Mapping the frontiers and front lines of global environmental justice: the EJAtlas

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Abstract

This article highlights the need for collaborative research on ecological conflicts within a global perspective. As the social metabolism of our industrial economy increases, intensifying extractive activities and the production of waste, the related social and environmental impacts generate conflicts and resistance across the world. This expansion of global capitalism leads to greater disconnection between the diverse geographies of injustice along commodity chains. Yet, at the same time, through the globalization of governance processes and Environmental Justice (EJ) movements, local political ecologies are becoming increasingly transnational and interconnected. We first make the case for the need for new approaches to understanding such interlinked conflicts through collaborative and engaged research between academia and civil society. We then present a large-scale research project aimed at understanding the determinants of resource extraction and waste disposal conflicts globally through a collaborative mapping initiative: The EJAtlas, the Global Atlas of Environmental Justice. This article introduces the EJAtlas mapping process and its methodology, describes the process of co-design and development of the atlas, and assesses the initial outcomes and contribution of the tool for activism, advocacy and scientific knowledge. We explain how the atlas can enrich EJ studies by going beyond the isolated case study approach to offer a wider systematic evidence-based enquiry into the politics, power relations and socio-metabolic processes surrounding environmental justice struggles locally and globally.

Key words: environmental justice, maps, ecological distribution conflicts, activist knowledge, political ecology

Résumé

Cet article met en évidence la nécessité pour la recherche collaborative sur les conflits écologiques, avec une perspective globale. Le métabolisme social de notre économie industrielle est en augmentation. Cette intensifie les activités d'extraction et la production de déchets, et les impacts sociaux et environnementaux associés générer des conflits et de la résistance. Cette expansion du capitalisme mondial conduit à une plus grande déconnexion entre les diverses «géographies de l'injustice» à travers le filière. Pourtant, dans le même temps, grâce à la mondialisation de la gouvernance et des mouvements pour la justice environnementale (EJ), les écologies politiques locales sont de plus en plus transnationale et interconnecté. D'abord, nous plaidons pour de nouvelles approches pour comprendre ces conflits interconnectés à travers la collaboration et la recherche engagés, entre le monde universitaire et la société civile. Deuxièmement, nous présentons un projet de recherche à grande échelle visant à comprendre les déterminants de conflits au sujet de l'extraction des ressources et de l'élimination des déchets à travers une collaboration mondiale initiative de cartographie: le EJAtlas, l'Atlas mondial de la Justice de l'environnement. Ce document présente les EJAtlas et sa méthodologie, décrit le processus de co-conception et la phase de développement, et évalue les résultats

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initiaux et la contribution de l'outil pour l'activisme, de plaidoyer et de connaissances scientifiques. Nous expliquons comment l'Atlas peut enrichir les études EJ. Il propose une enquête fondée sur des preuves systématiques dans la politique, les relations de pouvoir et les processus socio-métabolique environnantes luttes de justice environnementale, localement et globalement.

Mots clés: la justice environnementale, des cartes, des conflits de distribution, les connaissances écologiques militante, l'écologie politique

Resumen

Este artículo destaca la necesidad de realizar investigación colaborativa sobre conflictos ambientales en una perspectiva global. Al crecer el metabolismo de las economías industriales se intensifican las actividades extractivas y la producción de residuos, con impactos sociales y ambientales que producen conflictos y resistencia en todo el mundo. Esa expansión del capitalismo global lleva a una desconexión entre las geografías de la injusticia a lo largo de las largas cadenas de extracción, transporte y desecho de las mercancías. Pero al mismo tiempo, a través de la globalización de los procesos de gobernanza y de los movimientos de Justicia Ambiental, las ecologías políticas locales cada vez son más transnacionales y están más interconectadas. En primer lugar, proponemos nuevos enfoques para entender esos conflictos mediante la investigación colaborativa y comprometida entre los académicos y la sociedad civil. Presentamos después un proyecto de investigación dirigido a entender los factores globales determinantes de los conflictos por extracción de recursos y producción de residuos a través de una iniciativa colaborativa de mapeo: el EJAtlas, el Atlas Global de Justicia Ambiental. Este artículo introduce este proceso de mapeo del EJAtlas y su metodología, describe el diseño colaborativo y el desarrollo del atlas, evalúa sus resultados iniciales y su contribución como una nueva herramienta para los activistas, los académicos, las organizaciones ambientalistas. Explicamos cómo el atlas puede enriquecer la investigación de la Justicia Ambiental yendo más allá de los casos individuales, ofreciendo la posibilidad de estudios sistemáticos más amplios, basados en evidencias, sobre la política, las relaciones de poder y los procesos socio-metabólicos relacionados local y globalmente con las luchas por la justicia ambiental.

Palabras clave: justicia ambiental, mapas, conflictos ecológico-distributivos, conocimiento activista, political ecology

1. Introduction

Environmental conflicts are invading new spatial and symbolic spaces; emblematic examples include the mobilization in Istanbul in defence of Gezi park (Ors 2014), the toppling of the government in Madagascar over land-grabbing (Douguet 2013), and the aboriginal 'Idle No More' movement in Canada, where Indigenous opposition to fracking led to a violent stand-off between the Royal Canadian Mounted Police and Native communities in New Brunswick (Ornelas 2014). 'Fracktivism' has also made its way into the living rooms of middle class and rural families, from the US to Poland to Tunisia, exposing new audiences to debates about energy provision and "climate justice." In Post-Communist Romania, the 'Save Roşia Montană' campaign against a proposed gold mine brought one million protesters to the streets of the capital in what is now regarded as the largest civic movement in Romania since the 1989 revolution (Velicu 2012). This process has been described as the "environmentalization" of social struggles (Acselrad 2010), whereby ecological issues are increasingly important in themselves but are also used to contest political and scientific structures and practices.

At the same time local political ecologies are becoming increasingly transnational and interlinked across space. Grandmothers are chaining themselves to earth-moving machinery in Texas in cross-continental pipeline blockades against tar sands oil from Canada (Temper *et al.* 2013). Famous court cases confront giant oil or mining companies such as Chevron (Texaco), Shell, and Rio Tinto in their home countries, as activists attempt to pierce the veil of corporate impunity (Pigrau *et al.* 2012). New points of convergence between movements are manifold, as campaigns around biofuels and food sovereignty, land-grabbing, climate and food justice address sectors such as agriculture, energy generation, water management and financial markets simultaneously. This blurring of governance boundaries presents challenges for campaigners and social movements as they navigate new institutional structures (Borras, Franco, and Wang 2013).

Recent Environmental Justice (EJ) scholarship has focused on how contemporary capitalism is reconfiguring the geographies of environmental justice (Pellow 2007, 2009; Sikor and Newell 2014). Yet this has only gone partway in responding to long-standing critiques from geographers that consider EJ literature

as theoretically weak and dispersed (Holifield, Porter and Walker 2009). For example, Swyngedouw and Heynen (2003) charge that the EJ focus on local case studies does not lend itself to generalization. Further, they contend that analyzing dynamics only at local scales risks overlooking crucial processes and relations generating environmental inequalities at broader regional, national, and global scales.

