unequal distribution of their effects. Violence (no matter its definition or

form) is not lived equally among all of us. Poor and disadvantaged people and nature are the most affected.

Therefore, through the study of environmental conflicts, in this paper, we link forms of violence, inequality, and resistance. An ecological distribution conflict—interchangeable with environmental conflict (see Scheidel et al. 2017)—is defined as “collective manifestation of discontent that detonates when people organize themselves, to denounce situations regarding not only unequal distribution of environmental benefits but also unequal distribution of the environmental costs” (Martinez- Alier and O’Connor 1996).

The concept of ‘Violent Environments’ (Peluso and Watts 2001) intersects the study of environmental conflicts, violence, and power relations. Under this notion, ‘environment’ is defined as “an arena of contested entitlements where claims over property, assets, labour, and politics of recognition are played out” (Peluso and Watts 2001: 25). Besides, “violence” is defined as a “phenomenon deeply rooted in local histories and social relations but also connected to transitional processes of material change, political power relations and historical conjuncture” (Peluso and Watts 2001: 29-30). As follows, we describe the EJAtlas as a tool for the study of environmental conflicts and the different variables used to understand how violence manifests in different environmental conflicts and countries.

4. Methodology

The EJAtlas is a large-scale database to gather and analyse environmental conflicts around the world (Temper et al. 2015). The unit of analysis is an economic project (a mining project, an oil extraction project, a hydroelectric dam, a tree plantation, among others) which causes visible or potential socio-environmental damage and where impacted people at a local level (but sometimes at a national or regional level) organize themselves to protest against such projects and resist with different mobilization forms. The information gathered on the EJAtlas is the result of collaborative mapping between academics and activists and sometimes also the people most directly affected (Temper et al. 2015).

4.1 Methods used to gather information

In selecting the Central American cases, we used a snowball sampling method, asking environmental justice experts⁶ which cases in the region were the most relevant to enter into the EJAtlas. The organisations contacted were Centro Humboldt (in Nicaragua); Ecological Voices (Radio Temblor), the Environmental Advocacy Center (CIAM) and Alianza para un Mejor Darién (AMEDAR) in Panamá. The Salvadoran Center for Appropriate Technologies CESTA - Friends of the Earth in El Salvador. The organisation Justice and Freedom Movement in Honduras. The Institute of Agrarian and Rural Studies IDEAR-CONGCOOP, the Central American Institute of Fiscal Studies and Madre Selva in Guatemala. All well-known organisations and collectives in the region working for environmental justice and very knowledgeable about the environmental conflicts in their own countries and in the rest of the region.

With this in mind, we made a general list of conflicts based on secondary sources (academic and non-academic articles such as newspapers and websites of environmental defenders' organizations). Then, we shared the list with experts to validate these cases while asking them to identify other ones. Subsequently, we entered the cases based on secondary sources as well as information previously provided by experts. Data were gathered during the period 2014–2017; in total, it includes 95 environmental conflicts that span nine different types.

Furthermore, the authors of this paper have been engaged for many years in diverse environmental struggles in the region so access to experts was made through personal contacts. This paper's first author made field trips in 2014 and 2015 to Belize, Guatemala, Panama, and Costa Rica to get feedback and to gather information about less known cases. Often, activists directly involved in the conflict filled in the EJAtlas data sheets based on their own experience and knowledge.⁷

⁶ People involve themselves in the regional struggles as activists or academics or both.

⁷ The data base has received contributions of scholars and activists representing a mixture of academic and grassroots organizations whose names appear in the last part of the data sheet.

4.2 Variables from the EJAtlas used to analyze information

The EJAtlas data sheet has over 100 different variables to compare and analyze (Martinez-Alier et al. 2016). First, to describe conflicts we used “type of conflict”,⁸ “date of beginning of the conflict”, “area of impact (rural, urban, and semi-urban)”, and “mobilizing groups”. To analyze violence, we first chose the variable “intensity of the conflict” which includes latent level (nonvisible organizing), low level (some local organizing), medium level, (street protests and visible mobilization), and high level (widespread mass mobilization, violence in its direct form and arrests, and deaths of demonstrators or activists). We also revised the variables called “impacts” and “outcomes of the conflict”.

We placed different variables in Table 2.2 depending on the definition of violence according to different authors. As it can be perceived, some variables can be placed in more than one form of violence.

⁸ EJAtlas classifies conflicts according to ten mutually exclusive primary categories (Nuclear power, Mineral Ore Extraction, Water management, Biomass and land conflicts, Fossil Fuels and Climate Justice, Infrastructure and Built Environment, Waste management, Biodiversity conflicts, Tourism, and Industrial and Utilities conflicts). There are many more secondary categories. For instance, under Nuclear Power conflicts (of which, incidentally, there are none from Central America in the EJAtlas), there could be conflicts classified under Uranium Mining, Nuclear Power Plants, or Nuclear Waste Disposal).

Table 2.2 Variables (not mutually exclusive) from the EJAtlas according to type of violence

Form of violence	Definition	Variables from the EJAtlas
Direct violence	An event in a specific time and space that is brutal and visible (Galtung 1969)	Murders: selective assassinations of environmental defenders Criminalization: unsubstantiated accusations of environmental defenders to demobilize them from their campaign Repression: massive coercion in a social protest Targeting of activists: direct attack aiming to cause physical and psychological damage, death threats
Structural violence	Social structures affecting individual wellbeing, especially towards discriminated groups, as a result of social inequalities and institutional failings (Galtung 1969)	Institutional arena/judicial activism: institutional failings endangering environmental defenders Court decision (failure for environmental justice) Criminalization: unsubstantiated accusations of environmental defenders to demobilize them from their campaign
Cultural violence	The use of cultural elements (religion, ideology, language) to legitimize structural and direct violence (Galtung 1990)	Impact on and lack of participation of historical discriminated groups (indigenous and afro-descendant's groups)
Slow violence	Delayed destruction dispersed across time and space that is incremental and accumulative (Nixon 2011)	Exposure to unknown and/or uncertain complex risks Deaths (conversely to murders these are deaths by indirect, for example through an illness caused by a long-term exposure to an hazardous substance) Water pollution Air pollution Soil contamination
Ecological violence	Violence focusing on nature, on the biophysical world and its interrelations (Watts 2001)	Biodiversity loss Deforestation Water pollution Air pollution Soil contamination

Table 2.2 shows a categorization of variables from the EJAtlas according to the type of violence. However, this relation is not so straight forward; environmental conflicts are complex as is the way violence manifests in them. Who are the main actors (both perpetrators and victims)? How is resistance organized? How do the social structures from different countries shape these forms of violence? Can ecological violence be both direct and slow? How slow is slow violence? In the next section, we will address these questions by examining both regional trends and local examples from the seven countries.

5. How does violence manifest in environmental conflicts?

The time span of start dates for mapped conflicts in Central America extends from 1959 to 2015. From the total of cases, 70% occurred in rural areas, 15% in semi-urban, and 10% in urban areas. The rest occurred offshore, such as the oil drilling case in the Blue Hole in Belize (EJAtlas 2015b). The most common types are mining extraction (27 cases), water management, mostly hydroelectric dam projects (23 cases), and biomass, and land conflicts due to monoculture expansion (17 cases). Infrastructure and built environment, industrial

and utilities, and waste management conflicts are less common. Figure 2.2 situates the conflicts by type and intensity level (high, medium, low, and latent).

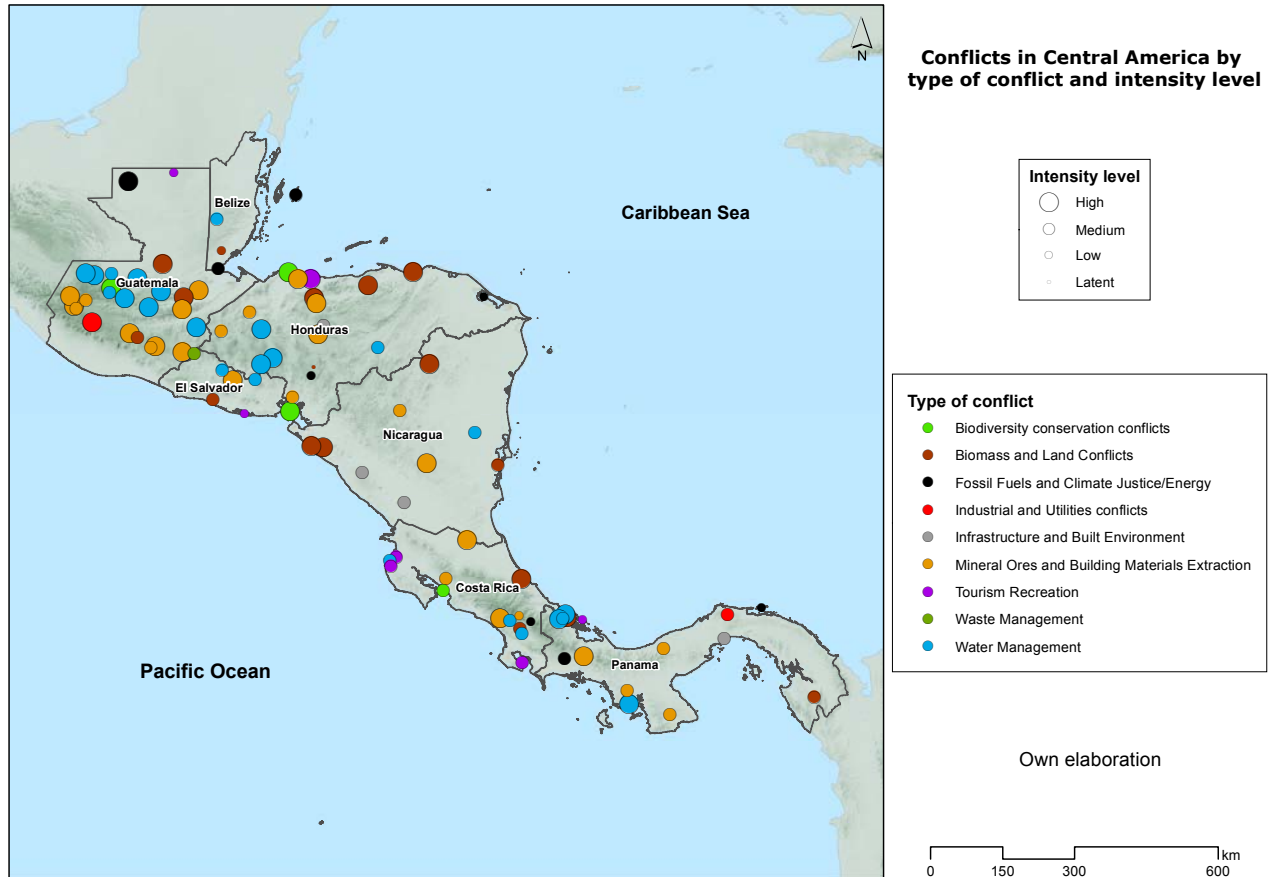


Figure 2.2 Environmental conflicts per country by type of conflict and intensity level. Source: the authors, based on EJAtlas data

Most of the conflicts are “high-level intensity” (around 46%) which means that there have been mass mobilisations and episodes of direct violence (murders, arrests, violent targeting of environmental defenders). Followed by “medium level” (42%) which means that there have been visible mobilisations such as street protests or akin mobilising forms. And finally, low level (10%) which means that there has been only some local organising. Only one case (in Honduras) is “latent intensity” which refers to no visible organising at the moment. Minerals’ Extraction and Water Management is the most common and most highly intense types of conflicts. Guatemala and Honduras are the countries in which—no matter the type of conflict—there are more high-intensity cases. Tourism recreation conflicts are mostly categorized as medium or low-level intensity; however, there is an exception in Honduras,

where Garifuna people defend their ancestral lands against a mega-tourist project and a golf course (EJAtlas 2014c). In addition, the only high-intensity conflict from fossil fuels and climate justice is located in Guatemala, while the rest are medium level intensity (EJAtlas 2015b). Regarding resistance in these conflicts, Fig. 1 also shows how some conflicts overlap offering multifold resistance to more than one project at the same time. The following section explores key examples of different dimensions of violence along Central America. When possible, we identify the actors involved in deploying violence, the victims, and their resistance.

5.1 Direct violence

The murder of at least one environmental defender appears in 27% of the cases, violent targeting in 37%, repression in 37%, and criminalization in 38%. Data by country illustrate substantial differences. Guatemala and Honduras seem to be the most directly violent as they make up 79% of the total of cases in which a murder has occurred. Even if the EJAtlas does not specifically count the number of murders by conflict, some asymmetries are relevant to note. The number of murders ranges from one such as in the case of Jeanette Kawas in Honduras (EJAtlas 2017b) to at least 444, in the Rio Negro massacre (EJAtlas 2015a), while other cases such as the expansion of oil palm in Bajo Aguán, Honduras reported 93 murders (EJAtlas 2014d).

Variables on direct violence are not mutually exclusive, and it is common that an assassination is preceded by violent targeting and death threats. One of the most illustrative cases is the Agua Zarca hydroelectric dam in Honduras (EJAtlas 2017a). The project, led by the Honduran company Desarrollo Energéticos (DESA), planned to build a dam in the Gualcarque river to generate 21.3MW of energy leading to the displacement of Lenca communities and the assassination of the river. During a protest in 2013, the community leader Tomás García was shot dead and his son was wounded. Years after, in 2016, Berta Cáceres, an indigenous Lenca woman, —who won the world-famous Goldman Prize for environmentalism in 2015—was shot to death in her home. Due to her active role against the hydroelectric dam and other extractive projects in Honduras, she had been intimidated, criminalized with false accusations, temporarily detained, and threatened (Global Witness 2015).

Another such case is located in El Salvador, where six environmental defenders were killed. The victims (a pregnant woman included) were activists against the El Dorado- Pacific Rim mining project (EJAtlas 2017c). Some other female environmental defenders murdered include Alicia Recinos Sorto (El Salvador, 2009), María Enriqueta Matute (Honduras, 2013), Rosalinda Pérez (Guatemala, 2015), Lesbia Yaneth (Honduras, 2016), and Laura Lorena Vásquez (Guatemala, 2017). Similarly, in Panama, during a protest in 2012, violent repression by the police left three environmental defenders dead and more than one hundred wounded. Ngäbe-Buglé indigenous, where protesting against Barro Blanco hydroelectric dam Project (EJAtlas 2016c) arguing that this project violates the laws that define their territories, water rights, and self-determination.

In general, direct violence is used as a premeditated act to intimidate and demobilize environmental defenders from their resistance. Who the main culprits are often remains unknown and most of these cases remain in impunity (Global Witness 2016); nonetheless, families of the victims and other environmental defenders accuse landowners, foremen, policemen, and goons paid by companies as the main actors.

5.2 Traits of structural and cultural violence

In direct violence, governmental institutions fail to ensure justice by passively ignoring and not investigating these murders. However, institutions can also actively play a role in these conflicts through structural and cultural violence. Environmental defenders appeal to State institutions to carry out their actions in the conflict in 50% of the cases; at times, this form of mobilization has become successful in terms of Environmental Justice in stopping a project (Aydin et al. 2017). For instance, in Costa Rica, despite criminalization of activists, the court annulled the Crucitas mining project (EJAtlas 2014e) and in El Salvador, despite the murders, the struggles against El Dorado mining project lead to a new law banning all types of metal mining activities in the country (EJAtlas 2017c). From the total cases accounted for, 34% end in a court decision favourable to environmental defenders and 27% end in resolutions against them. The rest remains unknown or yet to be decided. To analyse structural and cultural violence, we focus on cases of failure, where visibly weak institutions decide passively or actively against environmental defenders and environmental justice.

For instance, in Guatemala, despite the fact that the National Attorney General's Office declared the concession given to Perenco (a British–French company) illegal for oil exploitation in Laguna del Tigre, the project continues (EJAtlas 2015c). The National Attorney argued that the concession was given within the Mayan Biosphere Reserve, which is also part of a Ramsar protected area. Regardless, in 2008 the Government promulgated FONPETROL [Ley del Fondo para el Desarrollo Económico de la Nación], a law that guarantees the concession to Perenco if “the economic terms are favourable to the State”. Perenco, received the license for another 15 years more. This decision led to resistance by 53 communities that were already suffering from spills (resulting in water pollution, livestock, and crop losses); however, they were totally ignored. Additionally, in 2010, the government established the “Green Battalion”, around 250 soldiers to protect the Laguna del Tigre but also to protect the company's interests (EJAtlas 2015c).

Furthermore, in Guatemala, the Polochic Valley case (EJAtlas 2014f) shows how structural and cultural violence are present. For years, the state used its force and different powers (legislative, executive, and judicial), to repress local people and facilitate extractive projects such as sugarcane and oil palm expansion. In 2011, the government participated actively in the process of eviction of indigenous families of the Valley. A judge ordered the eviction of 14 communities at the request of an oligarchic family to plant sugarcane. The Public Ministry (the state agency in charge of executing court orders, somehow equivalent to an attorney general) participated in the evictions as well as soldiers and national police. The oligarchic family pressured the military into burning crops and they decided an exact date and time for the evictions. Around 800 families were violently evicted, the National Civil Police killed one peasant, dozens of people were injured, and the homes and 1800 hectares (ha) of staple crops were razed or destroyed. At the same time, the government, using the media, accused organizations of being radicals that systematically implemented illegal measures. In a way, this is a century old conflict. Local communities have tried to recover the land they had lost from the beginning of the colonial era, through liberal reforms and the development of the agroexport model of cotton, banana, beef, and coffee farming.

The last example is located in Nicaragua, and it combines structural, cultural violence, and direct violence. In 1987, as part of the negotiations after many years of internal conflict, the

government created the Autonomous Regions of the Atlantic (RAA-North and RAA-South) and conferred its management to the indigenous Miskito. These lands are protected under Law 445, which recognizes “indigenous communal property” and established that these lands are inalienable, immune to seizure, and exempted from taxes. Nevertheless, the increase of settlers willing to expand their businesses, wood smugglers, and ranchers is threatening the local population’s livelihoods and leading to land disputes over the last decades. In response, Miskitos call for *Tasba Pri* which opposes the notion of “economic development”. *Tasba Pri* means “Free Land” and the right to continue their sustainable and ancestral activities such as agriculture and fishing. In response of resistance, direct violence such as fire attacks, kidnappings, tortures, and murders has been denounced by the Miskito (EJAtlas 2017d). To escape, indigenous groups have crossed the border looking for refuge in the neighbour country Honduras. In total, 3000 people have been displaced and at least 32 indigenous people killed. For Miskito—as for indigenous from the Polochic Valley—these events hark back to another time when they battled the leftist Sandinista government in a quest to keep their land in the civil war in the 1980s. Up to now, we have described examples of the Galtung’s triangle of direct, structural, and cultural violence. In the following section, we identify less visible and accumulative forms.

5.3 Slow violence

Human exposure to unknown and/or uncertain risks is reported in 14% of the cases, deaths as health impacts in 24%, water pollution in 60%, and air pollution, and soil contamination in 45%. Overall, these health and environmental impacts are forms of violence to both humans and nature. Not only environmental defenders but surrounding communities and future generations are affected since hazardous substances can accumulate in future bodies and threaten new-borns before conception (Monge et al. 2007). Contrary to direct or structural violence, data do not show remarkable differences between countries. We see slow violence exemplified through cases of monoculture—one of the most common type of conflict in Central America—where pesticides in water, air, and soil slowly enter and accumulate in human bodies and the environment. The resistance appears only after impacts become visible, if at all. The next regional case in the “banana republics” (Costa Rica, Nicaragua, and Honduras) exemplifies this.

Nowadays, ex-banana workers are still mobilizing for compensation due to the effects of exposure to dibromochloropropane (DBCP), a nematicide used to kill little worms on the banana plants owned by the United Fruit company during the seventies. The chemical was produced by Dow Chemical and Shell Oil Company (EJAtlas 2016d, e, f). Years after exposure, surrounding communities of the banana plantations realized an increasing number of premature abortions, birth defects, or congenital anomalies and an increasing number of sterile men. Once the chemical was proven to be the cause of their health damages, banana workers began a mobilization to ask for compensation. However, nowadays and after decades of struggle (in national and international courts), most people have not received compensation from the companies. The efforts to sue the producers and users of the chemical have faced difficulties, unleashing a circle of injustices due to the power asymmetries between the multinationals and the local people in terms of scientific support, general information, relation with state institutions, and lawyers. According to affected communities, there has been a great failure in the institutional arrangements for enforcing liability for damages to health.

5.4 Ecological violence

Ecological violence focuses on nature, but humans through protesting and public campaigns play a role in making it visible. For instance, the ecological effects of DBCP remain unknown, and conflicts have mainly focused on the human impact. Ecological violence is generalized along the conflicts in the region. Biodiversity loss, deforestation, and loss of vegetation cover are reported as an impact in 80% of the cases, water pollution, decreasing water quality and reduced ecological and hydrological connectivity in 60%, and air pollution and soil contamination in 45%.

To draw on this dimension of violence, we focus on two key examples. The first one is in Costa Rica, where “shark finning” became an illegal practice. Shark finning involves catching the shark from the sea, cutting its fins off, and throwing the rest of the body back to the sea, where the shark slowly dies. This cruel practice is related to demand for fins in Asian markets, where dishes such as shark fin soup are popular. Against this, national and international organizations and universities have strongly denounced it, leading to mass

mobilization, calling for new and stricter legislation but also encouraging consumer boycott (EJAtlas 2016g).

The second example of ecological violence (combined with extreme direct violence against humans) is located in Guatemala, where a high degree of pollution in La Pasión River was caused by the spillage of *malathion*, a synthetic pesticide used in oil palm plantations as an insecticide (EJAtlas 2015d). After the spillage, there was a high impact on the aquatic ecosystem; neighbouring villagers saw the river full of dead fish and used the word “ecocide” in their public campaigns against pollution of the river and claims for decontamination. The company, REPSA [Reforestadora de Palmas del Petén S.A.], owner of the oil palm plantations and responsible for the use of the chemical, did not take actions. Concerned with this, Rigoberto Lima Choc—an inhabitant from the community—denounced the company, and finally, the local government took some actions against it. Days after, Rigoberto was found murdered, but no investigations were carried out to find the culprits. According to local community members, Rigoberto’s murdered was related to his decision to denounce the company (EJAtlas 2015c).

In this section, we have shown with specific cases from the EJAtlas how different forms of violence are present and how some of them overlap. We perceive how in some countries, violence is more visible than in others, governments and companies are the main actors and how resistance is carried out by local communities and environmental defenders. These cases indeed support our hypothesis, the need for a wider, and more complex comprehension of violence to address the study of environmental conflicts.

6. The need for a multidimensional violence approach

Causes of environmental conflicts are multifold. Empirical studies have shown how the extraction of raw materials and energy production and supply has an effect in the increase of environmental conflicts (Martinez-Alier et al. 2010; Muradian et al. 2012; Pérez-Rincón et al. 2017). This argument is highly consistent with our data, as the majority of the conflicts are related to mining, hydropower supply and the expansion of monocultures. One difference with other regions in Latin America (Pérez-Rincón et al. 2017; Teran 2017) is that conflicts

related to oil and gas exploration and extraction which lead to “petroviolece” (Watts 2001) are less common in Central America.