Clearly, these new terrains of conflict and resistance call for a deeper systematic evidence-based enquiry into the politics, power relations and socio-metabolic processes surrounding environmental justice struggles. It is to this end that a large-scale research initiative was created to increase understanding of the constituents and determinants of resource extraction and waste disposal conflicts in the world within a framework of engaged research with the movements struggling for social and environmental equity and democratization of decision-making. This article offers an explanation of the origins and motivation of that project, and in particular, of a tool created to systematize information about environmental justice conflicts: the EJAtlas, the Global Atlas of Environmental Justice[2] (Figure 1).

Figure 1: The EJ Atlas homepage. www.EJAtlas.org

This tool was set up and is managed by the authors of this article at the ICTA, Universitat Autònoma de Barcelona, Spain. We started in 2012 with funding from the European FP7 programme for research on 'Science in Society' for the EJOLT project[3] that we also coordinated. EJOLT had 23 partners from around the world, academic institutions and activists groups. EJAtlas draws on inventories of conflicts developed by activist organizations, supplemented with further research.

In the following sections, we offer an outline of our theoretical framing, rooted in activist knowledge. We then explain the contents of the database with its categories and filtering possibilities, and give more detail on the methodology used for building up the EJAtlas. We also present some first results of the mapping process and a reflection on how this initiative can contribute to enrich EJ research and the field of political ecology. The final section presents the conclusions and suggests new elements for the research agenda for environmental justice scholarship.

2. Background: the emerging global environmental justice framework

The Environmental Justice movement was born in the 1980s among Black and Latino communities in the U.S. It was later theorized, first by sociologist Robert Bullard (1990), largely in relation to concerns about the unequal distribution of social and environmental costs between different social groups according to

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[2] EJAtlas webpage: www.EJAtlas.org
[3] EJOLT project website: www.ejolt.org

distinctions of race/ethnicity, social class, gender, age, and location. EJ issues were often portrayed as a matter of socio-spatial distribution of "bads" (emissions, toxins) and "goods" (parks, green spaces, services) and called attention to the link between pollution, race and poverty (Bullard 1993). Statistical proof of the existence of "environmental racism" was established (Bryant and Mohai 1992). Academically, this field of study was not classified as political ecology but as environmental sociology.

At the same time, over the last thirty years the field of political ecology has grown, largely in geography and anthropology (Bryant 2015; Bryant and Bailey, 1997; Johnston 2001; Peet and Watts 2004; Peet, Robbins and Watts 2011; Peluso and Watts 2001; Perrault, Bridge and McCarthy 2015). Political ecologists have mainly (though not exclusively) studied environmental injustices in the global South.

There was a clear overlap in content between political ecology and studies of environmental justice. Over time, the view of EJ has broadened beyond the distribution of environmental hazards, first by activists and then by academics (Martinez-Alier *et al.* 2014), extending the concept materially, spatially, and politically (Bullard 2005; Schlosberg 2013; Walker 2009 a,b; Walker 2012). It has expanded to include multidimensional and interlinked aspects of justice related to distribution, recognition, and participation (Schlosberg 2007).

The globalizing of EJ (Martinez-Alier *et al.* 2015; Schlosberg 2004) has occurred horizontally; for instance, the U.S. EJ movement inspired similar claims in Brazil (Acselrad 2010), South Africa and Scotland (Dunion and Scandrett 2003). It has also occurred vertically, to encompass concerns beyond national borders, such as trade agreements, transfers of wastes, climate change, and the Rights of Nature (Schlosberg 2013). Transnational EJ issues such as trade in toxic waste has been explored by Clapp (1994) and Pellow (2007); debates on climate change and climate justice by Chatterton, Featherstone, and Routledge (2013), and long before them by Agarwal and Narain (1991), while the notion of an "ecological debt" from North to South, was born in Latin America in 1991 (Robleto and Marcelo 1992), and has now been developed further (Goeminne and Paredis 2010; Rice 2009; Robert and Parks 2007; Warlenius *et al.* 2015).

The breadth of issues and contestations in EJ research has coalesced with political economy, since "environmental inequality is a global phenomenon routinely generated by the normal workings of international political economy" (Szasz and Meuser 1997). This in turn demands greater attention to the link between trade and environmental degradation and a "richer, multidimensional understanding of the different ways in which environmental justice and space are co-constituted" (Walker 2009a). As Robbins (2012) points out, a mine, a dam, or a road in the forest are not isolated objects but connected sites where value flows, where accumulation occurs, and injustices expand. A trade perspective makes visible the spatial fractures or disconnections between the sites of consumption and production of environmental goods and bads through their localized effects (Giljum and Eisenmenger 2004; Muradian *et al.* 2012). Mapping the interconnected sites of injustice and patterns of exploitation along these commodity chains allows a deeper analysis of how power produces prevailing distributions of risk, and it highlights the relational nature of risk (Robbins 2014).

Meanwhile the politics of EJ have taken on a transnational and transdisciplinary character (Routledge 2003; Sikor and Newell 2014), as a dialogue between action or activist research and a growing network of activists, scholars, and non-governmental organizations that form part of what has been termed a new "global brand of environmental justice" (Agyeman 2014). This assemblage offers an opportunity for the innovative approaches to research and engagement that some EJ scholars have called for.

Activist-led research, an epistemological need in EJ studies

'Environmental justice' is a social movement and a research subject. EJ was from the start a community-led science: data gathering was carried out by the communities themselves, as a form of citizen science or popular epidemiology. Citizens have monitored the places where they "live, work and play" and tracked public environmental health (Brown 1987). For example, the pattern of illness in the famous Love Canal case was discovered by Lois Gibbs with the help of local "situated knowledge" (Haraway 1988) about the underground stream beds or swales that ran through the area, when she discovered that the illnesses clustered along the swales (Couch and Kroll-Smith 2000; Gibbs 1982).

Many researchers in EJ studies engage with communities through processes explicitly named Participatory Action and Collaborative Research (Bacon *et al.* 2013). Yet while such forms of engagement

attempt to more actively include communities in the process of knowledge production, social movements often remain as objects of study, rather than being recognized as producers of knowledge in their own right.

In contrast, in discussions related to socio-environmental conflicts, activists participate on equal terms with experts from public administrations, universities or companies. In this respect, Martinez-Alier *et al.* (2014, 2015) demonstrate how concepts in political ecology are very often grassroots concepts, from 'biopiracy' to 'climate justice.' Activist work contributes to theory, that in turn is further used and enhanced by academics and by civil society groups. EJ can thus be considered a field of social praxis which draws from and integrates theory and practice in a mutually informing dialogue (Sze and London 2008).

In this light, the concept of activist knowledge (*sensu* Escobar 2008) argues that social movements are important spaces of knowledge production and that movements are not only enacting politics through protest and cultural contestation but are generating diverse types of knowledge. This destabilizes the boundary between activist and academic (or other expert) domains, calling for new forms of science production (Casas-Cortés *et al.* 2008). This type of science raises the possibility for collaboration between environmentalists and scientists, developing 'science with the people' rather than for the people, especially in those fields characterized by "irreducible uncertainties and ethical complexities" (Conde 2014; Funtowicz and Ravetz 1994:198).