Environmental conflicts are also a result of structural and cultural dynamics; for instance, the unequal distribution of economic benefits and environmental consequences influenced by coloniality, racism, class and gender inequalities (Martinez-Alier and O’Connor 1996), clashes of values over nature (Martinez-Alier 2009), or lack of participation and the non-recognition of communal institutions (Schlosberg 2013; Walter and Urkidi 2017). Environmental conflicts can arise suddenly or be a result of a long social cost-shifting process (Kapp 1950; Teran 2017). Regardless of the causes, different forms of violence appear and overlap throughout environmental conflicts.

Central American data report incidences of murders, evictions, and tortures; however, these are not isolated cases around the world (Del Bene et al., 2018; Global Witness 2015). Our findings go hand in hand with Global Witness reports, highlighting Guatemala and Honduras—countries with the poorest social and economic indicators in the region—as the most directly violent (Global Witness 2016). Why and under which conditions some conflicts are more directly violent than others deserve more attention. The historical conjuncture (Peluso and Watts 2001) and differences in the democracy index (Van der Borgh and Terwindt 2014) indicators might give further insight.

Overall, it is a constant that environmental defender murders remain impune (Global Witness 2016) and our data show how governmental institutions are not neutral actors in this, not only as they fail to ensure justice by passively ignoring to investigate murders, but also by taking part in evictions such as the conflict in the Polochic Valley (EJAtlas 2014f) and by not respecting their own laws such as the Miskito case (EJAtlas 2017d). Weak institutions and strong elites in some Central American countries (Bull 2014) are certainly factors to explain how environmental injustices are produced and reproduced.

Overall, powerless social groups such as indigenous, afro-descendants, and peasants from rural areas are the most impacted, the same groups who were impacted by internal wars decades ago (Kay 2001; Sibrián and Van der Borgh 2014; Mingorría 2017). For instance, Miskito in Nicaragua relates their resistance today to their past struggles. In Guatemala,

Wayland and Kuniholm (2015) show how the memory of the war plays a role in the social cohesion to resist against mining and hydroelectric dams.

Despite the region's internal differences, instances of ecological and slow violence are more homogenous. Historical factors or social and economic indicators do not seem to be related to these forms of violence. Costa Rica—with a high level of democracy and with a peaceful history—is one of the largest consumers of pesticides. This issue is leading to high levels of diseases in rural settings (Monge et al. 2007) of which the DBCP episode was a tragic early example (Thrupp 1991). Even if there is not an immediate killer, these biocides (Carson 1962) or “slow murders” (Narain 2007) are culprits of slow violence (Nixon 2011) due to the daily contamination and the slow deaths they provoke. However, in the environmental conflicts studied, resistance is organized once the impacts in bodies have been felt and not before or during the slow violence.

Nowadays, even though the DBCP was banned, it is still causing impacts on human health (Bohme 2015). However, the impact it is causing on nature remains unknown. Environmental conflict cases in Central America also show how ecological violence can be manifested twofold; it can be both slow (daily and slow contamination, or loss of wildlife in rivers cut-off by dams) or direct (by a specific action such as cutting the shark fins).

Furthermore, different forms of violence can overlap in a single conflict, and in addition, one form of violence can lead to another. Due to the protest against ecological violence in Rio La Pasión, Rigoberto Lima Choc was shot dead. Moreover, banana workers still protesting for compensation have faced structural violence on the weak institutional systems that slowly ignored their need for a compensation (Boix 2007; Bohme 2015).

Also, Central America shows the key role of women as environmental defenders. Berta Cáceres was one key example, but there are many more in the region and around the world (Martinez-Alier and Navas 2017). Studies on gender and violence in environmental conflicts become relevant for this debate, more specifically women who deploy a twofold resistance against extractive companies and against patriarchal structures in their own homes, organisations and communities (Shiva 1994; Veuthey and Gerber 2010; Jenkins 2017).

Finally, most environmental defenders not only defend nature, because they depend on it, but also because their own values are congruent with this defence (Martinez-Alier 2002, 2009). Concepts such as “Tasba Pri” in Nicaragua closely relate with the Andean notion of *Buen Vivir* (Acosta 2013) and can lead to a wider discussion about not only cultural violence (the use of language to legitimize violence), but also the colonial, racist violence imposed by the dominant western narrative of “development” (Escobar 2011), where indigenous peoples are depicted as “backward”, and their communal institutions are seen as “obstacles to progress and development”. For instance, contrary to ‘development’ (as understood in a Western view), the concept of *Buen Vivir* is based on the Aymara concept of *Suma Qamaña* and the Quechua equivalent *Sumak Kawsay*, which are worldviews recognizing the multidimensional character of social wellbeing, and its link between social and environmental prosperity (Acosta 2013).

In this article, we aimed at viewing violence from a wide perspective, since a narrow view of violence will lead to misinterpretations of how violence operates in different countries and political and economic contexts. To approach this, we propose a multidimensional violence approach that we defined as “a focus in which violence is defined as an action or a process that appears in visible and unseen forms against humans, nature, and its sustainable relation”. In this article, multidimensional violence is an aggregate of direct violence, cultural, structural, slow, and ecological violence but other forms might also be added (and some might be missing) depending on the context in which environmental conflicts are embedded. For instance, other forms can be added such as gender violence in environmental conflicts. This multidimensional violence approach can be represented in the following figure 2.3

The multidimensional violence approach

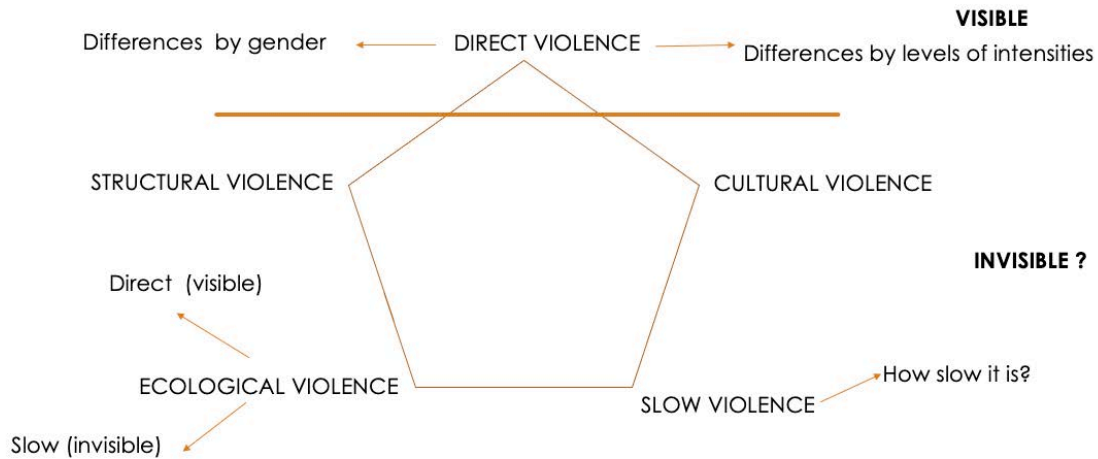


Figure 2.3 The multidimensional violence approach

Therefore, the forms of violence that are mentioned can be more complex; for instance, direct violence can be subdivided in different degrees of intensities (one murder or 90 murders makes a difference). Similarly, ecological violence can be both slow and direct. Furthermore, one dimension of violence can lead to the other and resistance can be deployed before or after one of these forms of violence is applied.

7. Conclusion

Drawing on literature in environmental conflicts, studies of violence and rich empirical evidence from 95 environmental conflicts in Central America recorded in the EJAtlas, we have shown how different dimensions of violence appear and overlap in different historical, political and economic contexts. Violence in its different dimensions becomes visible due to movements of resistance and claims by environmental defenders in environmental conflicts. Regional and worldwide databases fed both by academics and activists are also useful to increase their visibility. However, there are dimensions of violence that are manifested in these conflicts that still remain unseen—even for environmental defenders. Daily violence such as slow violence and violence against nature might not be crude types of violence but are also threatening livelihoods, humans, and nature, even though resistance is only deployed

once the impacts have been felt. Violence goes beyond individual environmental defenders to impact communities as a whole, nature itself and the human–nature interaction. In this article, we have proposed the need for a multidimensional violence approach (encompassing “slow”, structural, cultural, and ecological forms of violence, and not only direct quick episodes of physical violence) as a tool for a wider conceptualization of violence for analysis of environmental conflicts.

CHAPTER III

Paper 2: Invisibles within the invisibles:

Aftermaths of a toxic pesticide among women and male banana plantation workers in Nicaragua

This paper has been resubmitted to the *Journal of Peasant Studies*

“You told us you were making medicine for the field. You were making poisons to kill insects, but you killed us instead. I would like to ask, was there ever much difference, to you?”

In *Animal's People* by Indra Sinha (2007:306)



Demonstration in front of the US embassy in Managua: 'Killed by nemagón'. Source: Movimiento Nacional de Afectados por el Nemagón.

**Invisibles within the invisibles:
Aftermaths of a toxic pesticide among women and male banana plantation
workers in Nicaragua**

Abstract

Victims of pesticides are often disregarded when demanding political action because of the ‘undone science’ – poor evidence or lack thereof. Studies have analysed how people organise to rectify the ‘undone science’, but less is known about how the done/undone science permeates local organisations to direct their strategies when some are acknowledged as victims while others don’t. Using the case of banana plantation workers’ struggle in Nicaragua, I analyse how what counts as ‘evidence’ shapes the struggle and how, in the process, the women’s lived experience of harm was rendered invisible. The undone science, however, was not the only reason to dismiss the women, but their marginalised position within the organisation too.

Keywords: farmworkers, feminist studies, pesticides, DBCP, Nicaragua.

1. Introduction

Pesticide⁹ use in agricultural production is a major public health concern (Bertomeu-Sánchez 2019; Shattuck 2021). This problem is prevalent in the global south, where hazardous pesticides—frequently banned in the US and Europe—are entirely unregulated or subject to weak regulations (Galt 2014; Schreinemachers and Tipraqsa 2012). Precarious working conditions, lack of pesticide application training, and poor medical assistance make agricultural workers—and women in particular—vulnerable to pesticide’s unwanted effects (Jacobs and Dinham 2002; Jayaraj et al.,1997).

Faced with this scenario, social and environmental conflicts are triggered. Farmworkers and surrounding communities often organise and mobilise against the unequal burden of agricultural production and to protect their bodies and environments from pesticides (Arancibia and Motta 2018; Barraza et al.,2013; Berger and Ortega 2010; Bohme 2015; Harrison 2008; Monge 2018; Mora 2013; Shaw 2010).

However, pesticides are complex, and this complexity combined with their effects on different bodies at different life stages makes the scope of their effects difficult to track (Guthman and Mansfield 2013; Nash 2004). Pesticides can surpass temporal and geographical scales, be inherited through human bodies, and slowly accumulate in other organisms (Agard-Jones 2013; Johansen 2002; Narain 2007). Furthermore, pesticides can travel through the soil, water and air, affecting communities living some distance away from the pesticides’ target location (Harrison 2008; 2011).

Given this complexity and uncertainty, one main challenge in social struggles regarding pesticide contamination is the problem of ‘undone science’: deficient or nonproduction of knowledge but identified by civil society as worthy of more research to advance their goals (Frickel et al., 2009; Hess 2007). Victims of pesticides are frequently disregarded when demanding political action because of poor evidence to prove causalities of pesticide’s toxicity

⁹ Pesticides are substances to control insects, nematodes, unwanted plants and other pests that inhibit crop growth. Here I refer to “synthetic pesticides” which are pesticides containing manufactured chemical compounds

and their health consequences (Arancibia and Motta 2018; Jouzel and Prete 2014; Monge 2018).

While many studies have analysed how people organise to rectify the ‘undone science’ to understand their environmental hazards better and act in their interests (Allen 2005; Arancibia and Motta 2018; Brown 1992, 2007; Conde 2014; Wylie et al., 2017), little is known about how the done/undone science permeates local organisations to direct their strategies in a context in which some bodies are acknowledged as victims by the so called ‘scientific evidence’ while others don’t.

Using as an example the struggle of banana plantation workers to demand redress for ailments caused by the pesticide Dibromochloropropane (DBCP) in the province of Chinandega, Nicaragua, I analyse how what it counts as ‘evidence’—male infertility in this case—shapes the workers’ struggle to demand redress and how, in the process, the women’s lived experience of harm was progressively rendered invisible.

However, what it remains known/unknown was not the only reason to dismiss the women as victims of DBCP. I join the feminist discussions on the gendered power relations within rural and unionised social organisations (Agarwal 2001; Campbell 1996; Deere 1995; Frank 2005; Tsikata 2016) to analyse how the Nicaraguan women’s marginalised position in the decision-making process within the local organisation is another factor in dismissing their voice, interests and needs.

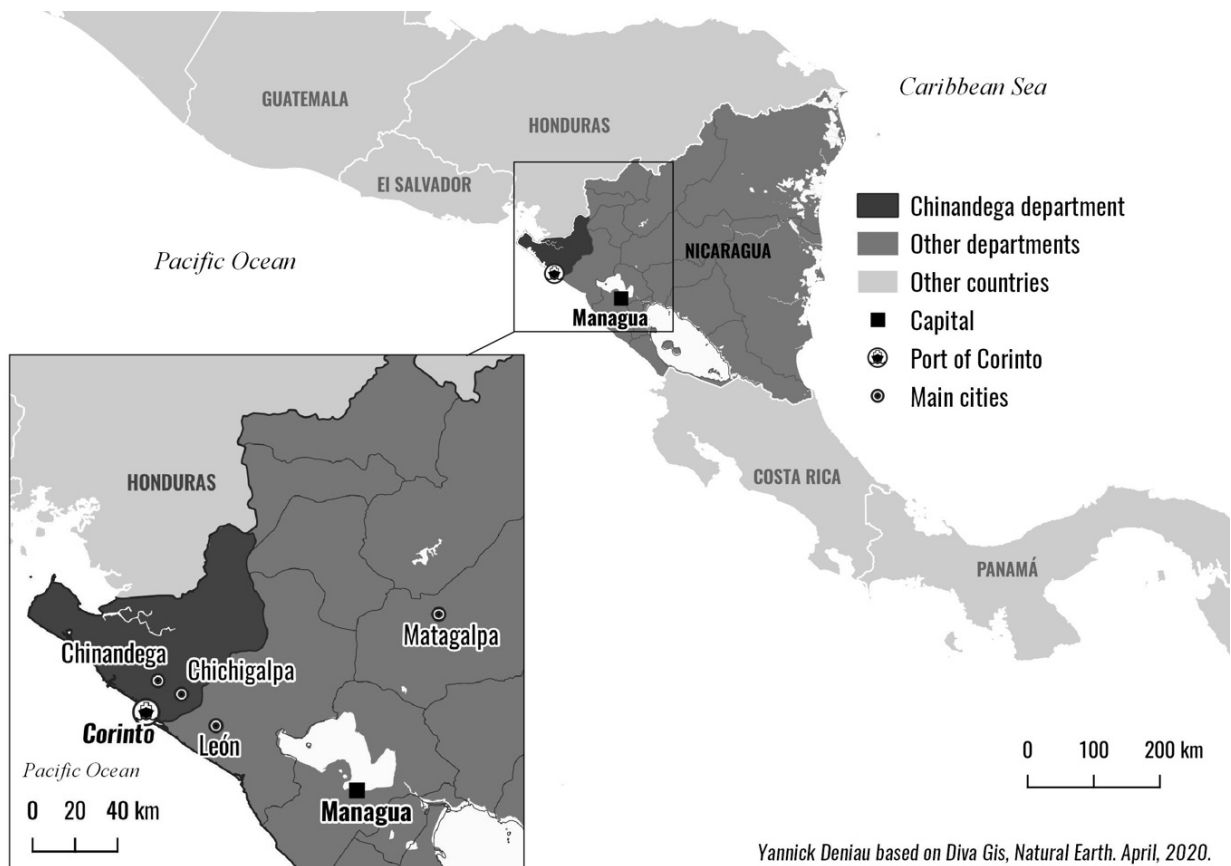
As follows, I present the background of the case study. Section 3 presents the conceptual framework engaging with the politics of knowledge production (and non-production) and feminist studies, pointing out the gendered bias of epidemiological studies regarding pesticides’ risks and the uneven power relations within local organisations. Section 4 presents the methodology. Section 5 discusses the main results, and Section 6 concludes.

2. Background

2.1 Banana production and working conditions

Banana production in Nicaragua started on the Caribbean coast with the United Fruit Company's arrival (UFCo) in 1899. Because of economic losses provoked by the Panama Disease, UFCo stopped production in 1911. Its exit led to general unemployment and internal migration from the Atlantic to the Pacific Coast, where cotton remained a key economic sector and an important labour source (Enríquez 1991; Gould 1990).

In 1962, the cotton price drop caused president Luis Anastacio Somoza to sign an agreement to reopen the banana sector (Biderman 1983). The National Institute of Promotion (INFONAC) financed new plantations, giving credit to private landowners contracted by the Standard Fruit Company (later Dole Fruit Co.) for supervision and marketing. In total, twelve banana plantations were set up by the government, and bananas started to be produced and shipped to California from Puerto Corinto [Figure 3. 1]



Yannick Deniau based on Diva Gis, Natural Earth. April, 2020.

Figure 3.1. Region of study: main geographical features

Unlike other Central American countries (i.e., Honduras, Costa Rica or Guatemala), Nicaragua was not a banana-based economy. Banana production remained minor compared with cotton, sugar, beef or coffee (Biderman 1983; Enríquez 1991). By the mid-1960s, 20% of people in Chinandega worked in the sector, from which 80% of jobs were permanent (Gould 1990).

As other banana plantations in the region, production chain in Nicaragua was based on intensive land use and sex division of work (Soluri 2005): Men in the fields, preparing and applying pesticides, planting, harvesting and transporting bananas to the packing area. There, women receiving the banana bunches, rinsing off residues, sorting them by quality, and packing the best ones for exportation. However, as argued by Melina¹⁰, a former worker, the women did enter the fields sometimes to remove the flower petals at the end of the bunch during the blossom season, and for all jobs during the Contra-War from 1979 to 1989¹¹, an internal conflict

¹⁰ All real names have been labelled with pseudonyms to protect confidentiality.

¹¹ The war lasted from 1979 with the overthrow of Somoza until 1989 with the Tela Accord.

between the “Contras”, a US-funded rebel group, against the left-wing revolutionary Sandinista government. During that epoch, men left the fields to join the war. As Melina states: “the women took the jobs of men in the fields” (I2) having mixed and applied pesticides in the fields during that epoch.

Rosa, another former worker, mentioned that the work in the banana plantations was very demanding for women. After working hours, women had to stay overtime to clean the packing area before leaving: “Everything had to remain perfectly clean”. She continues, “Labouring journeys could reach up to 17 hours. In my case, my mother used to take care of my children. Despite these conditions, we were willing to do everything to keep that job. And look at me, I am very sick now” (I3).

While she talks, she stands up, lifts her shirts and shows me the scars of the many surgeries she has had in the past years, including several tumour removals and gallbladder surgery. Her body talked for her in the interview. As Deborah Swistun reminds us (Swistun 2018), through illnesses, scars, chemical blood levels and other biomarkers, bodies epitomise the landscapes they inhabit. For Swistun, bodies represent historical exploitation dynamics based on the extraction, processing and disposal of materials. Rosa’s scars testified to a pesticide-based plantation that destroyed and poisoned landscapes and bodies to feed the US and European markets with tropical bananas.

2.2 The toxic legacy of DBCP

1,2-dibromo-3-chloropropane (DBCP’s full chemical name) was an organochlorine pesticide, known for its high toxicity, slow degradation in the environment and bioaccumulation (Babich et al., 1981; Jayaraj et al., 2016). Its volatility (capacity to transform from liquid to gas) and lipophilicity (capacity to accumulate in fatty tissues) render DBCP a high-risk pesticide, affecting organisms beyond those it is meant to target: microscopic nematodes attacking the banana plant roots.

Dow Chemical and Shell Oil Company manufactured DBCP in the 1950s. Despite a published report proving its toxicity, even at low levels, a probable carcinogenic and outlining

consequences in sperm atrophy (Torkelson 1961), its registration was granted and approved by the Environmental Protection Agency (EPA) without warning in 1964 (Lowry and Frank 1999; Thrupp 1991).

During the following years, DBCP started to be promoted and sold as an effective soil fumigator. It was used in vineyards in California and pineapple plantations in Hawaii and exported to at least 12 countries to be used as a nematicide on banana plantations in Latin America, several African countries, and the Philippines (Slutsky et al., 1999).

The first major episode of DBCP-induced human ailments occurred in California. In 1977, industrial workers from The Occidental Chemical Company in Lathrop started sharing with one another their inability to father children (Weir and Shapiro 1981). The same year, an epidemiological study was carried out, including 39 employees (36 men and three women). The results concluded that workers exposed to DBCP were suffering from deficient sperm (oligospermia) or absent sperm (azoospermia), leading to different levels of infertility (Whorton et al., 1977).

The striking findings associating DBCP with male infertility marked the onset of various legal actions demanding redress in the US courts and elsewhere in the upcoming years around the world¹² (Siegel and Siegel 1999). Nevertheless, because no more abnormalities were found, possible effects on women were excluded. Years later, researchers called attention to the issue, alleging that because too few women were employed in jobs with DBCP, it was almost impossible to conduct an evaluation. More research was needed to understand DBCP's effects on women's bodies (Teitelbaum 1999; Whorton and Foliart 1983).

In the late 1970s, workers in California sued producer companies, alleging that DBCP continued to be manufactured despite knowledge of its detrimental effects on human health, previously alerted by Torkelson (1961). Workers won settlements ranging from \$500,000 to \$4 million per person (Rosenthal 2004). Additionally, when identifying DBCP's contaminated

¹² Cases in the EJAtlas have been reported in Ecuador, The Philippines, Honduras, Ivory Coast, and Panamá.

water wells, companies responded by paying for water treatments for at least the upcoming forty years (*ídem*).

As a result of these lawsuits, in 1979, the EPA banned DBCP for domestic USA use. However, due partially to economic pressure from pineapple plantations, it continued to be used in Hawaii under strict protection measures until 1986. Conversely, on the banana plantations abroad, the pesticide continued to be shipped and used with neither restrictions nor warnings (Bohme 2015; Lowry and Frank, 1999; Thrupp 1991). As described by Rosenthal: “even after the product was banned, Standard Fruit Co. (now Dole), which owned many of the Central American banana plantations, threatened a breach of contract action against Dow Chemical if they failed to deliver the product as per their contract” (Rosenthal 2004: 181). These practices pose ethical questions well-described by Lowry and Frank (1999), illuminating the uneven environmental contamination and relocation of toxicities to racialised and expendable territories and bodies; not uncommon in the recent history of agrarian capitalism (Brisbois et al., 2019; Ferdinand 2015; Galt 2009, 2014; Polanco and Beilin 2019; Lowry and Frank, 1999; Weir and Shapiro 1981). Today, DBCP is globally banned from use, but ailments caused by it remain present in the environment, bodies, and memories of thousands of farmworkers worldwide (Bingham and Monforton, 2013; Boix 2008; Rogers 2004), including those women and men whom I interviewed in Nicaragua.

2.3 The creation of a workers’ movement

DBCP was applied in the banana fields every four to six months. It was used through the irrigation method, in which it was mixed with the irrigation water pump and sprayed through the air. As Carlos, a former irrigator describes: “because of its volatility, DBCP was applied at night. But the morning after, it was still dripping from the banana leaves to the workers’ bodies” (I4). Workers were also exposed through ingestion and inhalation. They often ate bananas when hungry in the field or drank contaminated water when thirsty. As Melina (I2) describes: “The irrigation water leaked into our drinking water. Because of the flavour, it was obvious that the water was contaminated with DBCP. But what could we do? We were thirsty!”.

Because of the gendered division of work, for women, in particular, inhalation was a common form of exposure. As Ana remembers, “There was a horrible odour in the packing area. It was hard to breathe, but then, I became familiar with it.” Besides different forms of exposure and immediate noxious effects such as headaches, dizziness, vomiting and similar symptoms of acute poisoning reported by workers, protection equipment, masks or gloves, was never provided, to say nothing of information about DBCP’s possible health consequences. As Melina said: “They never told us anything. We never imagined that this poison would take us to the grave” (I2).

But exposure to DBCP was not restricted to workers only. As Julia (I5), a former worker, explained to me, women were exposed to it while washing their husband’s DBCP-soaked clothes, or while bringing their husband’s lunch and coffee to the fields when the chemical was still vaporizing in the environment. Furthermore, workers and their families used to live on the plantations. María, for instance, comments: “I grew up with that poison! My mother was the cook of the company, and we lived inside the plantations. Older, I worked in the packing area, and I inhaled it there too” (I6). Marcelo, another former worker, feels guilty about having brought his family to live with him on the plantation. He thinks that his younger daughter, who died of breast cancer at 23 years old, was a victim of that decision.

In Nicaragua, the pesticide started to be imported in 1973 (Gómez 2013). But only by the 1980s did the workers and their families start to notice unusual rates of infertility, miscarriages, cancer, disabilities in new-borns, skin and ocular diseases. Knowledge about the link between DBCP and male infertility came from Costa Rica, where plantation workers, suffering similar effects, knew about the episode in California (Bohme 2015). In 1992, 1200 Nicaraguan workers organised under ASOTRAEXDAN (Association of Workers and Ex-Workers injured by ‘Nemagón’ and ‘Fumazone’)—the two main DBCP’s marketing brands. ASOTRAEXDAN started with three demands: 1) health assistance, 2) a monthly life pension for workers unable to work due to illnesses, and 3) as in California, monetary compensation for health ailments caused (Boix, 2008). The two first demands failed, and claiming monetary compensations became entangled in a long process of judicial conflicts in which many cases have been dismissed as—according to the accused companies—products of ‘fraud’ or irregular procedures (Bohme 2015; Boix and Bohme 2012).

Additionally, because of the lack of legal instruments, another of ASOTRAEXDAN's aims was to push for the adoption of Law 364 [Ley especial para la tramitación de juicios promovidos por las personas afectadas por el uso de pesticidas fabricados a base de DBCP] , a special Law for banana workers victimized by the use of DBCP-based pesticides, which would enable workers to sue DBCP producer and user companies in Nicaragua (Bohme, 2015). Besides judicial strategies, workers also deployed a strong social struggle, in which women played a predominant role (Meléndez 2006). During the 2000s, protests, long marches of around 130 km from Chinandega to Managua, a long-lasting blockade in front of the National Assembly—today named 'Ciudad del Nemaagón' [City of Nemaagón], a hunger strike in which 13 people participated, symbolic iconography and performances, and other cultural expressions such as songs and poetry were organized to render their struggle visible in the national and international arenas (Bohme 2015; Guevara 2008; Meléndez 2006). By that time, ASOTRAEXDAN was one of the most important organizations in the country, revealing the toxic and inhuman side of banana production, accounting for around 6500 members involving workers, ex-workers, and relatives, all of them alleged to be affected by DBCP (Meléndez 2006)



Figure 3.2 Demonstration in front of the US embassy in Managua: ‘Killed by nemagón’. Source: Movimiento Nacional de Afectador por el Nemagón.

The struggle over DBCP is one of the most severe occupational health crises in Nicaragua and other countries where the pesticide was used. Worldwide, approximately 75,000 men have been affected by infertility (Rogers 2004). In Nicaragua, including women and new-borns with congenital disabilities, the number goes up by 22,000 (Boix, 2008). However, despite numerous health impairments reported, litigations have included only male infertility as harm to demand redress (Bohme 2015; Boix and Bohme 2012; Gómez 2013). In light of this, how can the categorization of victims affected by a widely used pesticide be reduced to a single ailment (infertility) in a particular body (male bodies)? And more importantly, how does this reduction of victimhood shape social organising to respond collectively? As follows, I explore key theoretical insights to tackle these questions.

3. Conceptual framework

3.1 The challenge of undone science in environmental health justice struggles

‘Undone science’ confronts the problem of ignorance and questions what it remains unknown and why (Hess 2007; Frickel and Edwards 2014). Precisely, it refers to “areas of research that are left unfunded, incomplete, or generally ignored but that social movements or civil society organizations often identify as worthy of more research” (Frickel et al., 2009:2). For instance, epidemiological studies that could have been produced to better understand the scope of affectedness of DBCP in female workers’ bodies.

As feminist contributions to the field of Science and Technology Studies (STS) have largely pointed out, there has been a systematic inattention to women’s problems (and gender more broadly) in almost every aspect of science, its politics and the knowledge it produces (Bauchspies and Bellacasa, 2009). For instance, scholarship vis-à-vis chemical exposures has mostly concentrated on the uneven distribution of environmental hazards across class and race without bringing into focus that chemical exposures and environmental hazards are also

gendered (Murphy 2006). Epidemiological studies regarding pesticide exposures and health outcomes are not exceptions to this historical pattern (García, 2003; Jacobs and Dinham, 2002; London et al., 2002).

As García points out, despite sex-related biological differences and their distinct sensitivity to the effects of pesticides—such as lipophilic storage given the higher levels of fatty tissues in women—research on pesticide-related health effects have been historically focused on industrialized countries and men (García, 2003). In her study she focuses on how this lack of knowledge leads to underestimating the effects of pesticide on women.

Furthermore, the fact that women often occupy a marginal position in the agricultural economy and that production is organised in a gender-specific way, makes women more susceptible to exposures as they have fewer chances to control the environments and factors that affect their health (Jacobs and Dinham 2002). As noted by London et al., (2002), the fact that occupational health research targets principally male farmers, is due to the common belief that men working in the fields are supposedly the most exposed and, therefore, the most at risk (London et al., 2002). This gendered bias in research results in an underreported global number of pesticide-related injuries to women in the global south, which remains “out of sight, out of mind”.

Pushing for the ‘undone science’ to be done, women often organise to make their stories and sufferings visible. For instance, Florencia Arancibia’s and Renata Motta’s work analyses how the group of ‘Madres de Ituizangó’ [Mothers of Ituizangó] in Argentina deployed different types of counter-expertise (such as using cartography tools) to raise awareness about glyphosate contamination that women believed was the cause of their illness and their children’s. Although in the beginning, they were ignored and slandered as a ‘bunch of crazy women’ (Arancibia and Motta 2018:12), they mobilised medical and legal scientists to support their hypotheses. However, while their efforts successfully resulted in glyphosate use restrictions in their communities, Arancibia and Motta call attention to the fact that remedying the undone science is often not enough to foster structural change. The Argentinean agricultural model remains highly pesticide-intensive, and regulations fail to account for ailments caused by the long-term exposures experienced by the local communities (Arancibia and Motta 2018; Ávila-Vazquez and Difilippo 2016).

3.2 Uneven power relations within political organisations

Women have long been at the forefront of social and environmental struggles (Mbilinyi 2016; Morgan 2017; Sze 2004; Unger 2008; Veuthey and Gerber 2010). However, their historical engagement is not often translated into leadership positions within the organisations that they support (Bolados and Sánchez, 2017; Campbell, 1996). Stereotypically gendered roles are often replicated within the organisations, pushing women to assume tasks and to ‘sustain’ the movement without effectively including them as political agents (Campbell 1996; Yulia 2010).

For instance, Campbell’s research draws attention to how the rubber tapper trade union’s struggle to prevent deforestation in the Brazilian Amazon pushed women into traditional roles such as providing food during political interventions or taking care of the children without including them in the decision making (Campbell 1996). In the same vein, Agarwal’s analysis shows the problem of ‘gendered participatory exclusions’ in community forestry groups in India and Nepal (Agarwal 2001). The analysis concludes that while women assist in meetings and participate in akin social processes, they are often voiceless, having their abilities and opinions disregarded.

As feminist political ecologists have long pointed out, it is crucial to reclaim the role that women play in political life to gain access and control of natural resources and in environmental justice struggles (Elmhirst 2011; Jenkins 2017; Rocheleau et al., 1996). In the Latin American context, characterized by a deeply unequal and patriarchal society, this debate is especially relevant since women face multiple forms of uneven power dynamics, including gender-based violence on different scales when engaging in defence of life, nature and healthy futures (Navarro 2020; Machado 2018; Silva Santisteban 2017; Tran et al., 2020; Zaragocin and Caretta 2020).

In addressing the background of pesticide contamination in Costa Rica, Sindy Mora (Mora, 2017) reflects on the community struggles from a feminist perspective. She suggests that the organisations’ internal dynamics puts aside women’s environmental suffering. Conversely, Gloriana Martínez draws on organised women’s experiences in facing pesticide-contaminated

waters and their achievements in casting their daily experiences of contamination as a social mobiliser to gain visibility and garner political responses (Martínez 2019). In joining these discussions, I examine how women participate within ASOTRAEXDAN, their role and the gendered power dynamics they face in trying to place their embodied experience of DBCP's related illnesses within the political agenda.

4. Methods

I base my analysis on three months of qualitative research (one month in 2017 and two months in 2018), during which time I lived in a rented room in Chinandega. My first key informants were the leader of the movement and his six colleagues from the local organization's board of directors [Junta Directiva]—all of them men. I shared with the leader my particular interest in listening to women who had worked on the banana plantations during the years when DBCP was used. He put me in contact with two ex-worker women, active members of the organization, and from there, I could reach more female interlocutors.

As a participant observer, I attended the monthly assemblies of victims of DBCP [Asambleas de víctimas del nemagón]. The assemblies were crucial to observing the gender composition of the movement and the power relations among the leader and the rest of the members. However, I also had many informal conversations with many workers during the assemblies. I ended up conducting 18 in-depth interviews (nine men and nine women) lasting from one to two hours each. My interest was not to interview only active members but also those who left the organization.

I framed my interviews in three parts, the first part focusing on their working experience on the banana plantations (I asked questions about work routines: activities, hazards, exposure to pesticides, protection gear). Second, I addressed their health and how it changed during or after working on the banana plantations, asking about intergenerational effects on their children when this was the case. Third, I addressed their role in the organization, the internal dynamics, and the movement's successes and failures. The women, in particular, I asked about the gendered dynamics within the organisation.

Although my interlocutors do not represent the experience of all women in the movement, they offer key insights about their feeling of being voiceless, self-identifying as victims of DBCP without being recognised as such. Some women who quit the organisation were more open to talking about this particular issue.

Besides fieldwork, I conducted extensive archival research in Spanish and English, including published papers and books, a review of toxicology records of DBCP, newspaper coverage about DBCP in Central America, documents from NGOs and legal documents. Bohme's work (Bohme, 2015) was fundamental to understanding the very complex legal history of this case. I reviewed the local organisation's material: documents and photos of the different collective actions since the beginning of the movement. Included were photos of the visible health harms in the workers' bodies and effects on their children's, as well as legal documents, information about DBCP and other pesticides used on the banana plantations. I was fortunate also to have access to twenty videos (5 to 10 minutes each) recorded by the organisation in 2016 and 2017 to gather testimonies of workers and relatives (including widows and daughters) and create awareness about their suffering.

Back in Managua, the capital of Nicaragua, I had three more interviews with different NGO representatives who closely supported the victims of DBCP in the past. They gave insightful information about the workers' organization, the role of leaders and lawyers. I then transcribed all this material, translated it to English, and coded interviews into a matrix. All quotations are from my interviews or video transcriptions. The material provided by the local organisation (photos and videos) was consented to be used for this research.

5. The role of scientific evidence in shaping responses to claim redress for DBCP-health-related aftermaths

Different pesticides, quantities, forms and length of exposure have different outcomes in different environments and bodies at different life stages (Agard-Jones, 2013; Barbour and Guthman, 2018; Guthman and Mansfield, 2013; Nash, 2004; Romero et al., 2017). Despite this radical uncertainty, research on pesticide exposures and health outcomes has fallen short in fostering and enhancing research on women, who are often more vulnerable because of

biological characteristics and socially constructed roles (García, 2003; London et al, 2002). For instance, worker women in Nicaragua were exposed as workers, as wives, as mothers. Besides inhaling it in their working environment, they inhaled it while bringing lunch to their husbands in the fields during the time in which DBCP was still vaporising in the environment or while washing their husband's clothes.

However, knowledge production requires power and resources which are often distributed unevenly (Frickel and Edwards 2014). Therefore, based on the scientific evidence gathered abroad (in California), Nicaraguan workers and their lawyers initiated the judicial process to claim redress based on male infertility as the principal harm. This is critical because, as Linda Nash explains (Nash 2004), the same pesticide can have different results when exposure occurs under different conditions (i.e., quantities, forms and length of exposure) and environmental variables (i.e., humidity, rainfall, wind velocity).

For instance, while in California industrial workers were exposed to an indoor chemical plant; in Nicaragua, DBCP was spread out in an open area, which according to workers, often resulted in pesticide drifting beyond its target application area: “the poison could travel up to 20 km around” said Carlos (I4). Furthermore, while the pesticide was injected into the soil in the Californian vineyards, it was spread out through the irrigation method (a cheaper and faster method) in Nicaragua. Additionally, while in California, too few women were employed in jobs with DBCP exposure, on the banana plantations almost one-third of the labour force were women. These considerable differences would have certainly required a context-based scientific study, but it was never carried out. The problem of DBCP in Nicaragua is a problem of ‘undone science’ but it also gives key insights about the distributional aspects of what it is known and unknown. When the pesticide was banned in the USA it continued to be used abroad, without alerting about its effects.

As noted by Frickel and Edwards (2014:229) “knowledge and ignorance are coproduced”. Of course, evidence linking male-infertility to DBCP in California was very valuable for Nicaraguans. It allowed workers to organise, mobilise, to sue and seek redress - not very successfully. This was a health condition that otherwise could have remained unnoticed in the public arena. It is key to note, though, that in this case, the evidence played a twofold role:

while it rendered infertile males visible as victims, it rendered the other possible ailments invisible.

However, contrary to studies testifying about local communities' positive outcomes engaging with scientists for knowledge production in environmental health justice struggles (Allen 2005; Arancibia and Motta 2018; Conde 2014), victims of Nemagón did not engage with scientists or deployed community-based research activities such as popular epidemiology (Brown 1992) or worker's epidemiology (Barca 2014), intending to include new ailments beyond male infertility.

Because of the multiple embodied and empirically lived ailments of women exposed to DBCP—miscarriages, carcinogenic tumours, multiple surgeries, bone pains, strong migraines, and bone pains—women found their ailments worthy of more research. For them, the results would help to challenge DBCP producer and user companies differently in the judicial arena to advance their goals. Although unsuccessfully, women in Nicaragua did organise to push for the 'undone science' to be conducted. As Julia describes: "We struggled a lot to be medically checked. We asked for medical studies in Managua and asked the government to help us in identifying DBCP-linked effects. But only men were tested. They argued that only men were directly exposed in the fields" (I5).

As noted in the quote above, the fact that women did not attain medical check-ups was because of underestimating their risk: "only men were directly exposed in the fields" while women weren't. Julia's words resonate with global challenges faced by many other women working in agriculture in the global south, whose work, and therefore their health risks, are often overlooked (Jacobs and Dinham, 2002; London et al., 2002). Why was inhaling DBCP not considered direct exposure or at least considered suitable for further research?

Based on the interviews, I noticed that for workers, there is a shared—although simplistic—understanding that 'direct exposure' refers to skin contact in the fields (frequently affecting men) and 'indirect' refers to inhalation or skin contact in the packing area or even ingestion of contaminated water. Melina, for instance, inhaled DBCP for 30 years, but when she refereed

to herself as a victim, she mentioned that she was directly exposed in the fields, when “women took the jobs of men.” (I2)

This categorisation of direct/indirect exposure is motivated in part by the sex division of labour. Still, as a result, it undermines women’s health risks in the packing area (and beyond it). In her words, the ‘indirect exposure’ was used as a government’s attempt to deny women’s right to be medically checked and to better understand the causes of their illnesses and their daughters’ and sons’ ailments. María expresses her doubt about the cause-effect of her daughter’s strong migraines and concerns about DBCP’s transgenerational effects:

“I am very sick. I suffer from strong migraines, I often go to the doctor, but they only give me *dolo-neurobión* [a pill]. My daughter suffers from it too. But how come? She never worked in the bananeras. I think I passed the poison to her through breastfeeding. The doctor told us that this is probably because of *nemagón*, but who knows?” (I6).

Like other organochlorine pesticides, DBCP is a probable carcinogen, an endocrine disruptor, and a probable cause of genetic mutations (Babich et al., 1981; Colborn et al., 2007). Studies in laboratories using female rats have shown that DBCP exposure can cause mammary tumours and effects on the female reproductive system (reduction of fertility and ovarian failure) (Teitelbaum, 1999). However, as noted since the beginning of the 1980s, more studies were needed to understand its effects on women (Teitelbaum, 1999; Wesseling et al., 1996; Whorton and Foliart, 1983).

To establish causalities is, however, not an easy task in this case. Throughout their lives, women in Nicaragua have been exposed to other pesticides. In Nash’s words, they have a long ‘exposure history’ (Nash:2004:2010), making it hard to identify if DBCP is the cause of their illnesses or not, as concluded in a study carried out in Costa Rica (Wesseling et al., 1996). As said by María, when working on the cotton plantations, DDT (dicloro difenil tricloroetano) was aerially sprayed, sometimes with the workers inside the fields. Also, in the bananeras, other well-known toxic pesticides such as mancozeb, paraquat, gramoxone or glyphosate have been used. However, despite their ‘exposure history,’ women in Nicaragua came to identify DBCP’s

related ailments due to their embodied experience of harm. For women, there is a distinct ‘before and after’ regarding their work in the bananeras.

As Melina (I2) says, even though she inhaled DDT when harvesting cotton, she was healthy. Her health condition started to deteriorate only when she started working on the banana plantations. “I even had healthy children before. But then, I had five miscarriages and many surgeries for uterine tumour removal. Then I became infertile.” Because of frequent bone pains and strong migraines, she cannot work anymore in agriculture. To survive, she makes and sells tortillas from home.

As Narain (2007) refers to endosulfan’s in Kerala, India, workers in Nicaragua have referred to DBCP as a ‘silent murder’ [asesino silencioso]. Compared to other pesticides, DBCP murders silently and slowly. As Mateo explains: “other pesticides, for instance, lannante , kill instantaneously. But nemagón kills little by little” (I7). It is a form of ‘slow violence’ in which people are often being poisoned and sickened without even realizing it. When they realise, it is often too late, and by then ailments are irreversible and irreparable (Narain 2007; Nixon, 2011). However, slow violence is not completely invisible (Davies, 2019). Those who experienced it can smell it and feel its daily consequences. As Juana remembers remembers the immediate toxic effects of DBCP:

“There was an unpleasant odour. I used to have strong headaches when breathing it [...] I have been suffering from sight problems and bone pains since many years ago. When I was younger, I had one miscarriage. I could have children, but one son was born with congenital disabilities. Many women in this community had children with many problems because of that poison”. (I9)

Like Melina and Paula (I10), Rosa also harvested cotton. She was exposed to a number of different pesticides, but she is convinced that her health condition results from the multiple exposures to DBCP while working in the bananeras. “I know that this is because of the bananeras because I was healthy when I started working there, but then I progressively became very ill” (I3). Whether DBCP is the cause of their harm, they will probably never know. Embodied knowledge has been crucial in environmental health justice struggles (Altman et al.,

2008; Brown et al., 2004; Iengo and Armiero, 2017) but it remains partial and rarely considered a source of evidence if used alone (Shattuck, 2019).

Today, exposure to DBCP through the ingestion of contaminated water or its intergenerational impacts remains a problem of undone science. In 2009, a study of pesticide residue in water wells in Chinandega found DBCP in 100% of the studied zones, proving its movement from the target zones where DBCP was used to the control zones where it was not (Montenegro and Jiménez 2009). Faced with this uncertainty, people react with resignation. As Ana told me: “Nemagón remains in the environment for more than 100 years. And here in the community, we drink water from the wells, and who knows? It might be contaminated. But what can we do? Nothing, because we are poor” (I8).

During my stay in Chinandega, I had informal conversations with many people while using public transportation or visiting the farmer’s market. All of them shared a sense of living amid a ‘poisonous environment’ —not only because of DBCP but also because of other agricultural sectors such as cotton in the past, or currently, sugar cane and peanut plantations, or shrimp production. According to them, all these economic activities, using pesticides, sooner or later will make them ill. “Everything is contaminated here, the water, the soil, the cows”, a resident told me.

6. The role of power relations among women and men farmworkers within the local organisation

Although women were an important social force in the multiple social mobilizations during the 1990s and 2000s, they did not attain key positions within ASOTRAEXDAN. Since its founding, two men have headed the organisation. From 1992 to 2016, a Sandinista revolutionary unionist became the national and international public figure. In Rosa’s words, “He was a very charismatic person, and we feel very comfortable with him, he wanted us to be represented in courts and also be acknowledged as victims of DBCP, but with the time everything changed, we did not receive anything” (I3).

Because of internal conflicts and corruption accusations, the leader quit in 2016, and the vice-president took control and remains in power today. However, after thirty years, ASOTRAEXDAN—name changed to the National Movement of workers affected by Nemagón and Fumazone (MNAN)—remains a hierarchical and male-biased organisation. The ‘board of directors’ follows up on judicial actions and extra-judicial negotiations with the companies’ representatives. The board is composed of seven men and one woman, the secretary.

Economically, the organisation is sustained by a monthly fee (60 córdobas, around \$1.60) paid by each member. According to the leader, the money collected is used for administrative matters, to pay the office's rent in Chinandega, and other administrative expenses. Currently, there are 580 members in MNAN. Their numbers have dwindled from their original count of 6500. Many have left; others have died.