There are several reasons for the new global EJ framework to maintain a tight connection with such an engaged model of science. First, environmental problems are complex, interdisciplinary, and sometimes emerging; having been created by new technologies, industries and new patterns of energy and material flows through the economy (Funtowicz and Ravetz 1991). This leads to uncertainties and inevitable ignorance. For this reason, an important stream of research in EJ studies, led by scholars in Science and Technology Studies, focuses on the contestations between expert 'scientific' environmental knowledge and local or Indigenous knowledge, highlighting how the development and application of scientific knowledge is inherently a political process that expresses and exercises power in the service of particular social, economic or political ends (Jasanoff 2004; Nadasdy 2011).

In debates over technology, and in situations of uncertainty, scientific knowledge is wielded by different actors in contestation over the nature of legitimate environmental knowledge. EJ struggles are often about one version of "knowing nature" that is imposed, while other forms of knowledge are discounted or erased (Goldman, Nadasdy and Turner 2011). EJ activists aim to make issues of risk and the uncertainties of knowledge explicit, and in the process to remove the legitimacy of specialists in defining, in isolation, the parameters of the problem and the arguments most relevant to decision-making (Porto 2012). This manifests as a distrust not of science itself but as a critique to the privileging of expert and technocratic perspectives over local experience without questioning the objectivity and neutrality of science. This can be summed up with the intertwined questions of "Whose knowledge?" and "Knowledge for whom?" (Haraway 1988; de Sousa Santos 2007). In socio-environmental conflicts, no expertise can claim any monopoly on what is true, as the knowledge on these issues are based on a "plurality of legitimate perspectives" (Funtowicz and Ravetz 1993: 204).

Second, in this battle for scientific legitimacy, EJ activists engage in a range of strategies of knowledge production or what Casa-Cortes *et al.* (2008) term "knowledge practices." These include the collection and analysis of data on local health and the local environment, becoming experts themselves on relevant subjects to contest scientific knowledge, forming coalitions with scientists and building citizen–scientist collaborations to advance their claims and seek legitimacy for their views. Conde (2014) used the term "Activism Mobilizing Science" (AMS) to denote the process whereby activists and scientists co-produce new and alternative knowledge that gives local organizations visibility and legitimacy, and empowers them to challenge the manufactured uncertainty produced by the state or companies.

Finally, the practices involved in activist research production, distribution and reception are conducive to regenerating instances of collective agency, bringing about an innovative sense of political participation and re-invigorating political imaginaries (Casas-Cortés 2009). Through these processes, impacted communities transform from "vulnerabilized" to collective subjects (Porto 2012). Campaign work may have deep-reaching and radically innovative policy implications that can shape and inform academic theory.

Academics also need to recognize their privileged position to expose the processes leading to and reproducing inequalities. Research activists and activist scholars can straddle the line between the academy and activism, overcoming this dichotomy (Crampton 2009), while creating emancipatory theory and a new

(critical) research praxis. As Sousa Santos (2014) suggests in his work on epistemologies, this kind of research is not focused *on* a movement or a specific group of people, but *together* with them and based on an "ecology of knowledges" and the "restitution of silenced histories, repressed subjectivities, subalternized knowledges" (Mignolo, 2007:451).

While the need for collaboration is often acknowledged by scholars (Fuller and Kitchin 2004; Hale 2008) and activists (Jakobsen 2012), so far, there has not been a space of interaction that enables collaborative research on EJ conflicts at a global scale. This is precisely what the research initiative described in the following section advocated.

The EJOLT project

As mentioned in Section 1, 'Environmental Justice Organizations, Liabilities, and Trade' (EJOLT) is a European Commission funded research project, whose aim is bringing science and society together to analyse and understand socio-environmental conflicts from an environmental justice perspective (Martinez-Alier *et al.* 2011). To fulfill this objective, EJOLT based its work on two-way communication between activism and science in the development and use of concepts which are common in the EJ literature, such as 'Ecological Debt' and 'Ecologically Unequal Exchange.' Coordinated at ICTA-UAB, the project brought together 23 research and activist organizations from around the world. The project ran from 2011 to 2015. The EJOLT project has produced many substantial reports and academic articles, documentary films and on-line courses. One of its main products has been the EJAtlas.

All research activities in the project have been the result of a collaborative and collective effort between activists/academics and members of Environmental Justice Organizations (EJOs). EJOs are civil society organizations locally or globally involved in conflicts over the unequal distribution of environmental entitlements, burdens of pollution, and uneven access to natural resources and environmental services. They may be registered as formal NGOs, as local committees, or as social movements, advocacy and action platforms. They focus on the link between the need for environmental security, health, and the defence of human and community rights. This is a type of environmentalism different from nature or wilderness conservationism. It comprises the "environmentalism of the poor" (Guha and Martinez-Alier 1997), understood as the defence of the environment to ensure livelihood for those directly impacted by conflicts over resource extraction and disposal of wastes.

Through the bottom-up methodology of the EJOLT project, there was an attempt to shift the mode of engagement in research to create a more relational-symmetrical approach to the co-creation of knowledge production. This exercise is embedded in a previously little-explored interface between ecological economics and social metabolism, social movement theory and political ecology, as well as critical cartography, expanded on in the following section. The intersection of these areas of research, through a multi-scale approach provides the opportunity to contribute and enrich all of these disciplines while extending the theory of global environmental justice.

A global socio-metabolic perspective

According to many scholars, the main underlying driver of ecological conflicts is the constantly expanding metabolic profile of the global economy (Martinez-Alier *et al.* 2010). Despite some differences in the geographies of extraction and political economic dynamics and actors shifting over time, the search for new materials and energy sources will continue leading the expansion of extraction frontiers into new locations, setting the conditions for new socio-environmental conflicts.

The concept of social metabolism (Fischer-Kowalski and Haberl 2007) refers to the physical throughput of the economic system, in terms of the energy and materials associated with economic activities, either as direct or indirect inputs or wastes. Material flow analysis, along with other methods from ecological economics and industrial ecology, can elucidate the metabolic patterns driving environmental change and give further insights into how uneven flows of matter and energy (Fischer-Kowalski 1997) and transformations in the extraction and provision of natural resources characterize different socio-ecological transitions (Fischer-Kowalski and Haberl 2007) and to novel forms of social contestations. Geographically uneven and socially unequal metabolic processes in fact are key to understanding environmental inequality, which in turn reinforces and at the same time reflects overt forms of hierarchy and exploitation.

We hold therefore that combining material and energy flow analysis with a commodity chain

perspective from political ecology helps visualize linkages between the use of materials and energy by some social actors and the environmental impacts experienced by others, often in geographically distant locations. It also brings further attention to the relations between global economic processes and inter-dependencies between resource use patterns in some world regions and socio-economic dynamics in the places of extraction. The concept of "global commodity chains" (LeBillon 2000; Mintz 1985; Raikes *et al.* 2000) can help in this; they have been defined as a "series of interlinked exchanges through which a commodity and its constituents pass from extraction or harvesting through production to end use" (Ribot 1998: 307-308). The embedded nature of power relations in the chain, who gains and who loses, are key questions of political ecology in examining commodity chains. The conflicts take place all along the different nodes of commodity chains, from extraction to final disposal.

One useful approach in understanding commodity chains from the social metabolic perspective is the theory of ecologically unequal exchange: it posits that developed countries externalize their consumption-based environmental costs to less-developed countries, which increase environmental degradation within the latter (Hornborg 1998, 2005). With the use of biophysical indicators the literature demonstrates how wealthy countries have achieved economic prosperity through the over-utilization of the world's limited pool of natural resources and waste sinks, and by shifting environmental degradation to the global commons and to the developing world. As Hornborg (1998) puts it, a structural condition for the functioning of the metropolitan industrialized areas is to enjoy favourable terms of trade to appropriate materials and energy, and also land and labour. Peripheral areas have physical trade deficits by volume, meaning exports are larger than imports, and they suffer disproportionately from negative environmental impacts, without compensation for local or global externalities. This dislocation between those suffering the harms and those reaping the benefits of the global political economic system has been termed "environmental load displacement" (Muradian and Martinez-Alier 2001). Such asymmetries cause many complaints at commodity extraction frontiers (Moore 2000).

At the same time, the internationalization of production and lengthening of commodity chains increases the disconnection between producers and consumers and modifies the governance spaces available for the pursuit of justice (Robbins 2014). A global perspective brings to the fore the larger scale processes of participation that are made available through new institutional connections and governance spaces in which different actors stake their claims.

In this regard, we are also concerned with lines of enquiry from social movement theory that seek to explain why and how social mobilization occurs, how marginalized groups can access alternative sources of power, mobilize resources and create networks based on shared identities moving towards social transformation (Della Porta and Ruch 2002; Tarrow 1991; Tilly 1993). Environmental justice movements can be examined productively at local scales and as they organize into transnational coalitions across space and places (Keck and Sikkink 1998).

3. The need for global scrutiny of socio-environmental conflicts: The EJAtlas

Struggles over the burdens of pollution and over the appropriation of natural resources and public space, arise from inequalities of power in the hegemonic organization of industrial social-metabolism, and imbalances in the terms of decision-making processes and institutional practices (Porto and Pacheco 2009). Conflicts manifest when the local actors whose fundamental rights are affected, claim redistributions or recognition, which are often part of, or lead to larger gender, class, caste and ethnic struggles.

Political ecology focuses on research on such socio- environmental conflicts (or equally, ecological distribution conflicts), which is undertaken at either the case study level or sometimes at the national, regional or sectoral level (Bebbington *et al.* 2013; Urkidi 2010; Veuthey and Gerber 2011). While in-depth case study analysis yields valuable analytical inputs, there is a need to develop innovative tools for analysis that can transcend individual cases and identify patterns, relationships between cases and actors' perspectives on how such conflicts are shaped by the larger political economy. Such an effort will help consolidate a more general theory of extractivism-related conflicts - which is still a work in progress.

The EJAtlas project aims to fill this gap in research and co-sharing of knowledge on EJ struggles. The 'Global Atlas of Environmental Justice: Mapping ecological conflicts and spaces of resistance' is an online database and interactive map that documents socio-environmental conflicts, defined as mobilizations by local

communities against particular economic activities whereby environmental impacts are a key element of their grievances.

These conflicts usually arise from structural inequalities of income and power. Dimensions of environmental justice include the distribution of burdens of pollution and access to environmental resources, the right to participate in decision-making, and the recognition of alternate world-views and understandings of development. In the act of claiming redistributions, these conflicts are often part of, or lead to larger gender, class, caste, and ethnic struggles, and help to move the economy into a more sustainable direction.

The EJAtlas provides a tool for knowledge, for activism and advocacy: to help denounce cases of environmental injustice; to encourage dialogue and the interchange of experiences, ideas, data, and action strategies; to provide a resource with reports of concrete cases, legal disputes, and other relevant matters; to sensitize the media, opinion-makers and public opinion; to put pressure on politicians and policy-makers to implement public policies conducive to EJ; to develop and strengthen strategies of international articulation on EJ, and to contribute to new processes of knowledge creation within an EJ perspective.

Finally, the database aims to develop a system whereby environmental conflicts can be described, analyzed, compared and interpreted, where quantitative data from the activity at the source of the discontent can be gathered and where patterns of mobilization, such as the frequency of participation of indigenous groups in such conflicts, the rates of success in stopping extractive projects or introducing new regulations can be discerned and productive lessons can be learned.

While the historical EJ emphasis was on urban exposure to toxics, the EJAtlas gives focus to rural conflicts in which diminished or denied access to local environmental resources, their degradation and corporate enclosures dramatically affect local communities and their livelihood security. We hold that EJ for rural people and their communities has as much to do with whether they are able to exercise rights to own, access and use the natural resources on which their livelihoods depend, as it does with the quality of the resources themselves (IUCN 2007). While political ecology had its origins in rural issues, the EJAtlas also wants to represent brown issue agendas such as access to sanitation and poor waste management.

Further, while most of case studies on environmental conflicts focus on the extraction phase, EJAtlas also reports conflicts related to rising CO_2 emissions (REDD or CDM projects, for example), as well as conflicts related to special waste disposal such as in ship-breaking yards in India and Bangladesh (Demaria 2010).

The unit of analysis is the project-based campaign or specific place-based struggle, which sometimes express in influential protest events or in broader campaigns. The observations move from the specific offending economic activity to the related social struggles that mobilize against the misdistribution of costs and benefits, or the lack of consultation and representation in decision-making. These contestations are made visible through legal cases, campaigning, petitions, meetings, demonstrations, boycotts, strikes, threats, civil disobedience, collective violence, and other forms of action (Tilly 1993).

In sum, the main criteria applied for the identification of conflict cases are the following:

1. Economic activity or legislation that has actual or potential negative environmental and social outcomes
2. Claims by environmental justice organization(s) that such harm occurred or is likely to occur as a result of this activity, and mobilization
3. Reporting of that particular conflict in one or more media stories.

The three criteria apply simultaneously to almost all cases collected.[4] By 'economic activity' we mean a local project with resource extraction, waste disposal, or transport infrastructure. But it could be also a new state-level initiative, for instance a water policy implying a change in water rights.

Due to the extent of the task, the Atlas cannot be exhaustive. It grows together with the advancement of research and the involvement of more collaborators, activists, and activist scholars. The EJAtlas can be seen as one more initiative using geo-spatial information and new spatial media to advance, legitimate, and

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[4] Given that cases often involve impacts on minority and maligned groups, in some instances the cases will not be covered in mainstream or national media sources but rather in local municipal media or in minority language articles or websites.

secure political claims (Elwood and Leszcynski 2012), including also some well known maps made by EJOLT partners such as FIOCRUZ in Brazil (Porto, Pacheco and Leroy 2013) and OCMAL in Latin America. Elwood (2010: 352) refers to this as "knowledge politics": the ways in which individuals and institutions leverage digital spatial data and spatial technologies in negotiating social, political, and economic processes. "New spatial media, critical cartography, participatory research, and activist-based knowledge represent new opportunities for activist, civic, grassroots, Indigenous groups and scholars to leverage web-based geographic information technologies in their research and in their efforts to effect social change." (Elwood and Leszcynski 2012).