During the 2000s, internal conflicts led to creating parallel organizations, with each group implementing their strategies and separately negotiating with the companies’ representatives who have offered extra-judicial arrangements in the past (I11). In 2006, representatives offered \$300 per person as a settlement to withdraw judicial procedures. After being paid, the compromise was that workers agreed not to file an action against the company in the future. In despair and resignation that compensations through judicial procedures would probably never arrive, many signed. But many others—women in particular—alleged that \$300 was “ridiculous [...] \$300 is nothing compared to the harms we have lived [...] not even a lot of millions will repair unrepairable ailments” (Video 1).

The current leader of MNAN is the legal representative of all victims. The workers do not have direct conversations with lawyers or governmental authorities. The leader is the bridge between them. To update others on the progress of the process, the leader meets the workers in the ‘monthly assemblies’. As reported above, during my stay I attended three assemblies in Matagalpa, León, and Chinandega.



Figure 3.3 Assembly of workers in Matagalpa. Photo: Grettel Navas.

In one of the assemblies, I was taking notes when Juanita (I11), an ex-worker, asked, “What do they [referring to the companies’ representatives] say about the women?” The leader answered, “Nothing.” When the assembly finished, I interviewed Juana. Despite how unfailingly she attends every month (and pays the fee), she has received the same answer for the last twenty years: Nothing, meaning that there have not been updates of women’s cases towards compensation.

When I asked the board of directors about the situation of women and if (and how) women will be included in the extrajudicial negotiations, one answered: “Dole Food’s representatives told us that women would not be recognised as victims because there is no evidence. This argument becomes useful to narrow down the number of victims and avoid monetary reparations. They don’t want to pay” (I12). Another board member confirmed, “For the companies’ representatives, if there is no evidence, there is no victim [...] however we are trying to

maintain those women who were awarded money in prior court decisions [referring to the Benavente sentence, see below]

In 2000, Nicaraguan deputies approved Law 364. In Article 2, the law expanded symptoms beyond male infertility including kidney, spleen and liver problems, cancer, and psychological disorders. Article 11 established a table of minimum amounts to be paid by the producer and DBCP user companies. The table stipulates: Absence of sperm: \$ 100,000.00, low sperm count: \$50,000.00, and other diseases: \$ 25,000.00. The first outcome of Law 364 was the Benavente sentence, which ordered 446 plaintiffs to be paid \$489 million for “physical and moral effects” (as quoted in Rankin 2015). For the first time, a verdict included women. Juridically, it recognised DBCP-linked health effects encompassing miscarriages, genetic malformations in children, visual problems, central nervous system problems, impotence and “sexual frigidity,” prostate and uterine cancer, liver, lung, kidney, skin, bone, and muscle problems (Rankin 2015, 299). This was a pyrrhic victory. Right after, the companies refused the verdict and declined to pay, arguing the need to transfer the proceedings to the companies’ home countries. By 2012 most women’s suits were dismissed, and again, litigations included only male infertility.

The fact that male infertility was prioritised in filed lawsuits lead to women’s anger. A public statement by the “Women victims of DBCP”, an ad hoc group created to push for women’s interests such as medical checks, reads: “We are victims of ‘pseudo’ leaders and lawyers who ignored women in file lawsuits in the US” (Statement of women victims of DBCP, Chinandega 2000). However, for the male leaders, the strategy consists of making the companies pay for male-infertility, and then another court case will make the companies pay for the women. How and when this will be accomplished is the most important question. What happened in Nicaragua happened in the analogous struggle in Costa Rica too. As noted by Sindy Mora, “the emphasis on male sterility has left in a second-place the struggle for the recognition and attention of the diseases suffered by women banana workers” (Mora Solano, 2013: 224).

When women realised, they would not be represented in courts, many quit the organization. I noticed in the assemblies that attendants were predominantly male, with three women from eighty attendants in Matagalpa and five women from seventy men in León. A former worker confirmed my observation:

“In the beginning, there were a lot of women in the struggle. Now, they don’t come anymore. They are “hopeless” and don’t trust anymore the leaders. They lost a lot of money, paying the monthly fee without receiving any answer. My wife, for instance, is also a victim. She worked in the banana-packing area, and she is ill, but she doesn’t come anymore. She says that this struggle is a waste of time and money”. (I13)

Melina, a very well-known leader in the community, quit the organization because it was ‘very macho’:

“I was very active in this struggle. I don’t know how to read or write, but I helped mobilise many people. I walked from Chinandega to Managua three times. But the struggle was very macho. Men don’t appreciate women’s work, not even our needs. I had many problems with them [male leaders] and that’s why I quit” (I2).

She continues:

“We, the women, we have sustained the movement. We used to ask for money in the streets. We cooked for everybody during different forms of mobilizations [...] you know that a man would never do that. And I am not saying this because I am a woman, but it’s true! We sustained a blockade in Managua for many years. But in the end, women were valueless. They don’t recognise our work”.

Three more women echoed Melina, emphasizing their role within the organizations as “supporting men leaders” (I2), “preparing food for protestors” (I3) and taking care of children and ill men during the long blockade in Managua, today ‘city of Nemagón’ (I9). Women’s responses resonate with previous scholars analysing how in social organizations, women are often marginalised from the decision making and become part of the social struggle with stereotyped gendered roles (Campbell 1996; Deere 1995).

For instance, for Rocío Silvia-Santisteban, the exploitation of nature for capital accumulation is frame within a broader biopolitical project for the control of nature, life and death and in which contaminated territories and bodies are expendable (Silva Santisteban 2017). Or simply

said by Josefa, in an informal conversation: ‘they produced bananas by killing our people’. However, as Silvia-Santisteban argues, how communities respond to exploitation is also mediated by ingrained patriarchal structures at the most local and intimate scale, for instance, within the organisation struggling for environmental, social and agrarian justice.

7. Concluding discussion

Pesticide contamination is built on the bedrock of increased market production and of social inequality. Worldwide, the most vulnerable populations, the poorest and the most racialised, are often the principal recipients of its toxic effects. When it comes to understanding causalities to demand redress of ailments caused, intersectional inequalities play a key role. Women from banana plantations in Nicaragua experience intersectional barrier related to class and gender, and they come from a rural area in of the poorest countries in Latin America. Their histories are overlooked. Despite their strong support for their leaders sustaining the workers’ organization with reproductive work and showing their strength in street protests and blockades, they faced gendered participatory exclusions (Agarwal 2001). This meant that, despite their significant presence, their marginalised position obstructed them from influencing internal political agendas, failing to find enough support in remedying and completing the ‘undone science’.

Firstly, as the DBCP struggle illustrates, different bodies count differently even when the same pesticide and harm—male infertility—has been demonstrated. Male (white) industrial workers in California received redress. In contrast, male (Central American) farmworkers on the banana plantations became entangled in a slow process of bureaucratic conflicts and judicial divergences in which companies have successfully avoided accountability.

Secondly, knowledge production on pesticides’ risks and harms has been historically produced on male bodies, undermining female bodies whose biological characteristics and gendered social roles put them at greater risk than their male counterparts. This ‘undone science’, of

demonstrable significance with the case of DBCP, results risks to women being overlooked as well as their right to understand and identify the causes of their very real and material harms. Therefore, when the scientific evidence brought to light male infertility as the main effect, the rest of the possible harms were neglected. The social struggle was founded around this single effect by making one damage visible, and the other damages were automatically diminished.

In light of this, gender-sensitive epidemiological studies are very much needed in an increasingly pesticide-based agrarian world, with an increasing role of women in agriculture. Women were deemed to lack 'scientific' evidence of the damage to their bodies. And even then, they would have still faced a second hurdle, the companies' negative to accept their socio-environmental liability. Let us assume they got some money compensation – there would be still a third aspect to their struggle, how can damage to health (of themselves and their children) be really compensated by money?

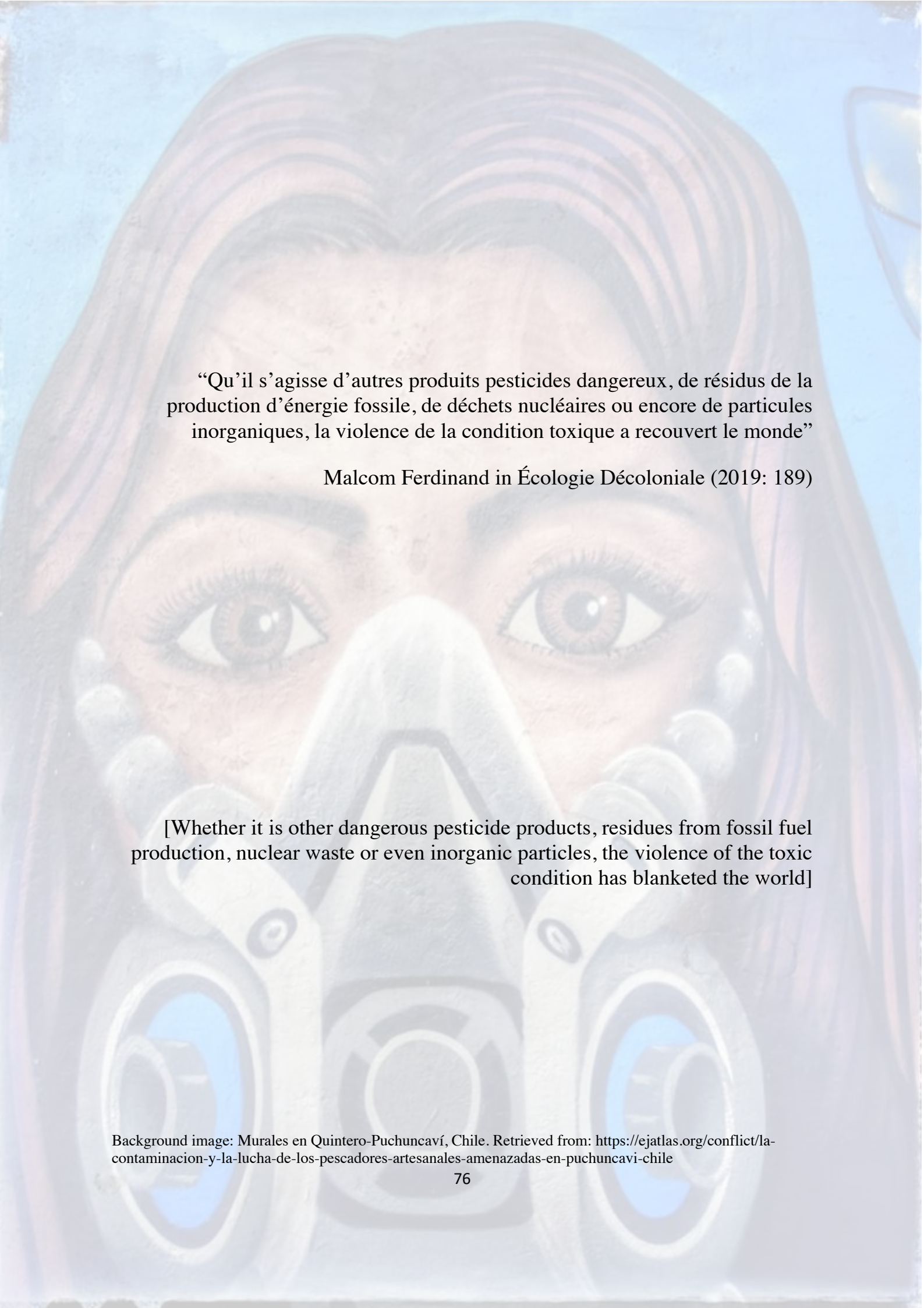
Finally, ingrained gendered relations within the workers' organisation cast women as a very important social force to sustain the movement, in protests, in blockades, and even economically, in paying the monthly fee. However, when they raised their voice to ask for medical check-ups, their needs were not supported. Science, the Nicaraguan government, the banana transnational companies, and the male banana farm workers have a large debt with these women. This paper is but a small contribution to make these women visible, to amplify their unheard subaltern voices.

CHAPTER IV

Paper 3: Mobilisations from below in a Toxic World:

A global analysis of environmental health conflicts

This paper is accepted to be resubmitted in *Global Environmental Change*



“Qu’il s’agisse d’autres produits pesticides dangereux, de résidus de la production d’énergie fossile, de déchets nucléaires ou encore de particules inorganiques, la violence de la condition toxique a recouvert le monde”

Malcom Ferdinand in *Écologie Décoloniale* (2019: 189)

[Whether it is other dangerous pesticide products, residues from fossil fuel production, nuclear waste or even inorganic particles, the violence of the toxic condition has blanketed the world]

Background image: Murales en Quintero-Puchuncaví, Chile. Retrieved from: <https://ejatlas.org/conflict/la-contaminacion-y-la-lucha-de-los-pescadores-artesanales-amenazadas-en-puchuncavi-chile>

Mobilisations from below in a toxic world: a global analysis of environmental health conflicts

Abstract

Bringing debates about temporal and spatial scales of toxic pollution, the role of working-class communities, and the human body's role as a site of social and environmental struggle this paper contributes to the study of environmental conflicts opening a research agenda on 'environmental health conflicts'. By using a large dataset derived from the global EJAtlas, we compare environmental conflicts reporting human health impacts linked to toxic pollution (n=1157) with those environmental conflicts that do not report those impacts (n=1876). We show that when human health is affected by toxic pollution, economic activities and commodities have more urban and industrial links. However, the use of pesticides in rural settings are also significant. Furthermore, working-class communities are key groups mobilising testifying to a pattern of 'working-class environmentalism'. Last, the time lag between the release of contaminants in the environment and their delayed and cumulative health impacts results in reactive rather than preventive mobilisation making environmental justice harder to achieve.

Keywords: Toxic pollution; environmental health conflicts; environmental justice; slow violence; working-class environmentalism; EJAtlas.

1. Introduction

Toxic pollution is a major and global health threat, but it does not affect all equally (Landrigan et al. 2018; Boudia and Jas 2019). The most vulnerable, marginalized, and racialized communities are the most affected worldwide (Brulle and Pellow 2006; Taylor 2014; Mah and Wang 2019; Brown 2007). Often, communities collectively organise in response and protest their toxic condition through mobilisations against the establishment of socially and ecologically damaging facilities set up in the places where they ‘live, work and play’ (Novotny 2000).

Environmental justice’s scholars have shown that human health hazards are key local communities’ motivations to engage in environmental conflicts (Bullard 1990; Falcone et al. 2020; Pellow 2002; Mah and Wang 2019; Sze 2004). Researchers on health social movements have long studied social struggles over access to health care systems, health inequalities and the role of knowledge production in establishing causations among health outcomes and toxic exposures (Brown 2007; Brown et al., 2012). This literature shows that besides the access, control and distribution of environmental resources, local communities do engage in environmental conflicts to safeguard their environments, livelihoods, and bodies from present and future hazards (Brown, 2007; Corburn 2005; Conde 2017; D’Alisa et al. 2010; Iengo and Armiero 2017; da Rocha et al. 2018).

Research on toxic pollution and social mobilizations often focuses on ethnographic approaches tackling one form of pollution, a particular impact or a single movement (Brown et al., 2003; Brown et al., 2012; Houston and Ruming 2014; Sze 2004; Ley 2009). Others have addressed a wider perspective, such as the relocation of toxic waste from richer to poorer countries and the transnational social actions that emerge in response (Pellow 2007). This paper adds knowledge from a global and quantitative perspective to reveal patterns about the main economic activities involved, actors mobilising and when do they mobilise (either preventively or for reparations) when toxic pollution’s related health impacts are being documented worldwide.

To do so, we analyse a sample of n=3033 cases gathered in the online Environmental Justice Atlas platform by January 2020. From a social metabolic¹³ viewpoint, the EJAtlas maps environmental conflicts at different commodity chains stages: extraction of energy and materials, transport or production, and waste disposal (Temper et al., 2015; 2018). The EJAtlas frames conflicts as Ecological Distribution Conflicts (EDCs hereafter) to emphasize the unfair distribution of the environmental costs and economic benefits that the increasing social metabolism generates (Martinez-Alier and O'Connor 1996). Another characteristic of EDCs is that often, these are 'valuation contests' meaning that conflicts cannot be understood only in the mainstream economic framework of monetary compensation for the so-called 'externalities' but advocated for the need to acknowledge that local actors can express their grievances with different priceless values (Martinez-Alier 2002). For instance, indigenous communities opposing the construction of a mining projects claiming for the 'sacredness of Mother Earth' or the use of slogans such as 'Health is not for sale' by industrial workers (Barca 2012a).

However, what can these conflicts tell us about social resistance, health impacts and toxic pollution globally? Specifically, we base our study on a quantitative comparison of n=1157 (38% of a total of 3033 cases from the EJAtlas) in which human health is reported as an impact of toxic pollution (that we call Environmental Health Conflicts (EHC)) with those environmental conflicts that do not (n=1876). By toxic pollution, we mean all kind of environmental pollution (i.e., contaminated soil, water, and air) contributing to increasing rates of deaths and short-middle and/or long-term ailments to exposed organisms.

Exposure to toxic pollution is complex and can take many forms (i.e., skin contact, inhalation or ingestion). Furthermore, different forms of pollution, quantities and length of exposure have different outcomes in different bodies at different life stages. One main characteristic of toxic pollution is its imperceptibility and capacity to surpass temporal and spatial scales (Agard-Jones 2013; Barbour and Guthman 2018; Carson 1962; Harrison 2011; Langston 2010; Romero et al., 2017). For instance, some pesticides used in agriculture, cannot be contained in their target location, and travel through the soil, water and air (Harrison 2011). Furthermore,

¹³ A concept used in ecological economics and other environmental social sciences to describe the need for inputs of materials and energy and their disposal as waste in human society (Fischer –Kowalski and Haberl, 2015)

toxicants can be inherited through bodies increasing probabilities of health impacts to new-borns (Johansen 2002; Smith 1999; Langston 2010).

By putting human health impacts of toxic pollution at the centre of our analysis, we explore if (and how) environmental conflicts reporting such impacts differ from the rest of the conflicts (e.g., conflicts over access to and control of land, water or other natural resources). Our main findings show that EHC differentiate in four main aspects. Firstly, economic activities and commodities involved have more urban and industrial links, rather than rural and agricultural, although the use of pesticides used in monocultures is significant. Secondly, working-class communities are key groups mobilising in EHC testifying a pattern of ‘working-class environmentalism’ in which worker communities and environmentalists lead struggles both for occupational health and environmental issues (Barca 2012a; Barca 2012b; Bell 2020; Foster 1993; Montrie 2018). Thirdly, temporalities of pollution, such as its long-term effects, as a form of ‘slow violence’ (Nixon 2011), can frustrate local communities’ ability to act and organise resistance before impacts occur. Fourth, building on previous analysis of environmental justice’s successes in environmental conflicts (Özkaynak et al., 2015, 2021; Scheidel et al. 2020), our results show that halting a project is considered a successfully (although insufficient) strategy to reach environmental justice. On the one hand, the time lag between implementing a project and its accumulated toxic impacts can decrease the probability of halting a project. On the other, toxicity can still threaten local people’s health even when the source of pollution ends. Therefore, EHCs strategies could be geared toward preventing a project or using a toxic substance, but mainly, toward claiming monetary compensation and decontamination (when possible) after pollution has occurred.

As follows, section 2 presents the conceptual background situating our work at the intersection of Environmental Justice, studies on slow violence, and working-class communities’ contributions to the environmental justice movement and environmental conflicts. Section 3 explains the methodology for using the EJAtlas for data gathering, selection of cases, and analysis. Section 4 presents the main findings to draw on the variables that form the different patterns exhibited by EHCs. Section 5 concludes and present future research directions.

2. Theoretical background

2.1 The slow violence of toxic pollution and environmental conflicts

Although different forms of violence intersect in environmental conflicts (Navas et al., 2018; Menton et al., 2021), scholars most often focus on one form: the direct and physical violence against environmental defenders: repression, criminalisation, violent targeting, and murder (Butt et al. 2020; Del Bene et al., 2018; Le Billon and Lujala 2020; Scheidel et al. 2020; Tran et al., 2020). Nevertheless, other forms of violence often escape attention. There are instances of environmental injustice that are both ‘fast and direct’ and cause ‘slow’ violence (Kojola and Pellow 2020). As it occurred in Bhopal (EJAtlas 2019a), Chernobyl (EJAtlas 2019b) or the Samarco dam disaster in Brazil (EJAtlas 2019c) environmental injustices can happen as dramatic accidents or explosions (visible, direct and fast violence). However, disasters can also occur gradually, neither spectacularly, nor instantaneously (Ahmann 2018; Liboiron et al., 2018). Health impacts of toxic pollution, as understood here, is a form of slow violence (Davies 2018, 2019; Nixon 2011).

In Nixon’s words, slow violence describes “a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all” (Nixon, 2011: 2). For instance, after the Bhopal explosion in 1984, anywhere from 3800 to 15.000, immediate deaths were estimated by authorities (Zavestoski 2009). More than 20 years later, Bhopal's toxic legacy continues in the form of high levels of dioxins, PCBs and toxic chemicals remaining and contaminating the site, producing several chronic diseases affecting many thousands more people. These ‘Slow Bhopals’ (Zavestoski 2009: 402) as many other examples around the world, such as the slow poisoning of the Arctic (Cone 2007) or ‘slow murders’ occasioned by the pesticide endosulphan in India (Narain 2007; Satheesh 2017)– count in our view as violence.

Because slow violence is often invisible, difficult to represent and even perceive, it poses crucial challenges for residents to manoeuvre politically and act preventively (Ahmann 2018; Nixon 2011). Also, the source of pollution is sometimes unknown posing confusion,

uncertainty in the local population and obstructing social mobilizations against their toxic condition (Auyero and Swistun 2009). Yet as Davies (2019) show, slow violence is not entirely invisible to all. People directly experiencing slow violence in their daily lives can see it and feel it in their bodies and environments. However, their stories are overlooked because of structural inequalities, making certain populations and zones expendable. From an activist point of view, one of the main objectives of the EJAtlas is to make people's stories count, or at least rend them visible in the public arena (Temper et al., 2015).

Slow violence is often consciously used for capital accumulation. Corporate and state actors owning polluting economic projects have used the lapse of toxic pollution and its long-term health aftermaths as a successful cost-shifting practice (Arcuri and Hendlin 2019; Litvinseva 2019). As described in 'The Circle of Poison': "multinational companies can play as they move their poisons from one country to the next, trying to maximise sales before their pesticides are banned again" (Weir and Shapiro 1981: 22). This is not a new strategy. The EEA report (2001) "Late lessons from early warnings" is an example on how –despite initial knowledge of possible harm– many years passed from the toxic pollution to regulations and acknowledgement of harms and eventual compensation to victims. Cases of low-level radiation (Lambert 2013), exposure to asbestos in the industry (Gee and Greenberg 2001) or the use of DBCP-based pesticides in Central America (Bingham and Monforton 2013) are well-known examples in which worker communities organized to claim reparations after health impairments become visible. Therefore, 'slow violence' is both a challenge for local organising and an 'opportunity' for capital accumulation while perpetuating pollution and health ailments to the most vulnerable globally. As the next section shows, worker communities are key actors in rendering slow violence visible.