One recent example similar to EJAtlas although at smaller scale, is WellWatch, a USA webtool designed to create a collaborative space for communities and academics to monitor, study, and respond effectively to the emerging shale gas industry (Wylie and Albright 2014). Following Crampton's suggestion (2009), these tools can help transcend the expert/amateur or expert/grassroots activist dichotomy, while creating a new spatial knowledge politics. These new politics aim to establish recognition and authority through witnessing, peer validation and transparency of data sources rather than through academic peer-review.

Process and aim

We briefly touched upon the methodology for the data gathering in the Introduction, and this is represented in Figure 2. As Environmental Justice was from the start a community-led science, the harvesting of data in the mapping process was carried out by the communities themselves, as a form of citizen science, drawing on the concept of activist knowledge which is at the core of the whole EJOLT project. Many researchers in EJ studies engage with communities through processes of Participatory Action and Collaborative Research (Bacon *et al.* 2013), and such forms of engagement attempt to include communities in the process of knowledge production more actively, and to recognize them as producers of knowledge in their own right.

Through the bottom-up methodology of the EJOLT project, there is therefore an attempt to shift the mode of engagement in research to create a more relational-symmetrical approach to the co-creation of knowledge production. In the initial phase, contributors (partners of the EJOLT project and later also outside collaborators) were invited by the authors, as editors of the EJAtlas, to take part in the mapping. The contributors (both activists and academics) had engaged in activism or in documenting activism around particular struggles. Cases were often jointly co-produced; academics draft versions which are then sent to local groups for review and elaboration, or vice-versa. Their data sources include field trips and first-hand experience, official reports, EIAs (Environmental Impact Assessments), interviews with stakeholders, court decisions, online research, academic papers, as well as 'grey literature', all of which are then referenced in the corresponding box (Table 1). Entries are geo-located on a world map (Figure 3), based on the data provided. Once data is entered, it goes through a moderation process at the ICTA - Universitat Autònoma de Barcelona, where the editors coordinate the work, fact-check and follow up on feedback and comments to ensure quality control for clarity, completeness and reliability of sources. Finally the case is published online.

While the EJAtlas aims to portray important and emblematic conflicts by geographical zone and thematic area, due to the bottom-up methodology and the variable quality of information available, the methodology for representation differs somewhat across regions, sometimes based on existing networks or on informal canvassing of relevant environmental organizations/activists within the country, or perhaps on tracking particularly vital public policies and investment trends if the case is time-sensitive.[5] Some of the challenges are linked to lack of reporting, or reporting in national languages. The aim is to present the most representative and significant environmental conflicts, as chosen by the activist experts, scholars and on-the-ground journalists.

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[5] In some countries a participatory process was undertaken amongst a large EJ community to choose the most relevant and emblematic cases. For example, in the US a survey was administered to the over 200 EJ leaders, activist groups and scholars by collaborators at the University of Michigan's School of Natural Resources and Environment. They identified influential cases in recent American history. Most cases in the EJAtlas from the US come from this University of Michigan group (with Prof. Paul Mohai).
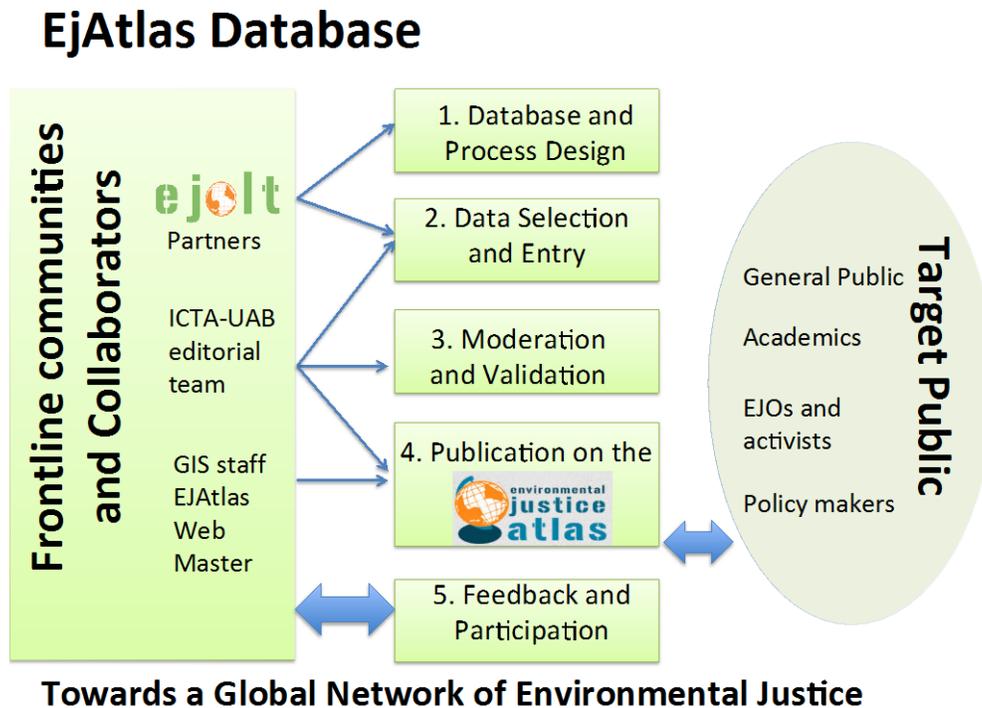
EjAtlas Database

Figure 2: The process of data collection (source: authors)

The EJAtlas mapping process draws on previous work from activists and scholars collecting information about environmental conflicts. These initiatives include that of EJOLT project partners Fundacao Oswaldo Cruz (FIOCRUZ), who along with the Brazilian network of Environmental Justice built a map of around 600 cases in Brazil. The Centro di Documentazione sui Conflitti Ambientali (CDCA) in Rome has documented emblematic ecological conflicts since 2007. Partners including the Latin American Observatory of Mining Conflicts (OCMAL), GRAIN, the World Rainforest Movement (WRM), and Oilwatch continue to support and document community struggles against mining, for food sovereignty and against land grabbing, against deforestation and tree plantations, and against fossil fuel extraction, respectively. Kousis *et al.*'s study of environmental protest-case studies in Southern Europe (1998) and work done by Gerber (2011) and WRM (2003), on conflicts on tree plantations, also provided methodological insights about data collection on environmental conflicts.

While providing extraordinarily valuable lessons, the examples mentioned above are limited by geographic or thematic boundaries. Only in some cases were the databases referenced actually open for interactive public participation. The EJAtlas aims to fill this gap and to provide a tool for activism and advocacy:

- to help denounce cases of environmental injustice;
- to encourage dialogue and interchange of experiences, ideas, data, and strategies of actions;
- to provide a resource with reports of concrete cases, legal disputes, and other relevant matters;
- to sensitize the media, opinion-makers and public opinion;
- to put pressure on politicians and policy-makers to implement public policies conducive to EJ;
- to develop and strengthen strategies of international articulation on EJ,
- …and to contribute to new processes of knowledge creation with an EJ perspective.

As the project and collaborators expand to achieve more even coverage, the emphasis on certain geographical regions should hopefully be reduced.