2.2 The role of working-class communities in environmental justice struggles

Even though workers have been acknowledged as key actors for sustainability transitions, their struggles are often seen as separate from environmentalists' struggles (Temper et al. 2018). This separation is rooted in the Cartesian divorce of nature and society. The 'jobs versus environment' dilemma is founded on the assumption that the enactment of environmental

regulations will increase costs and, consequently, job losses (Bell 2020). Thus, workers and environmentalists have sometimes failed to support each other in the past (Bell 2020; Keil 1994; Barca and Leonardi 2016; White 1996).

Looking back at US origins of environmentalism, Montrie (2018) shows that workers played a fundamental role in public health and environmental issues long before the ‘environmentalism movement’ was founded. In the UK context, workers had also waged environmental struggles “many years before environmental organisations came into existence” (Bell 2020: 139). Empirical cases worldwide highlight industrial and (migrant) farmworkers workers' role as a social force linking occupational health issues and enhancing environmental protection and risk reduction in their communities (Silpa 2020; Barca 2012b; Keil 1994, London 2003; Shaw 2008).

The theoretical frame of ‘working-class environmentalism’ (WCE) precisely emerges to connect workers’ and environmentalists’ struggles, values and interests (Barca 2012b; Barca and Leonardi 2018; Bell 2020). Differing from ‘the environmentalism of the poor’ (Martínez Alier 2002), often deployed by grassroots organizations and with predominant participation of Indigenous and/or peasant and rural social actors, WCE is led by trade unions and other formal and informal groups from the so-called ‘working-class’, including people whose physical waged work is their only source of income and livelihood, and who occupy the bottom of the labour hierarchy, being paid lower wages and placed in riskier conditions (Barca 2012b; Barca and Leonardi 2018).

The WCE reinforces the idea that environmentalists, grassroots organisations and workers have a common adversary: the profit-making and capital accumulation based on the production of toxic environments and the destruction of nature and societies. As emphasised by Bell “‘the jobs versus environment’ dilemma deliberately distracts attention from the fact that capitalist accumulation destroys both” (Bell 2020: 175). For instance, Barca and Leonardi analyse a steel plant in Taranto, Italy. As soon as the steel plant started, Taranto progressively became a highly polluted area. While the plant created industrial jobs –risking the workers' health– it also destroyed local traditional economic activities (Barca and Leonardi 2018). Many cases mapped in the EJAtlas echo this example.

3. Methodology

3.1 The Environmental Justice Atlas

The EJAtlas is an online archive hosted at the Autonomous University of Barcelona (ICTA-UAB). In January 2021 there were 3350, environmental conflicts documented worldwide. The unit of analysis is a state or corporate-driven economic project taking place along different commodity chain nodes: resource extraction, processing materials, and waste disposal provoking collective actions against the state organs or private or public corporations responsible (see Temper et al., 2015, 2018 for methodological details and Scheidel et al., 2020 for the definition of variables and data limitations). Conflicts over infrastructures (e.g. airports), tourism facilities (e.g. ski resorts) or the establishment of conservation areas threatening people's livelihoods are also mapped. The EJAtlas divides conflicts into ten mutually exclusive categories and nearly 50 non-exclusive subcategories. For example, a conflict arising from a mining project generating local demands over land or water use is categorised as 'Mineral ore conflict' and sub-categorised as 'land acquisition conflict' and 'water access and entitlements'. More variables such as who mobilise, how and when do they do it, the commodities involved, the status of the project (whether it is in operation or stopped) among other variables are provided for each case.

Although the hundreds of collaborators of the EJAtlas have different backgrounds (being activists, grassroots organisers, NGO employees, and scholars from master students to full professors), the standardised quantitative and qualitative data allow a global and comparative analysis (Del Bene et al., 2018; Scheidel et al., 2020; Temper et al., 2020). All cases are documented from published sources, and a core team based at the Autonomous University of Barcelona revises the accuracy of information based on different sources before posting the case online.

Health impacts in the EJAtlas are recorded as follows. Collaborators select between 10 visible or potential impacts in 'checkboxes'. If 'visible', the impact is documented as an outcome in the economic project mapped. If 'potential', the health impact may or may not occur. If there is no impact, the box remains empty. Collaborators can give more details about health impacts

in a 'free box' and the description section (from 500 to 1000 words each) accompanying each case.

3.2 Data collection and analysis

Database analysed in this paper dates from January 14th, 2020 accounting for n=3033 cases. First, we selected a sub-sample of cases where at least one of the following health impacts is reported as 'visible': Exposure to unknown or uncertain risks, Malnutrition, Occupational disease and accidents, Infectious diseases, Deaths, Other environmental related diseases, and 'Other health impacts'. We excluded other health impacts such as 'increasing rates of homicides/gender violence, including rapes' and 'health problems related to alcoholism/prostitution' (see Appendix). Even though these are global health challenges, they give few details about the link between toxic pollution and health outcomes.

After this selection, our subsample shrunk to 1157 cases (38% of the database). Next, through descriptive statistics, we compared our selected sample entitled 'Environmental Health Conflicts or EHC' (n=1157) to the rest of the cases (n=1876) which include those where no health impacts or only potential health impacts are reported. Next, we compared all the variables provided by the EJAtlas. Here, we present the variables that exhibit different patterns, and which are statistically representative¹⁴: 'Category and subcategories of conflict', 'Project Status', 'Type of population', 'Actor Mobilising', 'Reaction phase', 'Commodities involved', and 'Success rate'. Furthermore, we read the detailed descriptions in the EHC datasheets (of about 500 to 1000 words) of a randomized sample of 100 cases of the 1157 cases to bring empirical cases 'behind the numbers'.

¹⁴ P-values reported in this paper are two-sided p-value on t tests of the equality of percentages. Following the medical literature, we claim that differences are statistically significant when p-values are lower than 0.05. For ease interpretation, we report p-values higher than 0.001 with its face value and p-values lower than 0.001 as >0.001.

4. Relocation of hazards among geographies and timescales: the zones and bodies of sacrifice

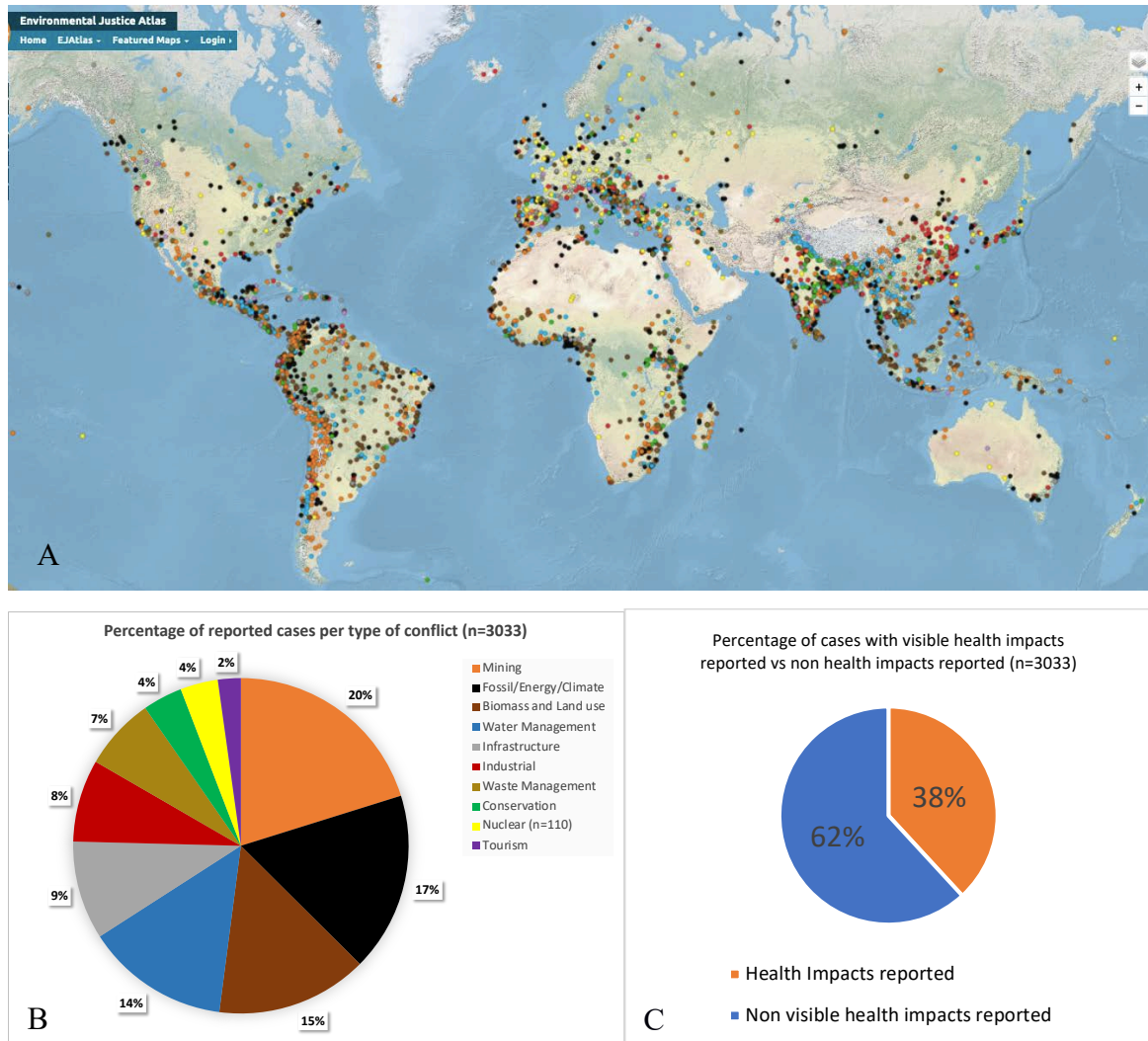


Figure 4.1. Environmental conflicts registered in the EJAtlas (n=3030). A: Geographical coverage of environmental conflicts (each dot represents one case and each colour a category of conflict). B: Types of conflicts and coverage (pie colours corresponds to the colour of the cases shown in the map). C: Percentage of cases with visible health impacts linked to toxic pollution (our sample analysed) and the rest of the cases from the EJAtlas. We follow the same representation as Scheidel et al. 2020.

4.1 Categories of conflicts

While the most common categories of conflicts represented in the EJAtlas are mining, fossil fuels, and biomass and land use [Figure 4.1] in EHCs industrial activities (65%), waste management (64%) and nuclear projects (52%) predominate [Figure 4.2]. These results are not surprising given that industrial activities often use, produce or dispose of highly hazardous

materials in the environment becoming a dominant source of toxic pollution worldwide (Guillem-Llobat and Nieto-Galán 2020).

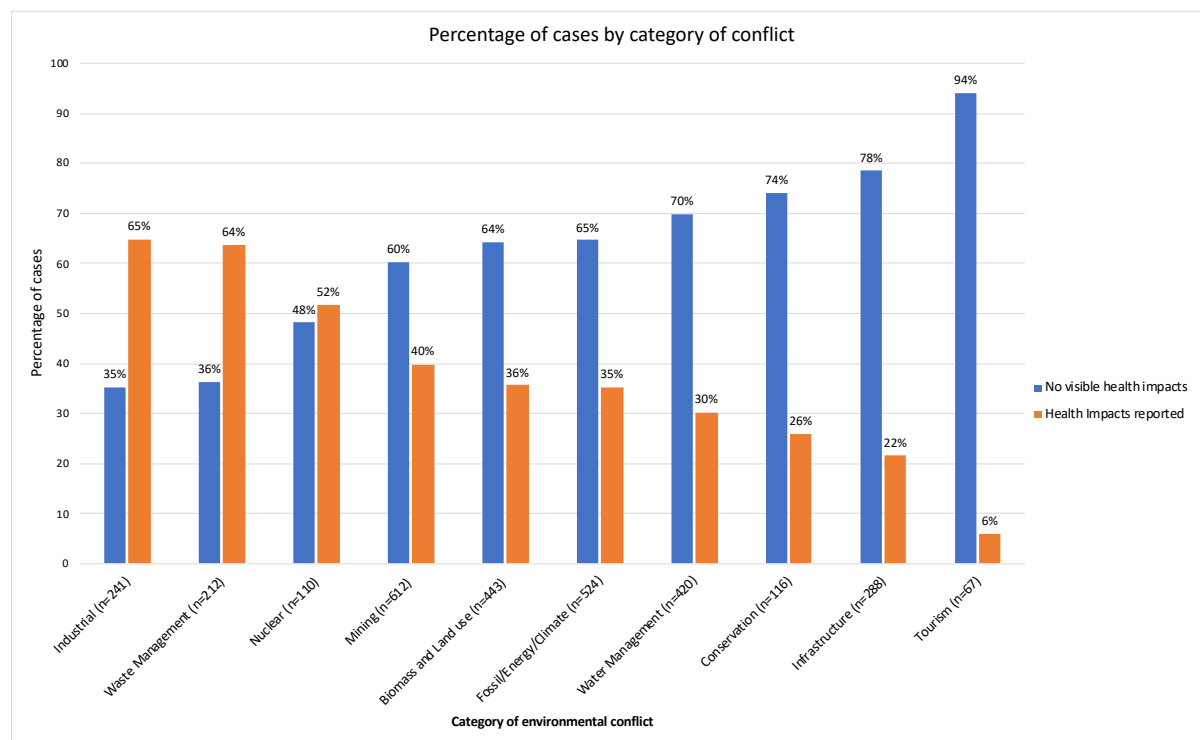


Figure 4.2. Percentage of cases by category of conflict reporting visible health impacts (EHC) with those cases non reporting visible health impacts (n=3033). Note that these are mutually exclusive categories.

Empirical cases from the EJAtlas show how toxic pollution is lived (and survived) by residents across countries. For instance, in Quintero-Puchuncaví (Chile), urban dwellers living near the Industrial Complex Ventanas daily confront pollution in their homes, schools, gardens and workplaces (EJAtlas, 2020a). The Complex holds several facilities, including mineral processing plants, thermal power plants, and metal refineries, involving more than 17 different companies. The place is known as a ‘Sacrifice Zone’, referring to an area where pollution and contamination are so high that nature and people living there have been squeezed out for the sake of economic development (Lerner 2010; Bolados and Sánchez 2017).

However, sacrifice zones are inhabited by sacrifice bodies (Bullard 1993; Barca 2014; Swistun 2018; Tironi et al., 2018). In a context of continuous pollution, some episodes have triggered social mobilization in Quintero. There are so-called ‘Hombres Verdes’– green men, slowly poisoned male industrial workers whose skin becomes green because of the high levels of lead,

arsenic and copper in their bodies. Also, a massive acute poisoning occurred in 2018 because of the release of *methyl chloroform*¹⁵ in the air; in this case, children were the most affected population (EJAtlas, 2020a).

Another industrial conflict from our sample occurs in India, against the Sterlite copper smelter unit in Tamil Nadu (EJAtlas 2018a). Through marches and public campaigns, local dwellers have repeatedly asked the smelter to shut down because of regular sulphur dioxide emissions¹⁶. Apart from the slow violence of sulphur dioxide expressed in the community's high rate of respiratory illnesses, direct violence occurred as the police killed 13 protestors in a public demonstration against the smelter in 2018 (Martínez Alier 2018). Complaints against industrial pollution as in Quintero are not new, as they have taken place since the end of the 19th century (Martínez Alier 2001, Chastagneret 2018; EJAtlas 2019h). Some environmental movements, such as in Japan, precisely arose in the 1950s and 1960s out of industrial pollution (McKean, 1981).

4.2 Subcategories of conflict

As noted in the following two figures, EHCs predominate in waste disposal and material processing activities [Figure 4.3a]. Despite the low global coverage, E-waste, ship breaking, agro-toxics, toxic waste, metal refineries and chemical industries are more likely to be linked to health impacts and civic mobilizations. Conversely, windmills (3%) and solar plants (7%) are deemed to be 'less toxic' [Figure 4.3b]. Because the EJAtlas maps 'in situ' conflicts, these percentages of course do not consider the material economy chain behind renewables (Zografos and Robbins 2020) such as pollutant cobalt-mines¹⁷ with deleterious working conditions in the Democratic Republic of the Congo (EJAtlas 2019f) and Morocco (EJAtlas 2018b).

¹⁵Methyl chloroform is used as a solvent and degreasing agent in industry and as a food and grain fumigant that can produce acute effects in humans (i.e hypotension, mild hepatic effects, and central nervous system (CNS) depression) EPA: <https://www.epa.gov/sites/production/files/2016-09/documents/methyl-chloroform.pdf>

¹⁶Sulphur Dioxide or SO₂ is a toxic gas often arising from fossil fuel combustion by power plants or industrial facilities. Short-term exposures can harm the respiratory system. SO₂ is also a cause of acid rain as it combines with water to produce sulphuric acid, damaging vegetation and buildings. EPA: <https://www.epa.gov/so2-pollution>.

¹⁷ Cobalt is a key component used in rechargeable batteries to store the energy produced by renewables energies.

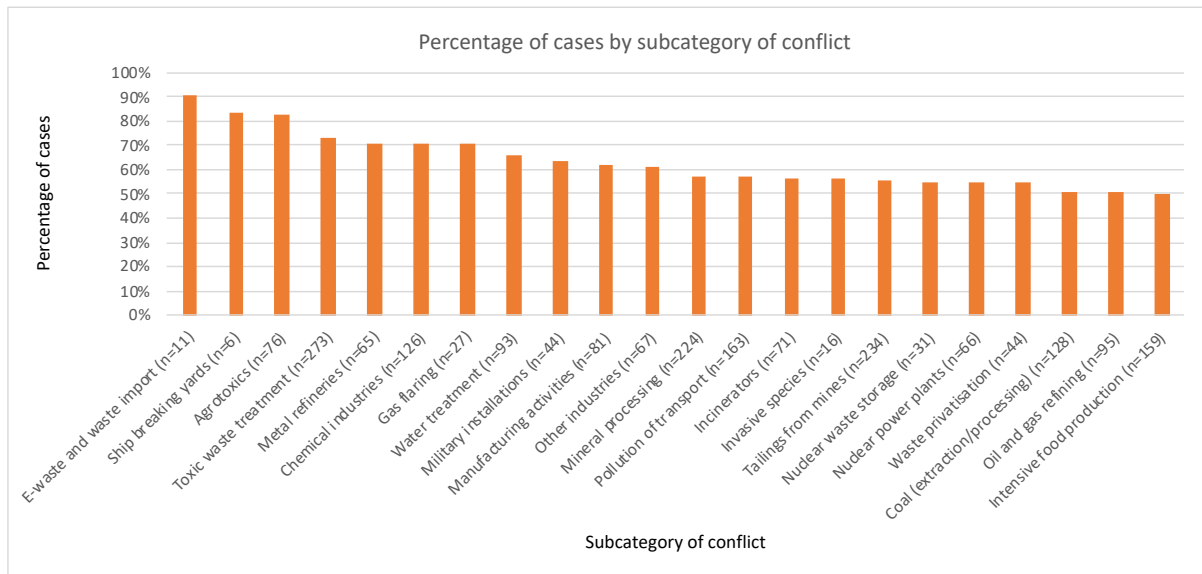


Figure 4.3a. Percentage of cases by subcategory of conflict (up to 100%). Note that the same case can be classified by several sub-categories.

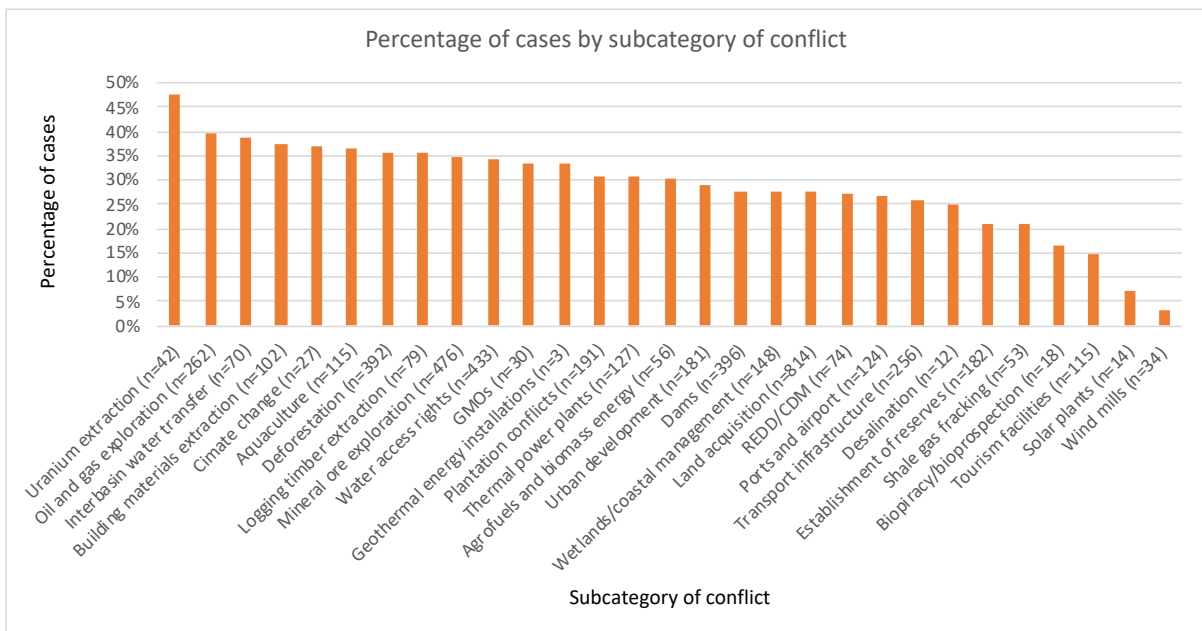


Figure 4.3b. Percentage of cases by subcategory of conflict (up to 50%). Note that the same case can be classified by several sub-categories.

4.3 Population type

Whereas rural and semi-urban cases are less likely to be EHCs ($p\text{-value} > 0.001$), urban cases are neither more nor less likely to be EHCs ($p\text{-value} = 0.209$) showing that toxic economic activities have more industrial links rather than rural ones. Copious research on environmental justice focusses on the toxic pollution of industrial facilities in urban settings (Taylor 2014).

However, our results suggest that economic activities such as waste management, nuclear projects, mining activities, biomass, and land use are important threats to people’s health. In particular agROTOXICS-related conflicts and pesticides in the rural world [Figures 4.2, 4.3a and 4.3b, above].

4.4 Commodities involved

While in the global dataset, ‘land’ (n= 987) and ‘water’ (n= 642) are the most frequent commodities involved. In our selected subsample, asbestos, recycled metals and pesticides are the most frequent. Asbestos, also known as ‘the killer dust’, is a group of silicate minerals with a fibrous structure commonly used for industry building materials and as heat and electric insulator (Litvintseva 2019; Trimbur 2020). Not surprisingly, more than 90% of cases involving asbestos report health impacts (Table 4.1).

Commodity involved	Percentage EHC
Asbestos	< 100
Recycled metals, Pesticides	< 90
Diamonds, Industrial waste, Chemical products	< 80
Lead, E-waste, Steel, Manufactured products	< 70
Domestic waste, Cotton, Sugar, Flowers, Rare metals, Shrimps, Uranium, Zinc	< 60
Rice, Soybeans, Cement, Iron ore, Crude oil, Fish, Aluminium bauxite, Fruits /Vegetables, Titanium ores, Coal	≤ 50
Eucalyptus, Corn, Pine, Gold, Cellulose, Ethanol, Wheat, Palm oil, Rubber, Water, Silver, Live animals, Timber, Copper, Natural gas, Sand gravel, Land	< 40
Ecosystem services, Electricity, Carbon offsets, Meat, Biological resources, Tourism services, Charcoal	< 30
Lithium, Asphalt	< 20

Table 4.1. Percentage of EHC by commodity involved (n=1157). Note that commodities are non-excluding variables.

Because asbestos-related effects have a long period of latency, 40 years from exposure to onset of the disease (Trimbur 2020), these conflicts epitomise, on the one hand, the slow unfolding violence of toxic pollution and on the other, the active role of working-class communities in rendering it visible. In Spain, the ‘Association of people affected by asbestos of Catalonia’(AVAAC) is a group of ex-workers demanding reparations for asbestos-induced illnesses (EJAtlas 2020c). From 1907 to 1997, three different companies: Roviralta, Eternit,

and Uralita, produced fibre-cement and asbestos-based materials in the town. During these years, industrial workers, their relatives and residents inhaled microscopic fibres resulting years later in lung cancer and *mesothelioma* (a type of cancer). According to AVAAC, many workers have died, others are still to be diagnosed, and many others live under threat of becoming victims (Muñoz 2018).

Likewise, the asbestos industry exemplifies the uneven transnational relocation of hazards (Pellow 2007; Weir and Shapiro 1981). As noted in the EJAtlas, while Spain banned asbestos in 2002, Eternit (the same company that owned the factory in Catalonia) produced asbestos-based building materials in Colombia until 2019 (EJAtlas 2015a, Ossa Giraldo et al., 2014). Despite global knowledge about asbestos-related health impacts, nowadays, many more factories are still producing or importing asbestos (Bahk et al. 2013; Litvintseva 2019).

As with asbestos, companies often move their poisons among countries with weaker environmental regulations (Arcuri and Hendlin 2019). For instance, the US banned the pesticide DBCP in 1979 because of causing infertility in industrial workers in California. The remaining stock was continued to be used as a pesticide in banana plantations in Central America until the 1990s (EJAtlas 2016a; EJAtlas 2016e). Today, DBCP persists in communities' water wells (Montenegro and Jiménez 2009) and somatises in farmworkers' bodies and their children (Bohme 2015; Mora 2017). In the same line, despite the so-called 'precautionary principle', regulatory agencies have historically been quick to approve toxic chemicals but slow to ban them after harms become obvious (Arcuri and Hendlin 2019; Langston 2010). Additional debate on this matter would certainly include the role of scientific knowledge production in defining hazards, risks and its powerless position in managing regulations of toxicant substances (Boudia and Jas 2014; 2019) and, furthermore, the role of local communities in creating their own data to challenge knowledge production (Brown 2012).

The fact that asbestos and DBCP remained in use in some geographies despite knowledge about its possible ill-fated health consequences conforms the so-called 'Lawrence Summers' principle (Martínez-Alier 1994) which —from a strictly economic viewpoint— supported the idea that the burdens of toxic pollution and dirty industries are cheaper when poor (and

racialized) bodies bear it (Summers 1992). This is precisely how a toxic and unequal world works (Boudia and Jas 2019).

Location of hazards can be driven by colonial relations too. The insecticide chlordecone remained in use in Martinique and Guadeloupe by the white French planter class to increase banana production despite knowledge about its carcinogenic effects (EJAtlas 2019j). Chlordecone became a public issue until local communities observed increasing rates of prostate cancer, nervous system disorders and akin chronic illnesses and therefore mobilise for justice. However, there is no known decontamination method and therefore chlordecone will remain in the soil for around 400 years more (Ferdinand 2019).

4.5 Project status: toxicities beyond temporal scales

The following figure 4.4 presents ‘Project Status’. As it shows, projects ‘in operation’ are predominantly EHCs, 54% vs. 46% (p-value<0.001), while stopped, unknown, under construction, proposed, and planned are predominantly non EHC.

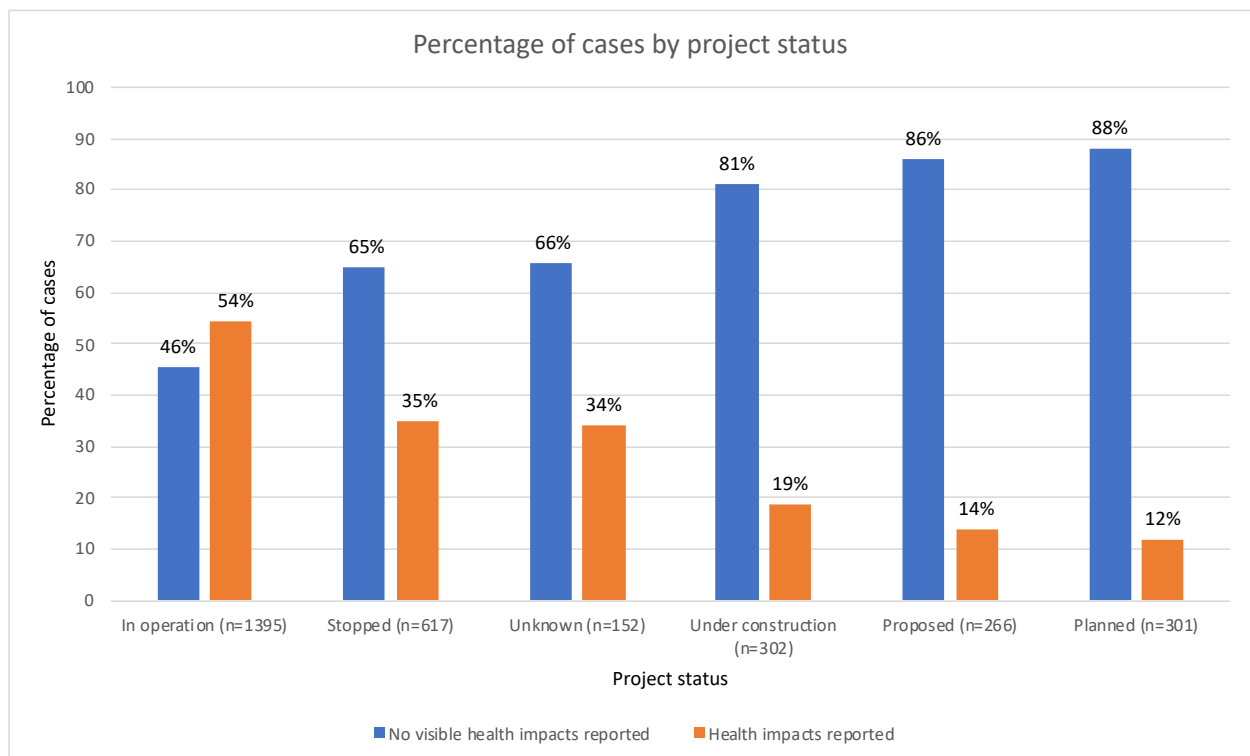


Figure 4.4 Percentage of cases reporting visible health impacts (EHC) with cases non reporting visible health impacts (n=3033) by project status.

How can a planned or proposed project report visible health impacts? conflicts in ‘proposed’ or ‘planned’ phases can include the expansion of an ongoing project. Indigenous Wayuu communities mobilising to revoke a license granted by Colombia's government to enlarge the Cerrejón mining project (EJAtlas 2019d). Since its operation in 1975, pollution and land dispossession have gradually impoverished them (EJAtlas 2017a; Avilés 2019). In 2011, the mine planned to increase coal extraction and alter the course of one of the remaining water sources (EJAtlas 2019d). The Wayuu people immediately organised in response to this initiative. Their demands underlined mining workers’ previous complaints about poor working conditions and toxic exposures in quantities far above the legal standards (EJAtlas 2017a).

Although the percentage of stopped EHC cases reaches 35%, stopping a project does not guarantee toxic pollution and health impacts disappear. In Polynesia, for over 30 years, the French government conducted nuclear tests and the high levels of radiation fallout led to radiation-induced diseases in the local population (EJAtlas 2019e). The tests ended, and the project appears as ‘stopped’ in the EJAtlas, but the conflict continues as the impact of contamination occurred years after radiation diffused in the environment. A long struggle for monetary compensation and remediation is ongoing, as are victims’ demands (Ruff 2015). For years, people reportedly vacated polluted islands to escape radioactive exposure through the ingestion of contaminated seafood. These are not directly violent evictions such as it often happens in land acquisition conflicts (Edelman and León 2013; Mingorría 2017; Temper 2019), but rather slow violent displacements or ‘expulsions by pollution’ processes in which the uselessness of natural resources as result of pollution makes people leave their territories (Li and Pan 2020:2). How to plant or live in a poisonous land?

In light of this, the intergenerational environmental justice becomes a key aspect in EHC. Toxic substances can remain in the environment and people’s bodies for decades inheriting vulnerabilities to future generations (Langston 2010). Studies on transmission of DDT or diethylstilbestrol (DES) through breastfeeding (Johansen 2002; Smith 1999; Langston 2010) or lead exposure in placenta (Rees and Fuller 2020) are well-known examples.

Around the world, 800 million children (1 in 3) have blood lead levels (at or above $5 \mu\text{g}/\text{dL}$ ¹⁸) that can affect their nervous system, behaviour, and intellectual development (Rees and Fuller 2020). Protests in China, accounts for villages against lead-battery plants in Fujian and Pizhou, that sickened children with ‘excessive blood lead levels’ (EJAtlas 2019i; EJAtlas 2020e). In Shanghai dozens of children who live nearby a lead-acid battery manufacturer reported blood lead levels up to $89,7 \mu\text{g}/\text{dL}$, caused them acute poisoning and problems in their nervous system. The government ordered to stop operations and clean the contaminated soil, but children’s harms remain difficult to repair (EJAtlas 2018d).

5. Actors mobilising in environmental conflicts

5.1 The key role of the working-class communities in environmental health struggles

Actors mobilising in environmental conflicts, as reported in the EJAtlas, are diverse and can have different scales of action (i.e. local, regional or global) (Temper et al., 2015; Scheidel et al., 2020), ranging from local collective organisations with a specific goal (e.g. a grassroots movement wanting to stop a mining project in their town) to transnational social movements aimed at transforming broader structural power dynamics (e.g. an international NGO aiming to stop nuclear power plants worldwide). As noted in table 4.2, in absolute numbers, in the global database, Local Environmental Justice Organisations. (Ejos)¹⁹ (n=2058), citizens and neighbours²⁰ (n=2014), farmers (n=1389), and Indigenous groups (n=1240) predominate as actor mobilising in environmental conflicts. However, one key finding from our analysis is that when referring to EHC, worker communities predominate.

In other words, while worker communities represent a low frequency of involvement globally (Scheidel et al., 2020), these actors are disproportionately represented in EHC. For instance, table 4.2 shows that from the total of cases in which industrial workers mobilise (222 conflicts), 71% of these conflicts are EHCs. Next, waste pickers (68%) and then informal workers (58%), artisanal miners (56%), trade unions (55%). This is not to say that, for instance, indigenous

¹⁸ Micrograms per deciliter.

¹⁹ include civil society organisations or informal collectives at a local level (i.e. associations)

²⁰ people not necessarily organised into formal organisations

groups do not mobilise in EHC. They certainly do, but not in proportion; from the total of cases in which indigenous group mobilise, 36% are EHC.

Actors	Total of cases	Percentage of involvement in EHC
Industrial workers	222	71%
Wastepickers, recyclers	53	68%
Informal workers	225	58%
Artisanal miners	117	56%
Trade unions	339	55%
Discriminated groups	561	49%
Women collectives	630	46%
International NGOs	905	42%
Landless peasants	331	41%
Scientists and other professionals	1193	41%
Fisher people	631	41%
Neighbours	2014	40%
Local organizations	2058	38%
Government and political parties	1083	38%
Religious groups	350	37%
Social movements	1166	36%
Indigenous groups, traditional communities	1240	36%
Farmers	1389	35%
Pastoralists	176	26%
Recreational users	231	22%

Table 4.2. Percentage of EHC by mobilising group. Column ‘Actors’ refers to the mobilising group, as reported in the EJAtlas. Column ‘Total of cases’ refers to the total number of environmental conflicts in which each actor is involved (both EHC and non EHC). Column ‘Percentage of involvement’ shows the percentage of EHC of the total of cases in which each actor mobilises. Total number of environmental conflicts in the EJAtlas = 3033. Note that more than one group can mobilise in each conflict.

In Catalonia, as well as in akin cases of asbestos exposure in Italy (EJAtlas 2015b) or Brazil (EJAtlas 2017c), the conflict first emerged as an occupational health concern and next extended to communities becoming key cases of working class (and their families) environmentalism. We do find empirical cases lead by workers in rural settings. In Central America, farmworkers suffer kidney diseases (CDFnT) after the sugar cane harvest season (EJAtlas, 2016c). Roughly 20.000 workers have died in the last few decades (Clark et al. 2016). Workers' protests have emerged for better working conditions and monetary help to sponsor the medical treatment (*dialysis*). Despite the absence of a scientific causal link, some workers attribute the use of pesticides as one probable cause of their illness. In this case, workers mobilise because they are dispossessed of their only income source: their labour force simultaneously alert about the possibility of pesticide pollution in the environment.

In contrast, some workers do not protest to safeguard their only income source (EJAtlas, 2016c). A common paradox faced by worker communities when there are no immediate alternatives to the economic activity that makes them ill (Neumann 2016; Barbour and Guthman 2018). A ‘job vs health’ paradox. Or simply said by a Nicaraguan farmworker to the first author: “I have to decide if I die today because I have no money to eat, or I die tomorrow because kidney disease” (Informal conversation, Nicaragua 2018).

Despite the lack of a specific category in the EJAtlas, migrant workers are key actors mobilising too (EJAtlas 2019k). As shown by Liu (2018), China’s economic boom in the 1980s, lead rural workers to migrate and join the increasing industrial sector. After years of exposure to sílica and coal dust in mines and construction sector, thousands of workers have been diagnosed with pneumoconiosis (a lung disease), the most common occupational disease in China today (íbid). In the same line, ‘discriminated groups’ such as racialized communities (49%) are also relevant. As in Warren County (Bullard 1990), cases of 'environmental racism' in Flint, Michigan (EJAtlas 2020d), or health risks faced by Roma communities in Eastern Europe²¹ enter into this category.

5.2 Toxic pollution beyond the working place

As noted in table 4.2. in absolute numbers, in the EJAtlas as a whole, conflicts involving vulnerable populations such as Indigenous Peoples are very significant (n=1240). Based on a comprehensive literature review, Fernández-Llamazares et al., (2019) highlight that indigenous people's exposure to pollution is often mediated by daily ingestion of polluted water and food. Arctic’s indigenous peoples contaminated with persistent organic pollutants (Pops) coming from elsewhere (Bruce 2020; Cone 2005) or indigenous Nahua Nanti in the Peruvian Amazon, who have been found with high levels of mercury (EJAtlas 2020f) are key examples.

Furthermore, working-class environmentalism is concerned by jobs in the sense of paid jobs. But women often face another burden in toxic environments, engaging in unpaid activities, including looking after ill men and children (Bolados and Sánchez 2017; Martínez 2019; Liu

²¹ See the feature map in the EJAtlas ‘Pushed to the wasteland: Environmental racism against Roma communities in Central and South-Eastern Europe’ available at <https://ejatlas.org/featured/roma> retrieved on Sep. 25, 2020.

2018). As noted in table 4.2, woman collectives are also a key group of mobilising (54%). Concerned about the future of children, they often organize in specific collectives such as ‘Women of the Zones of Sacrifice in Resistance’ in the Ventanas Complex in Chile (EJAtlas 2020a), ‘Mothers of Ituizangó’ against the use of glyphosate-based pesticide in Argentina (EJAtlas 2016f) or ‘Moms and Dads Against Smog’ asking for more strict measures against air pollution in Mongolia (EJAtlas 2018c). As noted in the EJAtlas, women’s role in environmental conflicts surpasses the notion of ‘victims’ and ‘caregivers’, casting them as a powerful organized social force for environmental justice (Bolados and Sánchez 2017; Kraus 1993; Tran et al., 2020)

Lastly, ‘Professionalised groups’ (i.e., epidemiologists, doctors, lawyers) appear in 41% of EHCs, similar to the global average (40%), but lower than in cases of non EHCs (59%). This result indicates that ‘Professionalised groups’ are less frequently involved in EHC (p-value<0.001). However, in those cases where they are involved, they may have a very important role in evidencing the link between chemical exposures and diseases, often previously empirically evidenced by local communities’ through ‘popular epidemiology’ processes (Brown 1992). A very well-known case of this kind is the case of ‘Mothers of Ituizangó’. Through cartographic tools, the community established a connection between the number of ill children’s houses and the proximity of soybean plantations fumigated with glyphosate-based herbicides (Arancibia and Motta 2018). Alliances with health scientists were crucial in this case to back up communities’ findings and start legal actions (EJAtlas 2016f).

5.3 Collective mobilisations and alliances among group mobilising

Groups mobilise collectively. On average, five different groups are mobilising in each conflict (n≈ 420) being the range from one (n=127) to 19 (n=1). This average is slightly higher in EHCs (5.0 vs. 5.4). Furthermore, mobilising groups (except for industrial workers, artisanal miners and informal workers) find more alliances in society when health impacts are reported. Regarding whom workers mobilise with, we see that although they primarily organize with other worker communities, they also mobilise with other collectives. Using industrial workers as an example, we find that when industrial workers mobilise, waste pickers (86%), artisanal

miners (80%) women collectives (78%), professionalised groups (75%), international NGOs (75%), local organisations (75%), and trade unions (75%) also mobilise.

Previous scholars have hypothesized that health-related matters invoke more groups mobilising (Falcone et al. 2020). Using an in-depth case study on waste disposal in Campania (Italy), Falcone et al. find that health-related matters became a binding issue for the re-emergence of a stronger movement almost 10 years after the first opposition the construction of a waste incinerator appeared. This could be explained by the fact that pollution affects all, compared to a land-acquisition conflict that will probably involve those groups interested in the acquiring the land. Further research on the drivers of mobilisations and groups motivations regarding health-related threats might confirm such hypotheses.

The fact that workers allied with professionalised groups such as health scientists constitute a form of ‘labour environmentalism’ is not new (Barca 2014:16), they have carried out processed of ‘worker’s epidemiology’ (Barca 2012a) and similar community-based research to monitor environmental hazards for the enforcement of environmental laws and the banning of toxic substances. However, our data reveal the need of more networks of this kind to advance knowledge of hazards, hopefully in a timely stage before irreversible impacts occur.

6. Temporalities of social mobilisation and success rates in environmental health conflicts

6.1 When does the mobilization begins?

People either organize to claim reparations once impacts are being felt, or might act preventively before damages occur. As noted in Figure 4.5, EHCs cases follow different patterns than non EHCs regarding ‘reaction phase’ (or when the mobilization begins). EHCs predominates in cases when social responses start for reparations, 69% vs 31% (p-value<0.001). But significantly less in preventive phases (84% vs. 16%).

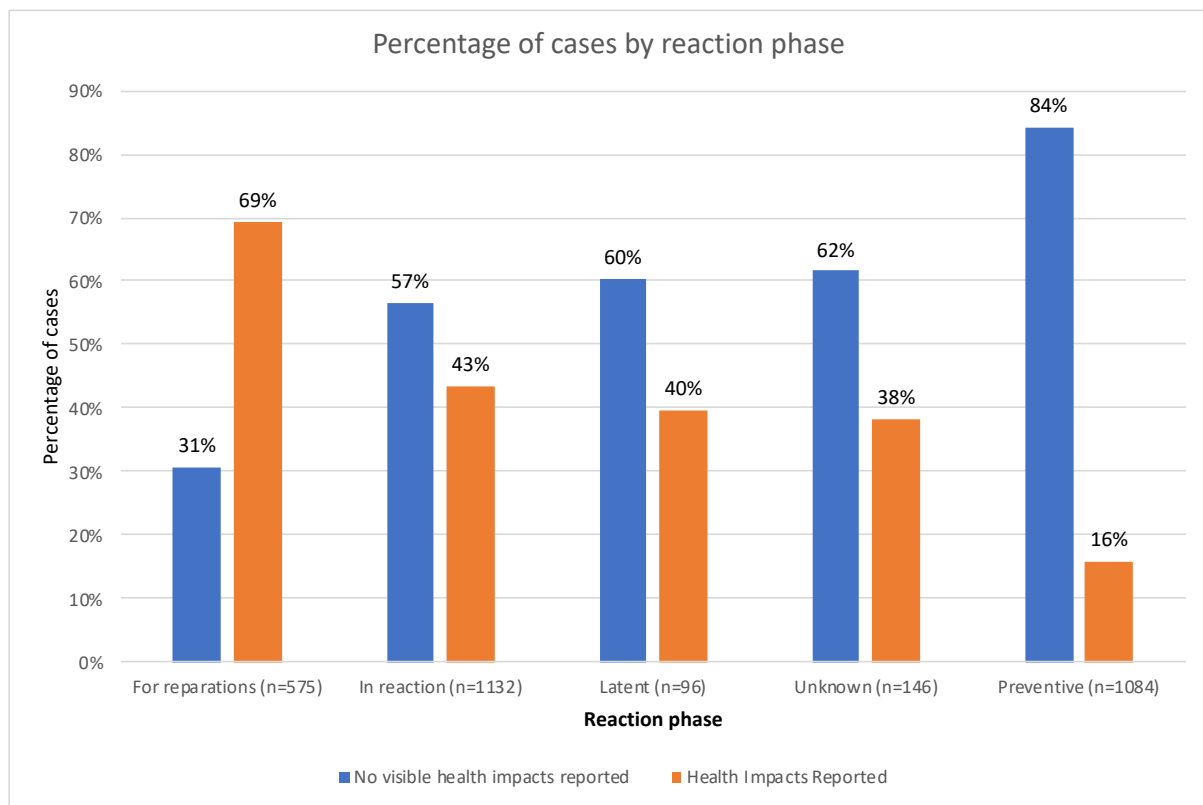


Figure 4.5. Percentage of cases reporting visible health impacts (EHC) with cases non reporting visible health impacts (n=3033) by reaction phase.

As cases from the EJAtlas show the time span between toxic pollution and health impacts can last several years, even decades. Industrial-induced chronic diseases in Japan including arsenic (EJAtlas 2016g) and cadmium contamination (EJAtlas 2016h), the ailments took a long time publicly acknowledged. And even more time for the mobilisation to occur. From 1932 to 1968, surrounding dwellers reported unusual muscle weakness rates, visual problems, insanity, ataxia and paralysis in the Minamata Bay (EJAtlas 2016b; Harada 1995). In response, fisher people, neighbours, and scientists carried out community-based research to identify explanations. The main cause became public years later: for around 35 years, Chisso Corporation Factory released *methylmercury* (MeHg) in the Bay and, therefore, marine food ingested by locals was also contaminated (Harada 1995). Social struggle came for compensations and decontamination of the bay ‘for reparations’. Until 2011, 2000 people had received compensation, but many others died waiting for it (EJAtlas 2016b).