In addition to advice received from the official partners of EJOLT, the design of data collection and some improvements in database management occurred through collaboration with some of the transnational advocacy networks that act as nodes for mobilization and research, both around thematic issues, such as International Rivers, La Via Campesina, Oilwatch, 350.org, Climate Justice Action, Friends of the Earth International, and Global Alliance Against Incineration (GAIA). There were also the campaigns against corporate entities or specific projects, including those of Monsanto, Rio Tinto, Vale, and Vedanta; as well as a wide range of activist-academic researchers working in different countries and at the regional level. Web and programming experts built the database platform online and improved it to make it more attractive and user-friendly according to needs and suggestions gathered from a wide audience and pool of experts and activists on the ground.
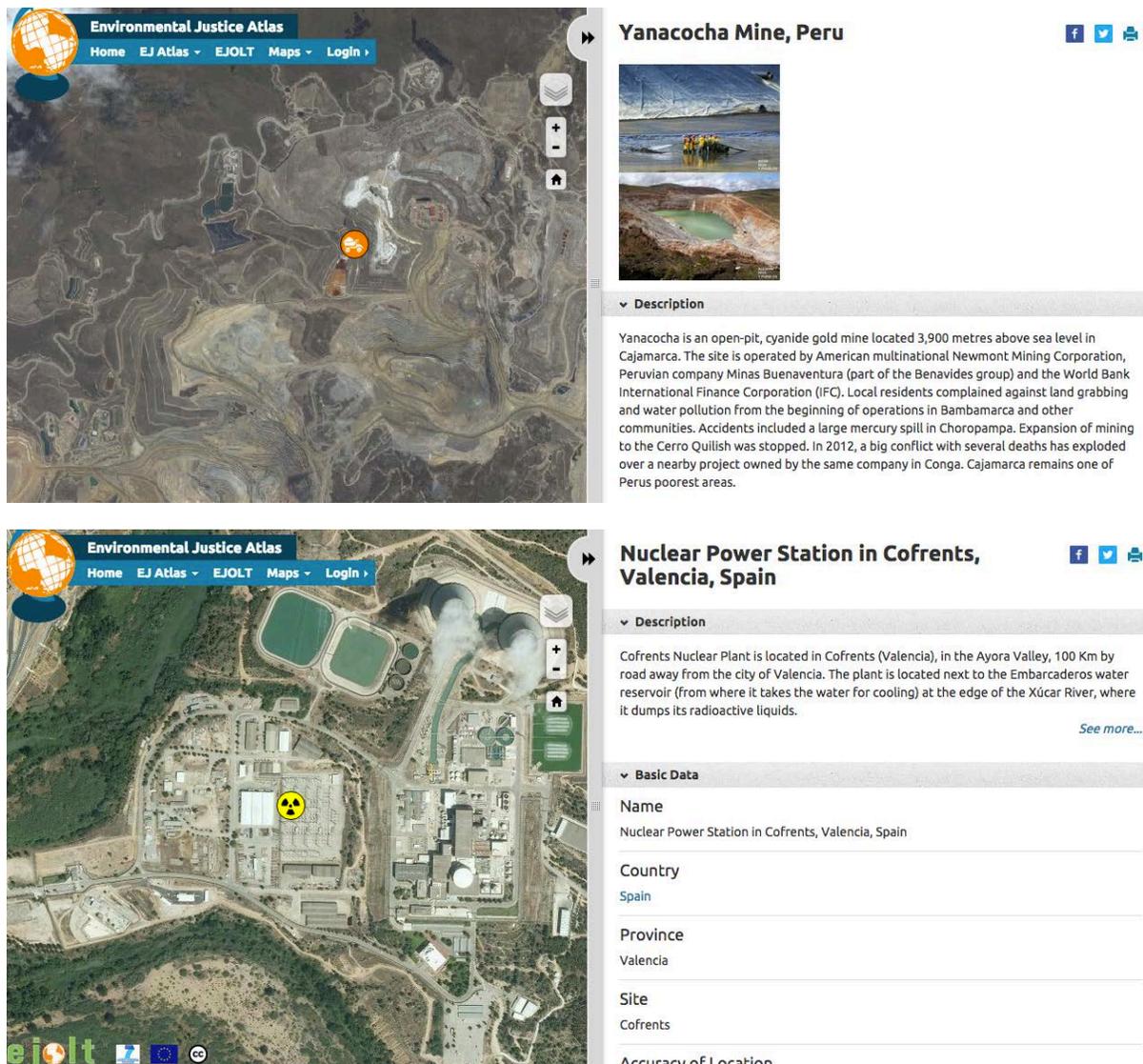

Figure 3: Examples of two geo-located cases in the EJatlas. Source: ejatlas.org

All contents of the form (Table 1) were jointly debated during the first year of the EJOLT project, drawing from the structure of the previous databases mentioned and modified to meet partner concerns. Following a trial period of data entry, the form was further modified and made more exhaustive. The form departs from a source of ecological intervention, a disruption activity, or a government policy.

Basic Data	- Name of conflict - Location & area - GPS coordinates & degree of accuracy - type of population involved (e.g. rural, urban)
Source of Conflict	- Type of conflict: – First Level (e.g. Mineral Ores & Building Extraction, Fossil Fuels & Climate Justice) – Second Level (e.g. Building Materials Extraction, CDM, REDD projects) - Commodities involved (e.g. Sugar, Copper, Domestic waste) - Description of conflict
Project Details & Actors	- Level of investment in the project - Technical details (e.g. MW produced, tonnes production) - Companies & State enterprises involved (& home countries) - International and Financial institutions involved - Number of affected people - Environmental Justice Orgs. involved
The Conflict and the Mobilization	- Intensity (maximum historical conflict level) - History of mobilization in reaction to (e.g. preventative, post-impact) - Groups mobilizing (eg. indigenous, women, union workers) - Forms of mobilization (eg. blockades, referenda, petitions) - Cross-involvement with other EJOLT conflicts
Environmental Impacts	- Examples: (Choose from Documented/Potential/No Data.) – Deforestation – Genetic contamination – Mine tailing spills
Health Impacts	- Examples: (Choose from Documented/Potential/No Data.) – Accidents – Malnutrition – Infectious diseases
Socioeconomic Impacts	- Examples: (Choose from Documented/Potential/No Data.) – Increase in corrruption of actors – Loss of livelihood – Militarization and increased police presence – Land dispossession
Outcome	- Current status: e.g., Proposed, Under Implementation, Stopped - Conflict outcome e.g. – Repression – Land demarcation – New environmental impact assessment - Proposal of alternatives - Perception of success: was environmental justice served? – (Yes/No/Not sure) Briefly Explain.
Sources & Materials	- Relevant legislation - Academic sources - Journalistic sources - Multimedia sources
Contributor Data	- Author contact information - Contact information of local activists & Ejos - Other comments
Multimedia	Upload of relevant photos, videos, PDFs.

Table 1: The EJAtlas database form.

The case is classified according to ten primary types (listed in Figure 4 on the horizontal axis, e.g. Biomass and Land Conflicts, Waste Management) as well as a secondary conflict type specifying the disruptive activity (e.g. deforestation, incinerators, see Table 2). This activity in turn creates or threatens various combinations of ecosystem offences, which lead to environmental, societal and health impacts. Social struggles follow against the inequitable distribution of costs and benefits, or lack of consultation or representation in decision-making and a lack of recognition of alternative territorial and social visions. This is schematized through sections of the site analyzing sources of environmental disturbance, impacts, responses from the claimants and any outcomes.