A key question to address EHC is When, to what extent, and to whom has the slow violence of toxic pollution to be visible to create resistance? Latent conflicts become particularly relevant

to address this question because there is no resistance organised despite reported health impacts. A well-known case of this kind is 'Flammable', an Argentine shantytown surrounded by a petrochemical compound (EJAtlas 2017b). Despite severe health impacts linked to toxicity (vomiting and dizziness, haemorrhagic measles, loss of breathing capacity, anencephaly) there is barely any local organising. Therefore, when slow violence becomes visible to all, local protests do not always emerge. Based on in-depth case studies, scholars have shown that pollution and suffering are sometimes normalized and even accepted (Lora-Wainwright 2017; Neumann 2016; Verbeek 2020). People often feel powerless and resign to their toxic reality (Lora-Wainwright 2017) or, as Nicaraguan sugarcane workers, do not protest because they economically depend on the activity that makes them ill. Confusion and uncertainty about pollution sources are other caused of social inactions (Auyero and Swistun 2009).

Finally, as many cases have shown throughout the article, when pollution and health consequences are widespread among communities and environments, there is sometimes low chance for repairing and decontaminating. Success in environmental justice in EHC can have different nuances. In hand with Scheidel et al. 2020 and Özkaynak et al. 2015, 2021 we note that successes and failures for environmental justice movements can take many forms and are difficult to define. A systematic review of mining conflicts from the EJAtlas suggested that halting a project, compensation and strengthening social networks are three outcomes of success (Özkaynak et al., 2015). Later, Scheidel et al. (2020) conclude that mobilisations in preventive phases (before the project starts operation) combined with diversification of protest actions and the use of litigation strategies can increase the probabilities to halt a project and therefore, succeed.

Yet our data suggest that the time lag between the start of a particular economic activity and the emergence of its consequences on people's health can affect social responses' timing. Poor information access to local communities about environmental hazards is a challenge in this regard. As scholars point out, local communities have little opportunity to access information about their toxic vulnerability, thus necessitating bottom-up forms of knowledge production and scientists' engagement in linking diseases with toxic exposures (Brown 2007; Conde 2014). Unfortunately, as shown in our described cases, these strategies often start once toxic

pollution's effect is irreversible, because of the invisibility (and overlooked) forms of slow violence.

6.2 Success rates

In the EJAtlas as a whole (n = 3030) roughly 1,500 cases of failure in environmental justice are reported, with 1,000 classified as 'not sure' and almost 500 as 'success'. From our sample, 60% of the successful cases (n=116) 70 cases resulted in the project being stopped, and/or 23 cases reported compensation strategies, and/or 40 cases strengthened participation. As noted in Figure 4.6, these proportions change slightly towards failure when visible health impacts are reported. This result is not surprising since health harms and the effects of persistent and often irreversible toxic pollution can require very complex and very expensive preparation processes that become possible only after lengthy legal battles for justice (Bohme 2015).

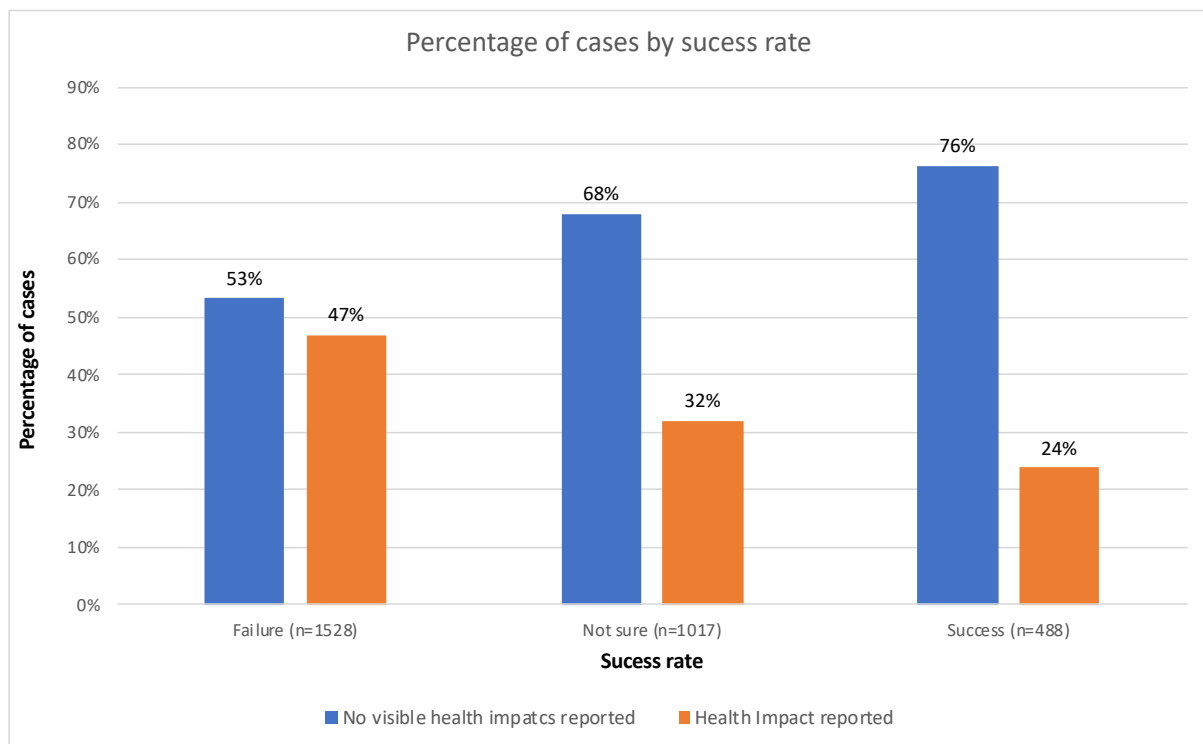


Figure 4.6. Percentage of cases reporting visible health impacts (EHC) with cases non reporting visible health impacts (n=3033) by success rate.

Nonetheless, even though the project is stopped, health concerns remain in the local communities, as noted in the Vieques case in Puerto Rico of contamination from military

practices by the US Navy (EJAtlas 2014a). Furthermore, even when the project is still operating, collaborators declare success because legal and technological tolls were established to reduce pollution (EJAtlas 2015c; EJAtlas 2016d; EJAtlas 2014b). Furthermore, success is sometimes declared because companies' investments address community concerns (i.e. communities' plans to address local health and environmental problems) (EJAtlas 2015d).

Toxic clean-ups are also mentioned (EJAtlas 2019g). However, despite efforts in recovering environmentally degraded and polluted areas, some pollutants are almost impossible to clean (EJAtlas 2019j). As mentioned in a case of PCB contamination: "detoxifying the landfill does not bring the community back to its pre-1982 PCB-free environmental condition" (EJAtlas 2015e). Monetary compensation gained is deemed to be a success in some cases (EJAtlas 2015f; EJAtlas 2015g) although sometimes contested: 'no amount of money can compensate the health ailments suffered' (EJAtlas 2015g). Instilling within the community a sense of justice, recognising victims, and ensuring that toxic environments will not happen again is also mentioned as success (EJAtlas 2015g). Success in environmental justice remains difficult to define in EHC, principally because of the irreversibly and persistence of damages even when the source of pollution stops.

7. Concluding discussion

Healthy environments are fundamental to the full enjoyment of life. When these are threatened, collective actions emerge in response and therefore, environmental conflicts arise around the globe. Our results show that when human health is affected by toxic pollution, environmental conflicts follow different patterns requiring a more nuanced and specific approach to understand them. This paper advances knowledge in this regard by signalling such differences and bringing key research agendas to tackle what we have named here 'environmental health conflicts', namely when human health has been affected by toxic pollution.

First, EHCs are recorded among all the ten major categories of conflicts in the EJAtlas. They abound in Mining, Land and Biomass, Fossil Fuels, Water conflicts (Fig. 2). However, in proportion, industrial, Waste management and Nuclear energy activities are more conducive to EHCs than others. These activities often produce and emanate persistent toxic substances that

do not disappear even when the activity or pollution source ends. As shown from several empirical cases, different forms of toxic pollution can persist in the environment and human bodies still impacting people's health (and their children's) for decades. Therefore, recognising the impacts of toxic pollution beyond their temporal and spatial scales are key to advance ongoing debates on intergenerational environmental justice and the scope of harm of toxic pollution in such conflicts. In light of this, how to guarantee a healthy future to the next generations whose parents' bodies are toxic and the environments in which they will grow up are (and possibly will continued to be) toxic too? Decontamination attempts by governments and private companies can be useful, but preventive measures should be the rule and not the exception in an increasing toxic world. Toxic pollution at the most local scale (the body) is embedded into a global economic system that is still requiring continuous resource extraction, processing materials and waste disposal constantly exposing people to dangerous health conditions. Past and present exposures is conditioning the future. The inattention to slow and toxic violence leads to thousands of people slowly dying every year, often the poorest and most vulnerable worldwide. But not only. Toxic pollution travels and knows no borders therefore the need of global actions.

Second, our data also show that workers play an important role in EHCs. Sometimes, their bodies are the first to perceive and suffer the slow violence of toxic pollution. Their leadership in safeguarding healthy working conditions and outside environments is key in sustaining collective actions, bringing together more worker communities, collectives and grassroots organizations to the fore.

Third, successes in EHCs remain hard to define. Stopping the source of pollution and acknowledging how past exposure can harm the present are key challenges for mobilising groups. Sharing knowledge about toxic chemicals among countries with weaker regulations systems and strengthening transnational environmental justice networks are urgent needs for the global environmental justice movement facing human health hazards. More research is needed to understand how justice is defined by local communities when the present and future is already toxic.

Finally, claiming reparations and decontamination after damages are felt can result in successful battles that prevent companies from escaping unpunished. We celebrate that social resistance from below has led to the transformation of regulations systems such as banning a toxic substance or decontaminate a toxic landscape. Although many toxics remain in our environment, these local struggles reveal the urgent need of a healthier and just world.

CHAPTER V

Conclusions and further research agenda

Wake up! Wake up Humanity! There is no time.
Our consciences will be shaken by the fact that we are only contemplating self-destruction
based on capitalist, racist and patriarchal predation.

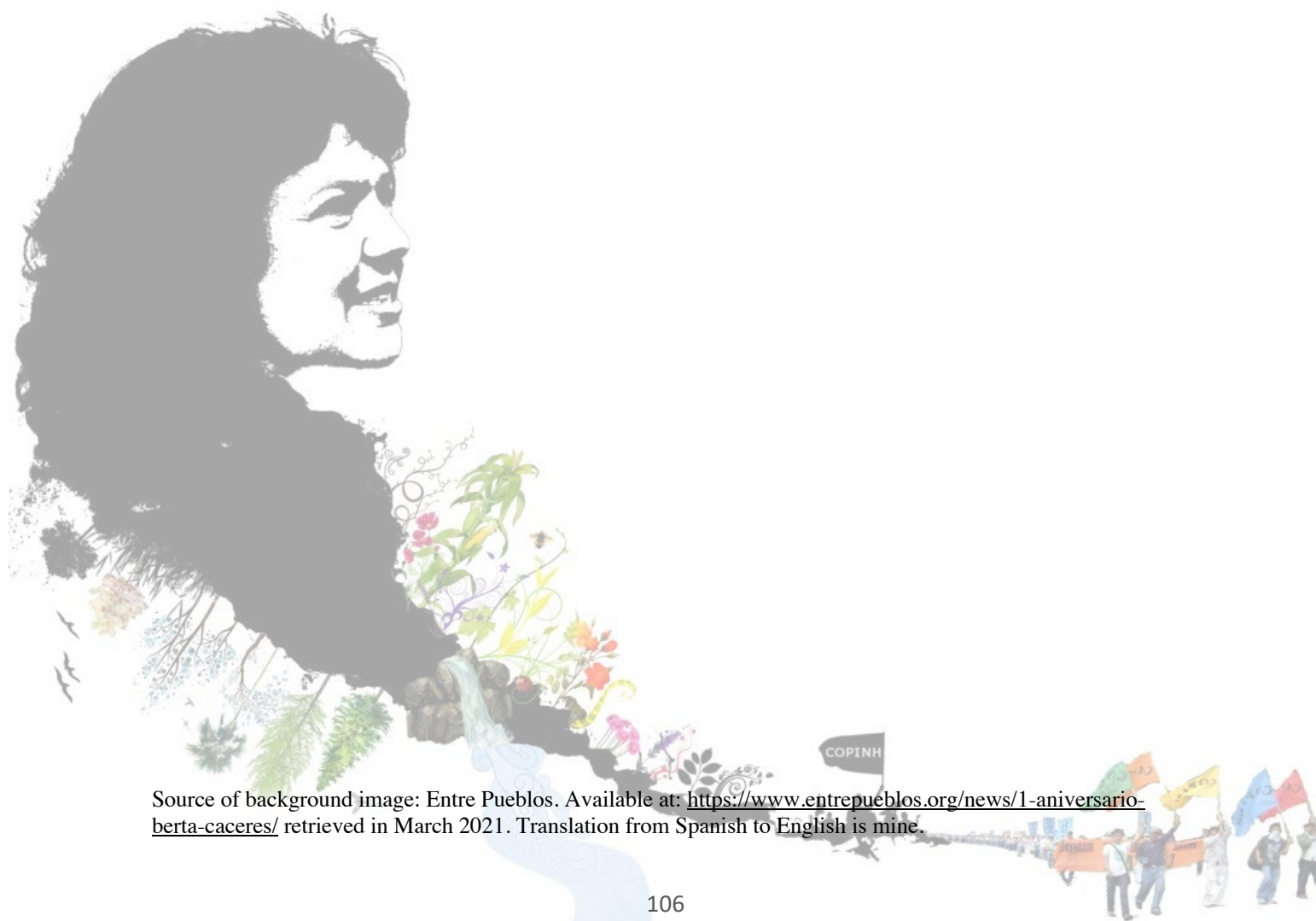
The Gualcarque River has called us, as well as the others that are seriously threatened.

We must go.

The militarized Mother Earth, fenced off, poisoned,
where elementary rights are systematically violated, requires us to act.

–Berta Cáceres
Acceptance speech at the Goldman Prize ceremony
2015

Source of background image: Entre Pueblos. Available at: <https://www.entrepueblos.org/news/1-aniversario-berta-caceres/> retrieved in March 2021. Translation from Spanish to English is mine.



1. General contributions and conclusions

This thesis has aimed at advancing knowledge of how and why people protest to protect nature, their livelihoods and their healthy living conditions from environmental hazards. Furthermore, it aims at improving our understanding of the challenges these communities face and the outcomes they reach.

Methodologically, I based the research on the use of qualitative and quantitative methods to tackle different scales of analysis. First, the regional scale is based on a comparative approach of a sample of 95 environmental conflicts throughout the seven countries in the Central American region: Panama, Costa Rica, Nicaragua, El Salvador, Honduras, Belize, and Guatemala. Then, the local scale follows a case study analysis in the province of Chinandega, located in Nicaragua's Northwestern Pacific Coast. And last is the global scale, which tackles a large sample of n=3033 of past and present environmental conflicts occurring worldwide. These three analysis levels have allowed a broader and more complete approach to addressing the different research questions.

Furthermore, this research builds on transdisciplinary theoretical frameworks, including Political Ecology and Environmental Justice and environmental health. Also, it contributes to different fields of research, particularly to the study of environmental conflicts, studies on violence, gender and agrarian studies. As follows, I detail how this thesis contributes to each one of these fields from a set of conceptual, methodological and empirical contributions and implications.

1.1 Conceptual contributions

In Chapter II, I have proposed the 'Multidimensional Violence Approach' to study how violence appears and overlaps in environmental conflicts. The 'Multidimensional Violence Approach' is defined it as "a focus in which violence is defined as an action or a process that appears in visible and unseen forms against humans, nature, and its sustainable relation". This definition is built on the work of previous scholars who have been concerned about the need to expand the notion of violence and the causes that generate it (Galtung 1969;1990). It is also

supported by dialogues with scholars' concern about the gradual and crescent effects of toxic pollution that local communities and nature undergo over time (Narain 2007; Nixon 2011; Davies 2019). My aim in bringing the debate of violence within the study of environmental conflicts was to reveal forms of violence that often escape attention and to think beyond the main focus in both academia and public debates: the direct violence against environmental defenders—for instance, their murder.

The forms of violence that are mentioned in Chapter II include: the direct, the structural, the cultural, the ecological, and the slow violence that are woven into broader dynamics of power and social inequality. I am not saying here that analysis on the direct violence against environmental defenders is not useful; of course, it is. Efforts to register their victims' names, pushing for their murders to not remain unpunished, and commemorating and continuing their struggles are a must. However, what I aimed at bringing to the debate is the idea that this is the tip of the iceberg, thus necessitating a more comprehensive understanding of the structural and cultural dynamics that allow violence to occur. The multidimensional violence approach is not an ending point, and the frame continues to evolve. Dalena Tran's forthcoming work in *Geoforum* (Tran 2021), analysing the multidimensional violence approach from a feminist perspective, is a substantial effort in this regard.

Furthermore, the multidimensional violence approach can bridge with research agendas in environmental health, global health and planetary health which —paradoxically—tends to avoid debates about violence towards local communities that defend nature and healthy environments. The recent comment published by Correa-Salazar et al., 2021 in *The Lancet Planetary Health* about the role of violence against environmental defenders in the Planetary Health research agenda sheds lights on this specific issue. The authors argue that because Planetary Health is driven by initiatives from the North, it largely dismisses the key role that violence against environmental defenders face in the South: “planetary health science is primarily driven by initiatives and organisations from high-income countries, which largely ignore the role of violence for communities striving to protect the environment and its resources in low- income and middle-income countries (LMICs)” (Correa-Salazar et al., 2021:113). However, I think that beyond the individualized focus on ‘environmental defenders’ or to specific communities, the use of the multidimensional violence approach can be beneficial in

revealing how and why violence (in its visible and invisible forms) is historically put into practice and maintained in the South in detriment of local communities' livelihoods and nature.

Additionally, environmental defenders are not the unique victims of violence in environmental conflicts. Their voices represent a struggle against deforestation, the increase of carbon emissions, land grabbing, pesticide-based agriculture, the exploitation of the oceans and the contamination of the rivers. Therefore, if governments want to accomplish the proposed target objectives to face the climate crisis and biodiversity loss, it is advisable to address a multidimensional violence approach to tackle the different forms of violence that environmental defenders, their families and their communities face in the protection of their local environments, but also, the protection of the planet and future generations. For instance, the Escazú Agreement, a regional, legally binding agreement that will be enforced in April 2021 is seeking to implement Principle 10 of the 1992 Rio Declaration about citizen participation in environmental matters. This Agreement is a good starting point, as it includes specifically the protection of environmental and human rights defenders, access to information about environmental threats and the protection and defense of public participation in environmental matters (United Nations 2018).

A second conceptual contribution of this thesis is the adoption of more nuanced lenses of analysis to address environmental conflicts that deal with a very complex, uncertain and often invisible threat: toxic pollution. In Chapters II and IV I offer key elements to better understand what I call 'environmental health conflicts' in which human health has been severely affected or put at risk by the toxic pollution of different economic activities. This includes, for instance, the toxic gases of industrial facilities, heavy metals of mining projects, synthetic pesticides used in monocultures and akin toxic substances that can produce present or future harm to live organisms.

A main characteristic of these conflicts is their temporal and spatial dimension. Toxic pollution can remain in the environment and bodies for decades, even when the source of pollution is stopped. Examples analysed included protests of local communities against nuclear radiations many years after radiation was emanated to the environment, as well as indigenous communities in the Amazon forest who are slowly becoming ill because of mercury poisoning

discharge by extractive industries located many miles away. Toxic pollution, its persistence, and its mobility opens up our scales of analysis within the study of environmental conflicts.

Furthermore, in environmental health conflicts, we find that people do not (or not only) protest for the access and use of natural resources as it is commonly evidenced within the study of environmental conflicts, but they also fight against an invisible and complex threat, present everywhere—in their bodies, houses, schools, labouring environments—yet almost invisible. Therefore, rather than a literal murder of an environmental defender, toxic pollution is a ‘silent murder’ (Narain 2017)—a form of (slow) violence which is much more difficult to identify and to face. Additionally, there is a very important scale in environmental health conflicts: the human body, which is often the first site in which toxic pollution manifests and the first site of social and environmental struggle.

The last element arising from the analysis is the need to recognize the impacts of toxic pollution beyond their temporal and spatial scales to advance debate about intergenerational environmental justice. This includes, for instance, the hard mission to guarantee a healthy future to the next generations whose parents' bodies are toxic and the environments in which they will grow up are (and possibly will continue to be) toxic.

1.2 Methodological implications

Regarding the methodological perspective, I have used different methods to address my different scales of analysis. In particular, this thesis benefits from the derived knowledge that scholars have uncovered in advancing the field of ‘statistical political ecology’ using the EJAtlas as the main source of data (Temper 2014; Del Bene et al., 2018; Scheidel et al., 2020; Temper et al., 2020).

Through descriptive statistics, I predominantly used ‘statistical political ecology’ in Chapter IV by analysing a large number of environmental conflicts to identify specific patterns of environmental health conflicts. After Scheidel et al., 2018, with an analysis of 3033 cases, Chapter IV is the second largest study using EJAtlas data, and the first world-wide analysis of

the human health dimension of environmental struggles. Therefore, a little step in showing the benefits in the use of ‘statistical political ecology’ to reveal a global problem that requires urgent action.

Such a global perspective can have however, some limitations. What is being lost in the analysis is an in-depth understanding of environmental conflicts as a complex process within their particular political, economic and ecological contexts, which are only possible to tackle through the use of qualitative and ethnographic methods, such as I did while doing fieldwork in Nicaragua.

On the contrary, going beyond a case study or do not limit to a specific region cannot provide such specificities. However, it can help in revealing global patterns for a better understanding of the characteristics of environmental conflicts around the world: actors mobilising, their reaction phase, the main economic activities threatening environmental health or the most ‘toxic commodities’ involved useful to boost global actions.

Furthermore, because of its ambitious and global scope, the EJAtlas has some limitations itself. As follows, I mention some of the limitations that I detected while entering cases to the database and also while doing my own research or in collaboration with other scholars. First, and as previously detailed by Temper et al., 2020, and Scheidel et al., 2020, the database is not statistically representative according to geographic distribution or economic activities. The frequencies of variables and analysis reflect the distribution within the EJAtlas database, providing a hypothetical picture of an unknown number of conflicts globally. Furthermore, some countries are mapped in more detail than others. The number of cases in each one of the countries, or regions, responds to the number of collaborators we have in that country. Or the interest of researchers in entering cases in a particular area or economic activity.