Land acquisition conflicts	371	Pollution related to transport (spills, dust, emissions)	94	REDD/CDM	44
Mineral ore exploration	273			Other industries	41
Water access rights and entitlements	243	Intensive food production (monoculture and livestock)	88	Agro-toxics	40
Dams and water distribution conflicts	201	Establishment of reserves/national parks	72	Oil and gas refining	39
Deforestation	177	Urban development conflicts	71	Aquaculture and fisheries	37
Tailings from mines	151	Thermal power plants	67	Incinerators	35
Oil and gas exploration and extraction	145	Chemical industries	54	Water treatment and access to sanitation (access to sewage)	35
Landfills, toxic waste treatment, uncontrolled dump sites	130	Coal extraction and processing	53	Manufacturing activities	34
Plantation conflicts (incl. Pulp)	127	Tourism facilities (ski resorts, hotels, marinas)	47	Building materials extraction (quarries, sand, gravel)	34
Mineral processing	107	Wetlands and coastal zone management	46	Interbasin water transfers/ transboundary water conflicts	31
Transport infrastructure networks (roads, railways, hydroways, canals and pipelines)	105	Agro-fuels and biomass energy plants	46	Ports and airport projects	31

Table 2: Distribution of cases by 2nd level category as of May 2015.

Sub-platforms and featured maps

While recognizing the need for a global perspective, the EJAtlas is most effective when accessible in local languages and at local or national scales. Several country sub-maps have been created, key examples being Colombia, Turkey and Italy. The map of environmental resistance in Turkey was exhibited on a tree during the Gezi Park demonstrations in Istanbul in June 2013 (followed by an online map in Turkish [6]). It contributed to a critical discussion in Turkish media and across civil society about contested large infrastructure projects in the country (Ozkaynak *et al.* 2013). The Italian sub-platform[7] of the EJAtlas was launched in March 2015 and awakened significant debate in Italy. A participative process for the selection of cases and preparation of database forms has been made for the Italian sub-platform, where a group of researchers from the EJOLT partner CDCA conducted an extensive survey across Italy with NGOs, committees, scholars, environmentalists, and journalists, etc. They identified the top 24 cases of conflict in the country to be included in the global map, and later expanded the coverage to 80 cases which were presented in the national platform.

Featured Maps, developed in the last phase of the project, integrate geospatial indicators and aim to be visual tools for telling stories and explaining interconnections across space and time (Figure 4). They illustrate socioeconomic indicators as intensity/choropleth maps (i.e. GDP, poverty or material extraction) representing different types of land uses and biophysical parameters (i.e. pasture lands, forests, location of mines, protected areas or water scarce areas). For example the Fracking Frenzy featured map (Figure 3), created in collaboration with Friends of the Earth Europe, combines conflict information with geodata such as shale basins and plays, information on companies and reserves, and baseline water and groundwater stress. Country maps track the history of environmental concern and mobilization, awareness raising and legal actions taken at national level across several years or decades. Other thematic maps, like the Climate Debt map (4igure 4) illustrates cartographically the extent and relevance of one of the most urgent concepts born out of ecological economics and social metabolism studies.

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[6] Available at http://www.direncevre.org/.
More information at http://www.ejolt.org/2013/12/turkeys-map-of-environmental-injustices-is-now-online
[7] The Atlante Italiano dei Conflitti Ambientali is available at http://ejolt.cdca.it/
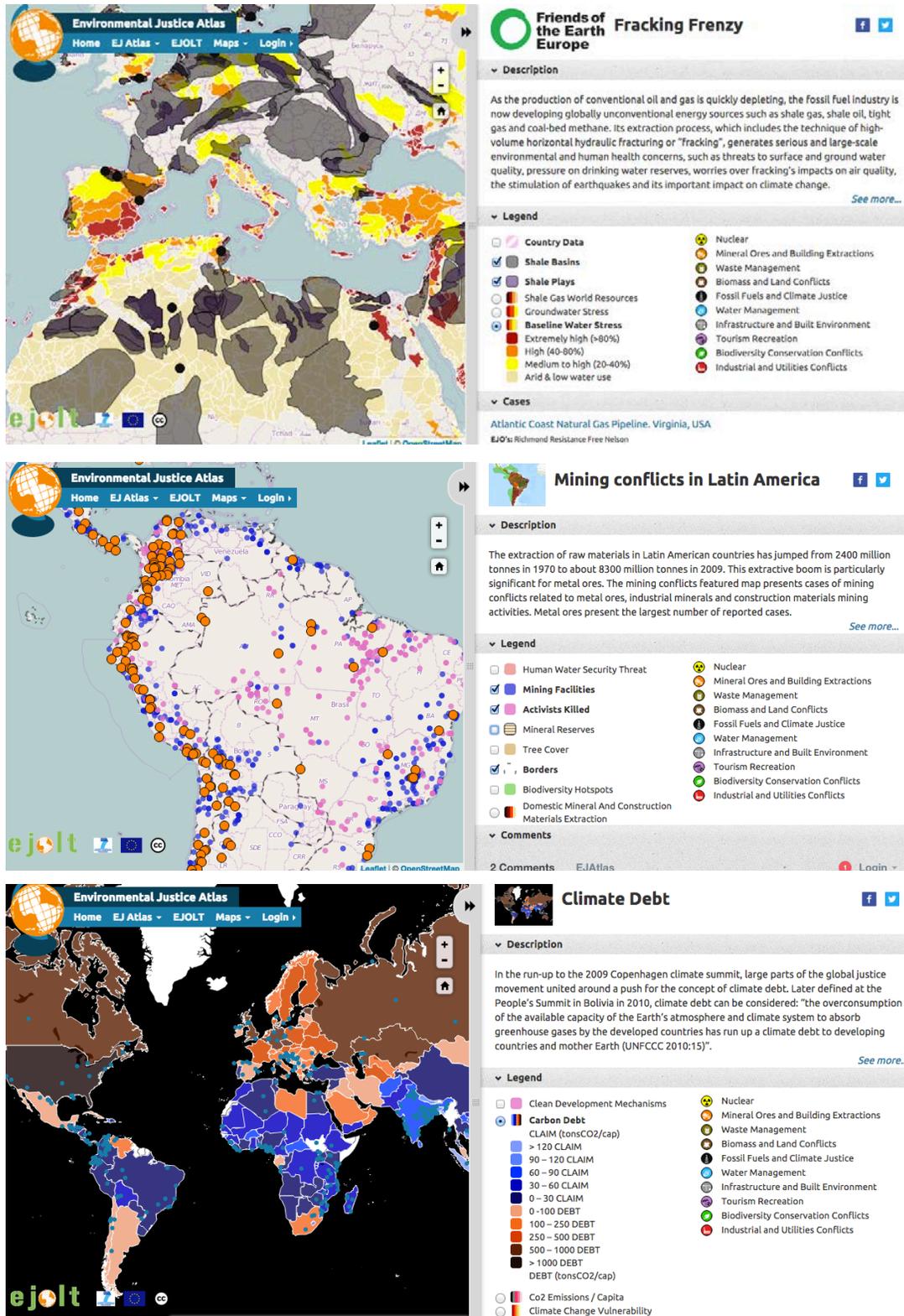
Figure 4: Examples of 'Featured Maps': Fracking Frenzy (in collaboration with Friends of the Earth showing the Shale Basins and Plays and Baseline Water Stress layers), Mining Conflicts in Latin America (showing mining conflicts, activists killed and mining facilities) and Climate Debt (with Rikard Warlenius). Source: www.ejatlas.org

4. The Atlas in practice

Public reception and press

The EJAtlas was first launched on 19th March 2014 at the United Nations Environmental office in Brussels, with about 920 conflict cases. As of late August 2015 the EJAtlas contains over 1,560 cases (and growing, as research proceeds and new collaborations are established). Among the most represented types of conflicts in the EJAtlas are those about the industrial extraction of natural resources (oil and gas extraction, mining, deforestation, etc.), land acquisition, water management and also conflicts over waste disposal (incinerators and landfills). See Table 2.