Second, because the EJAtlas is highly dependent on secondary sources, some countries could be under-mapped, not necessarily because of the absence of environmental conflicts, but because of the lack of secondary sources available. This might apply, for instance, to countries with poor press liberty. There is also the language barrier, although there is a very large number

of collaborators around the world. In some countries there is a lack of collaborators speaking the local language to read the news in that language and provide a reliable entry to the EJAtlas.

Last but not least, environmental conflicts are complex social processes in which their actors and the levels of violence, constantly change over time. Because there are more than 3000 cases mapped in the EJAtlas, it is almost impossible to deep into the complexity of each one of the conflict or keep all of them up to date. Therefore, mapped cases should be read as a general representation of reality and fact for the date on which the case was accepted for online publication. Nevertheless, despite these limitations, the EJAtlas continues to be the only and most extensive global sample available on environmental conflicts today and it will continue to grow and improve.

1.3 Empirical contributions

Both Political Ecologist and Environmental Justice scholars have a tendency to study how grassroots organisations and local communities, often labelled as the ‘poor’ (Martínez-Alier 2012), the ‘subaltern’ (Spivak 1988), the ‘dispossessed’ (Temper 2014) struggle against corporate and powerful governmental actors that exploit their land and bodies through the process of capital accumulation. The result of this tendency is the study of local communities as homogenous actors.

Using the case study of ASOTRAEXDAN in Nicaragua (Chapter III), I have demonstrated that local communities struggling for environmental justice are far from homogenous. On the contrary, my results testify about the uneven power relations among women and men within the workers’ organisation and how this uneven access to decision making on the agenda of the struggle led to women not being able to push for their interests in being medically checked.

However, the fact that local organisations are often male-centred, and that women’s voices are often neglected in the environmental and agrarian justice struggles and organisations is not new (Bolados and Sánchez 2017; Buckingham and Kulcur 2009; Campbell 1996). What I think is new in my research is that the limited scientific knowledge—highly gendered in their point of

origin—can interacted with social forms of difference in terms of gendered power dynamics within the environmental justice organising.

Within this context, my invitation to scholars working on environmental conflicts from a Political Ecology perspective is to unveil how local organisations often produce and reproduce internal power dynamics that perpetuate environmental injustice. These findings are useful for local organisations and activists working on environmental justice, too. One opportunity to tackle this, is to reflect from the bottom-up how these uneven dynamics need to be transformed at the most local and intimate scale. Some examples of this include the integration of women's rights into the agenda of the struggle for environmental justice, the promotion of non-stereotyped roles within the organisation and the support for equality in the leadership of the organisation.

Another insight that we can gain from the case study in Nicaragua is about the crucial role (and lack thereof) of scientists (doctors, epidemiologists, lawyers) supporting environmental justice struggles. As noted in chapter IV, 'Professionalised groups' are less frequently involved in Environmental Health Conflicts, but in those cases where they are involved, they may have a very important role in evidencing the link between chemical exposures and diseases, which are often previously evidenced by local communities' through, for instance, 'popular epidemiology' processes (Brown 1992).

However, beyond the 'undone science' there is the issue of the formal accepted evidence produced in bodies that count politically (male white bodies in California). The fact that reproductive harm was discovered in California shaped the Nicaraguan workers' struggle to demand justice. However, the history of the production of scientific knowledge on pesticide effects is also the history of organizing around them (Nash 2004). Therefore, two main conclusions can be highlighted: firstly, the need for gender-sensitive and localised scientific studies in the communities that face the burdens of toxic pollution. This is particularly of interest because the agrarian industry is walking to an increasingly pesticide-based agrarian world, with an increasing role of women in agriculture. Secondly, one main strategy for local organisations is to push for the undone science to be done.

2. Further research agendas

We are in an unprecedented era in history, the COVID-19 pandemic seems to have ‘awakened’ both politicians and society to understand (or at least take more action regarding) the planetary crisis. However, these actions have been primarily directed under discourses regarding climate change, biodiversity loss, and the energy transition. Undoubtedly, these are major problems that deserve to be tackled. However, the effects of an increasingly toxic world remain hidden in these global discourses (Barca 2020). As follows, I foresee three main potential research agendas that would help to render this toxic world visible.

Social actions and inaction in toxic environments:

Throughout this dissertation I have focused on communities who unite to mobilise for environmental justice. Contrariwise, a growing research agenda is concerned about why people do not mobilise despite living in toxic environments (Auyero and Swistun, 2009; Lora-Wainwright, 2017; Neumann, 2016; Verbeek, 2020), even more, some of them even deny their toxic condition (Neumann 2016). These brilliant analyses have been, however, grounded on the case-study analysis. As a first research avenue, I suggest that some of its hypotheses and results can be tested at a global level using the EJAtlas. For instance, that further examination of ‘latent conflicts’ from EJAtlas (conflicts in which there is no visible resistance) when health, environmental and socio-economic impacts have been reported, can give insights necessary to advance knowledge and better understand the social dynamics and power relations in which environmental injustices are embedded. For instance: What are the factors that lead people to protest (or not protest) in the most polluted places on Earth? Are there differences among countries and political regimes? Does the role of companies or state-actors shape collective (in)action? If yes, how? Are compensations (or akin monetary-based solutions) drivers of social (in)actions?

In the same vein, different types of economic projects and facilities mapped in the EJAtlas can lead to different forms of pollution, health impacts and therefore, the risk perception of local dwellers, which informs if they engage in social actions. For instance, a lead-battery plant or a nuclear plant can be perceived as more dangerous than a landfill of domestic waste. Will people

be more willing to protest against the nuclear plant? Or in other words: *Do different forms of pollution lead to different forms of social action (or inaction)?*

Additionally, as revealed in Chapter III, Nicaraguan farmworkers consistently identified DBCP as the main probable cause of their different health ailments—despite also being exposed to other highly toxic pesticides in the banana plantations and other places of work. This is not uncommon, and often, environmental justice organisations deploy strong campaigns against a specific pesticide when many other pesticides are being used. Hence, the question: *Why do some pollutants surface and encounter strong resistance while others do not?* A key example to start thinking on the issue is the use of glyphosate-based pesticides which have gained strong resistance both in the global north and south. Unfortunately, this is one of a very long list of toxic substances used today (Shattuck 2021).

Legal mobilisations and accountability in a toxic world:

A second research avenue is related to the legal tools that environmental justice organisations use to deal with and claim reparations for being exposed to hazardous substances in their environments. As noted in Chapter III and IV, local communities often appeal to national and international courts as a mobilising form to claim environmental reparations and compensations for health damages caused by toxic pollution. However, while legal mobilisation strategies are common tools used by environmental justice movements (Scheidel et al., 2020), these strategies have been barely explored by scholars working on environmental conflicts (Conde, 2017)

Nonetheless, as shown in Chapter III, claiming monetary compensation for human health impairments in judicial courts can pose different challenges for local communities, turning these processes into vicious cycles in which polluting companies often escape unpunished. DBCP contamination in Central America is, of course, an extreme case of a transnational corporate toxic injustice (Bohme 2015). However, as in some other empirical cases described in Chapter IV, monetary compensations can take years to be achieved and often arrive after victims of pollution have passed away. Furthermore, monetary amounts established in courts are sometimes insignificant compared to companies' budgets, which does not dis-incentivise their toxic practices. One question to be addressed is: *Which forces make the 'precautionary*

principle' sometimes fail to avoid public health harm regarding toxic pollution to the poorest geographies worldwide?

In light of this, there is an urgent need to better understand the strategies followed by transnational corporations, multinational and state actors to avoid accountability, while producing bodies and zones of sacrifice to accumulate wealth. This would require an analysis not from the lenses of resistance and local actors –as I have done in the thesis– but through analysing more deeply the state and corporate actors' strategies to avoid liability and accountability. Finally, related sub-questions in this vein would ask if *monetary compensation is an effective path for justice and how justice is defined by local communities when irreversible harms are produced in their environments and bodies.*

These questions would inevitably join discussions such as those introduced by Martínez Alier about 'languages of valuation' (2002), as well as those introduced by ecological economists on “when and how to value with money? and under what conditions?” (Kallis, Gómez-Baggethun, & Zografos, 2013:97). These debates would probably move the discussion beyond the 'polluter pays' principle, firstly, because often companies successfully find strategies to escape unpunished or pay as little as possible. Secondly, the debate would be broadened because our healthy environments, healthy bodies and the future of our children do not have a monetary price. The broader topic under discussion (and of utmost interest to political ecologists) is the unequal power relations in the legal arenas.

Uneven toxicities behind the energy transition:

The last research avenue using the EJAtlas database is to dig into the commodity chain behind renewable energies. As shown in Chapter III, windmill farms, solar plant projects and hydroelectric dams are deemed to be 'less toxic' to human health. Yet these percentages do not consider the material economy behind renewables (Zografos and Robbins 2020). For instance, cobalt is extracted in highly risky conditions in the Democratic Republic of the Congo (EJAtlas 2019a) and in Morocco (EJAtlas 2018a). Cobalt is used to power electric vehicles, batteries, or to store energy from renewable sources; its use is expected to increase in the upcoming years to supply the global demands of a 'greener' world. Therefore, using the EJAtlas database, one could look at the whole chain from resource extraction to waste disposal of specific materials

used in renewables energies: cobalt, lithium, and ‘rare metals’ among others. This analysis would link one conflict to another throughout the commodity chain, providing a bigger picture with which to understand the extent to which renewables are becoming visibly toxic to human health. This would thereby address overlooked but nonetheless affected bodies and geographies in the so-called energy transition. At the same time, it will pose structural debates to rethink the economic system in which we are involved: *Are we going to discuss how to minimize the social, environmental, and health costs of the energy transition and continue with ‘business as usual’ or engage in more critical debates to decrease our over-consumption of energy and materials? These debates are already taking place; I hope it is not too late*

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Juana (I9) former banana worker. Chinandega, Nicaragua 2018

Paula (I10), former banana worker. Chinandega, Nicaragua 2018

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Pedro (I15) former banana worker ‘Ciudad del Nemagón’, Managua, Nicaragua, 2017

Juan (I16) former banana worker ‘Ciudad del Nemagón’, Managua, Nicaragua, 2017

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ANNEX: Other academic achievements obtained during the PhD project

My dissertation was funded by the European Research Council through the research grant awarded for the ENVJustice Project (ERC No. 695446). Besides achieving my personal research interests aiming at writing this dissertation. Being part of the ENVJustice Project allowed me to participate in other scientific papers, book chapters and other academic activities which I have not mentioned before. Since all that work has been a source of learning, teamwork and inspiration for my writing process and academic career, I find it is worth to be mentioned here.

Co-authored articles

Paper 1. Socio-ecological distribution conflicts in the mining sector in Guatemala (2005–2013): Deep rooted injustice and weak environmental governance.

Abstract: This study characterizes ecological distribution conflicts (EDC) related to the mining industry and derives a series of political implications for Guatemala. The characterization includes a placement in the context of Central America, regional location, intensity of the EDC and the trends in social and environmental consequences, with special emphasis on the groups of social actors affected and the degree to which the institutional framework does not provide effective means of participatory environmental governance. The time period covers 2005 to 2013. In order to understand trends in actor behavior and diverse moments of high intensity we introduce the use of action and response timelines as a methodology for EDC analysis. We propose the notions of embedded conflicts to describe their relation with the structural social conditions prevailing in the country and swarms of conflicts to describe their escalation through time. We conclude that conflictivity is inherent to the unsustainable characteristics of metallic mining and is aggravated by Guatemala's history of social inequality and power concentration. The attempts to reduce "conflictivity" through CSR have been insufficient in addressing these structural conditions. EDCs may have helped create a positive environment for creative forces to seek sustainability and justice in Guatemala's development model.

Keywords: *Environmental Justice Atlas (EJAtlas) Ecological distribution conflict Nested conflict Conflict swarm Indigenous community consultations Guatemala mining*

Reference: Aguilar-González B, Navas G, Brun C, Aguilar-Umaña A, Cerdán P. Socio-ecological distribution conflicts in the mining sector in Guatemala (2005–2013): Deep rooted injustice and weak environmental governance. *Extractive Industries and Society*. March 2018. DOI:10.1016/j.exis.2018.02.002

Paper 2. Environmental conflicts and defenders: A global overview

Abstract: Recent research and policies recognize the importance of environmental defenders for global sustainability and emphasize their need for protection against violence and repression. However, effective support may benefit from a more systematic understanding of the underlying environmental conflicts, as well as from better knowledge on the factors that enable environmental defenders to mobilize successfully. We have created the global Environmental Justice Atlas to address this knowledge gap. Here we present a large-n analysis of 2743 cases that sheds light on the characteristics of environmental conflicts and the environmental defenders involved, as well as on successful mobilization strategies. We find that bottom-up mobilizations for more sustainable and socially just uses of the environment occur worldwide across all income groups, testifying to the global existence of various forms of grassroots environmentalism as a promising force for sustainability. Environmental defenders are frequently members of vulnerable groups who employ largely non-violent protest forms. In 11% of cases globally, they contributed to halt environmentally destructive and socially conflictive projects, defending the environment and livelihoods. Combining strategies of preventive mobilization, protest diversification and litigation can increase this success rate significantly to up to 27%. However, defenders face globally also high rates of criminalization (20% of cases), physical violence (18%), and assassinations (13%), which significantly increase when Indigenous people are involved. Our results call for targeted actions to enhance the conditions enabling successful mobilizations, and for specific support for Indigenous environmental defenders.

Keywords: *Environmental justice Environmentalism of the poor Environmental conflicts Sustainability Statistical political ecology EJAtlas*

Reference: Scheidel, A., Del Bene, D., Liu, J., Navas, G., Mingorría, S., Demaria, F., Avila, S., Roy, B., Ertör, I., Temper, L., & Martínez-Alier, J. (2020). Environmental conflicts and defenders: A global overview. *Global Environmental Change*, 63. DOI: 10.1016/j.gloenvcha.2020.102104

Paper 3. Gendered Geographies of Violence: A Multiple Case Study Analysis of Murdered Women Environmental Defenders

Abstract: This study illustrates how, despite the diversity of women environmental defenders and their movements around the world, there are near-universal patterns of violence threatening their survival. Violence against women environmental defenders, often perpetrated by government-backed corporations, remains overlooked. Research on this issue importantly contributes to discussions about environmental justice because women defenders make up a large proportion of those at the frontlines of ecological distribution conflicts. Through comparative political ecology, this research analyzes cases from the Environmental Justice Atlas, an online open-access inventory of environmental distribution conflicts, in which one or more women were assassinated while fighting a diverse array of extractive and polluting projects. Although the stories showcase a breadth of places, conflicts, social-class backgrounds, and other circumstances between women defenders, most cases featured multinational large-scale extractive companies supported by governments violently targeting women defenders with impunity.

Keywords: *Violence, murder, women environmental defenders, EJAtlas, comparative political ecology*

Reference: Tran, Dalena, Joan Martínez-Alier, Grettel Navas, and Sara Mingorría. 2020. “Gendered Geographies of Violence : A Multiple Case Study Analysis of Murdered Women Environmental Defenders.” *Journal of Political Ecology* 27(1): 1189–1212. DOI: 10.2458/v27i1.23760

Paper 4. Commons grabbing and agribusiness: violence, resistance and social mobilization

Abstract: The recent phenomenon of large-scale land acquisitions (LSLAs) is associated with what has been described as a global agrarian transition. New forms of land exploitation and

concentration have led to profound socio- environmental transformations of rural production systems in Latin America, South-East Asia and Sub-Saharan Africa. Scholars have pointed out that the expansion of transnational land investments is often associated with detrimental social outcomes, has negative environmental impacts and can represent a potential impediment to the achievement of many SDGs. In this paper, our primary concern is on the mounting evidence that LSLAs preferentially target the commons, in the process altering long-standing customary resource governance systems. While it has been shown that in many instances of commons grabbing associated with LSLAs, different types of social conflict emerge, it is less clear what forms of social mobilization and organized collective re-actions are taking place to defend the commons and contest such processes of dispossession and enclosure. The main aim of this contribution is to fill this gap by synthesizing and describing the different typologies of social mobilization and collective re-actions that emerge as a result of commons grabbing associated with the transnational expansion of the agribusiness frontier. In order to do this our research synthesizes information from the Environmental Justice Atlas (EJAtlas) shedding light on some of the key characteristics associated with the different forms and dynamics of social mobilization that are organized in reaction to agribusiness-related commons grabbing.

Keywords: *large-scale land acquisitions; social mobilization; violence; land grabbing; commons grabbing; environmental conflicts*

Reference: Dell'Angelo, J., Navas, G., Witteman, M., Alisa, G. D., Scheidel, A., & Temper, L. (2021). Commons grabbing and agribusiness : Violence , resistance and social mobilization. *Ecological Economics*, 184, 107004. DOI: 10.1016/j.ecolecon.2021.107004

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García López GA, Navas G. Eco-Imperial Relations: The Roots of Dispossessive and Unequal Accumulation. In: Z. NIC, ed. *The Palgrave Encyclopedia OfImperialism and Anti-Imperialism*. Palgrave Macmillan, Cham; 2019. https://doi.org/10.1007/978-3-319-91206-6_28-1

Menton M., Navas G., Le Billon P., 2021. Atmospheres of Violence: On defenders' intersecting experiences of violence. In: Menton & Le Billon (eds). *Environmental defenders: Deadly struggles for life and territory*. Routledge:London. ISBN 9780367649647

Jiménez-Thomas D., Navas G., Scheidel A., From Chico Mendes to Berta Cáceres: the murder of environmental defenders. In: Handbook of Latin America and the Environment. Routledge: London (*forthcoming*)

Visiting fellowships

- Visiting researcher at the Institut des Hautes Etudes de l'Amérique Latine (IHEAL)- Université Sorbonne Nouvelle - Paris 3 under the supervision of Dr. David Dumoulin. March- June 2019.
- Visiting researcher at the Centre Population & Développement (CEPED)- Université Paris Descartes- Paris 5 under the supervision of Dr. Mina Kleiche. March- June 2019.

Courses

‘JPS 2020 Writeshop in Critical Agrarian Studies and Scholar-Activism’. Organized by The Journal of Peasant Studies (JPS), College of Humanities and Development Studies (COHD) of China Agricultural University (Beijing), Institute for Poverty, Land and Agrarian Studies at the University of the Western Cape (PLAAS), Young African Researchers in Agriculture (YARA), Future Agricultures Consortium (FAC), and the Global South Young Critical Agrarian Studies Scholars. *Online*. July-November 2019. <https://www.plaas.org.za/sarchi-chair/jps-writeshop/>

Assistance to International Conferences as speaker

- 5th Conference on Business, Conflict and Human Rights. November 2016. Geneva, Switzerland.
- Environmental Justice in the Anthropocene, School of global environmental sustainability, Colorado State University. April 2017. Colorado, United States.
- 12 Conference of the European Society for Ecological Economics. ESEE 2017. Corvinus University in Budapest. Budapest, Hungary.

- XXXVI International Congress of the Latin American Studies Association. International Convention Centre of Barcelona (CCIB). May 2018. Barcelona, Spain.
- Environmental Justice Conference 'Transformative Connections'. University of East Anglia, Norwich, UK. July 2019.

Non-peer review publications

Navas G., 2020. “Entrevista a Malcom Ferdinand”. *Ecología política*, 60: 133-136. Icaria: Barcelona.

Liu, J., Martínez-Alier J., Scheidel A., **Navas G.**, González Hidalgo M., (eds) 2018. *Ecologías Políticas de China*. N. 56. Icaria: Barcelona

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Thiers, R., J. Liu, **G. Navas**, A. Scheidel y H. Mou, 2018. “La “micología política” del próspero sector bananero en China”. *Ecología Política*, 56: 90-96. Icaria: Barcelona.

Navas, G., 2018. “Resigned Activism: Living with Pollution in Rural China”. *Ecología Política*, 56: 150-152. Icaria: Barcelona. (book review)

Rolando Mazzuca, C., Mingorría S., **Navas G.**, Del Bene D. 2017. “Violencia contra mujeres tejedoras de resistencias”. *Ecología política*, 53: 104-107. Icaria: Barcelona.

Navas G., Blázquez M. 2016. “El turismo bajo las lógicas del capital: entrevista a Ivan Murray Mas”. *Ecología política*, 52: 118-123. Icaria: Barcelona.

Navas G., Blázquez M., Ivan Murray (eds). 2016. *Ecología Política del Turismo*. N. 52. Icaria: Barcelona.

Invited guest lectures

- August 2018. Summer course held at Northwest A&F University in Yangling, Shaanxi, China. Co-organized by Dr. Juan Liu and Dr. Arnim Scheidel. Title of the course: “Critical Social Studies: Current Issues in Sustainability Science”.

- October 2020. “Violence in Ecological Distribution Conflicts’ Master Program Political Ecology and Degrowth at the Institute of Environmental Science and Technology, Autonomous University of Barcelona (online).
- October 2020. The Global Atlas of Environmental Justice as a tool of research. Professor: Gabriela Merlinsky- Universidad de Buenos Aires, Argentina (online)

Organizing of a conference and part of the scientific committee

- Title of de conference: “Ce que l’Amérique fait a l’écologie politique: Bilan d’étape d’un courant ascendant des sciences sociales”. Paris, France (online). December 2020.

Part of Tribunal in Master’s thesis defences

- **Thesis title:** “Corruption, and the dual process of mobilisation and community-based natural resource management: The Don Diego mining project on the coast of Baja California Sur.” Presented by Romain Jon Alexander. Degree: Master’s Degree in Interdisciplinary Studies in Environmental, Economic and Social Sustainability at ICTA-UAB- September 2019
- **Thesis title:** “Mujeres Defensoras del territorio” Presented by Sofía Pérez Azula. Degree: Master’s Degree in Interdisciplinary Studies in Environmental, Economic and Social Sustainability at ICTA-UAB- September 2019
- **Thesis title:** “The Contested Triangle: Eco-Extractivism and the Discursive Governance of Lithium Mining in Argentina, Bolivia and Chile” Degree: Master’s Degree in Interdisciplinary Studies in Environmental, Economic and Social Sustainability at ICTA-UAB- July 2018.

Participation in academic networks

- **CLACSO- Grupo de Trabajo Ecología Política Latinoamericana.** (Coordinator 2016-2019)- The Latin American Political Ecology Network is multidisciplinary and transdisciplinary network includes around 70 Latin-American scholars working on the intersection among nature, social sciences and environmental conflicts. From this network, we tend to build bridges among academia and grassroots organization based on the analysis of power relations regarding nature access rights, participation in the decision process, democracy, justice, gender and health inequalities in Latin America. I was the coordinator from 2016-2019.
- **Mesoamerican Society of Ecological Economics (SMEE)**-Since 2016 I am part of the SMEE and since 2018, I am the vice president. This is an academic network based on the principles of Ecological Economics, an interdisciplinary aiming to understanding the economic processes within the Planetary boundaries. Our area of analysis in Central America, Mexico and The Caribbean: this network is part of the International Society of Ecological Economics