The platform allows users to browse conflicts by conflict type, country, company, and commodity as well as to filter across all relevant fields in the database. The public can access the data and also leave a comment, adding pictures, videos and .pdf documents on the case. The opportunity for interaction among EJAtlas members, collaborators and the general public aims at strengthening and widening contacts and exchanges, as well as improving the quality and exhaustiveness of the reporting.

To assess patterns of public use in early 2015 we distributed an online survey which was completed by nearly 80 users, belonging to academic institutions, NGOs, and international institutions such as the Inter-American Development Bank, the UNEP and UNESCO. By May 2015, almost 400,000 separate users had visited the webpage, opening almost 1 million pages. Since the launch the EJAtlas has been mentioned in the press over 150 times in 21 countries including *Science Magazine*, *Le Monde*, the BBC, *The Guardian* and including coverage from many countries including Uruguay, Panama, Argentina, Madagascar, Belgium, Bulgaria, Italy, and many others. From India, the country with most cases in the EJAtlas, the Live Mint of the *Wall Street Journal* noted in 2014 that:

> The Indian and global lists are far from comprehensive, but the information is scalable and can quickly incorporate data and critical perspectives. It's a list that cannot be wished away by the government's blocking of such websites, or accusations that it's a conspiracy of Maoist rebels, of "pseudo-intellectuals" or "pseudo-secularists".... Unless India adopts the don't-give-a-damn approach of China, in the game of public relations truth-or-dare there is nowhere for India to cut and run. The increasing globalization of social networking, activism and accountability makes it so…... Human rights scrutiny of business is increasing. Deal with it.

One year later, in March 2015, Live Mint described again and analyzed the growing EJAtlas from an Indian point of view.[8] On 15th August 2015, journalist John Vidal published a full page in *The Guardian* acknowledging EJOLT's work and commenting at length on some of the mining conflicts so far uploaded to the EJAtlas. In Figure 4 we show a small selection of press reports. In Colombia, top newspapers carried full-page spreads on several conflicts included. The launch coincided with a drought in the eastern part of the country that brought to the fore problems of oil extraction, featured on the cover of *La Semana* with the title "Environmental Nightmare." Using data from the EJAtlas, an article in *El Espectador* by Carlos Andrés Baquero showed the incidence of environmental conflicts in areas inhabited by Indigenous or Afro-Colombian minorities. He showed that of the 72 cases already uploaded, they were involved in 42 of them, a proportion much higher than in the population as a whole. Indigenous people are affected twice as much as Afro-Colombians.

Use by activists

The tool is used by affected communities and other web users for connecting with other communities, for campaigning and advocacy, for publicising environmental conflicts and for doing other political work with the data. More cases are emerging directly from activists working with local communities as the EJAtlas gains wider recognition; one under-reported case, for example, was brought to the attention of the Aarhus Convention[9] (the Ile-Alatau State National nature park case in Kazakhstan[10]) after inclusion in the EJAtlas

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[8] http://tinyurl.com/p7wunvt and http://tinyurl.com/oe69vr2
[9] http://aarhusclearinghouse.unece.org/news/1000793

and from related media coverage. Another case was brought to public attention by a project partner after an activist, Naim Prelvujak, was arrested on 18th August 2014 resisting a landfill in Montenegro located in a historical site for the cultural heritage of minority Albanian Christians, the very spot where the resistance against the Ottoman Empire in defense of Albanian Christianity started in 1710. While this conflict had been reported only in the local press, being included in the EJAtlas was important for the community to feel their voice was being heard more widely, particularly in view of Montenegro's aspirations to join the EU.

Figure 5: The EJAtlas in the press – some international and local echoes. Source: authors' collage based on Google.

Pedagogy and analysis

Pedagogical uses have included initiatives for inclusion in high school curricula and in higher education. Further, the EJAltas is being used extensively in online courses on resource politics and environmental justice, and has become an important tool for case study selection for researchers and journalists. Moreover, efforts are now being put in place to insert the EJAtlas in a teaching kit to introduce Environmental Justice to school students in the frame of an external collaboration with a consortium of NGOs.[11]

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[10]   http://EJAtlas.org/conflict/protect-kok-zhailau-ile-alatau-state-national-nature-park-kazakhstan

[11]   The teaching kit is a forthcoming product of the SAME World project, more info here: http://tinyurl.com/qc5s8zg

Beyond the pedagogical, public awareness values and policy attention on EJ, the EJAtlas, through the collection of a large dataset of geo-located case studies provides a tool for what we term 'comparative political ecology' or in some cases 'statistical political ecology' — comparative analysis of many emblematic and historical cases across thematic issues and across spatial and temporal scales. Few efforts have been made so far in this direction, but we believe such approach has a strong potential in explaining why particular environmental and social outcomes are to be found in one place rather than in another, or why specific social groups react with similar means or using similar counter-arguments. It provides a means to understand commonalities, to get a glimpse of the great variety of roles that EJOs play in environmental conflicts, and constitutes a solid basis for case study selection or comparisons, queries, and country and thematic based analyses.

Such analyses, combining qualitative and quantitative methods and co-produced with activists, can be seen as a source of engaged knowledge creation, which is increasingly being recognised as a pertinent method to inform scientific debate with policy implications. Historical and political analysis at the nation-state level based on the database has been undertaken by Perez-Rincon (2014), who for example, gives a broad overview on socio-environmental conflicts in Colombia, due to the increasing "reprimarization" of its economy with the mining sector leading the trend and specialization of new export products such as coal and palm oil. He has also correlated conflicts in Colombia with a spatial analysis of variables such as the presence of Indigenous and Afro-Colombian populations and biodiversity hot-spots, establishing that these groups are the most affected by EJ conflicts. Further work is being done on conflicts related to changes in the social metabolism in Turkey (Özkaynak 2015), Madagascar (Douguet 2015) and Ecuador (Latorre *et al.* 2015).

An EJOLT report analyzing 364 mining conflicts from the EJAtlas (Özkaynak *et al.* 2015) firstly applied social network analysis to study the nature of the relationships both among corporations involved in the mining activity, and EJOs resisting mining projects. Such a network analysis can demonstrate how assemblages of activists converge and coordinate against corporate entities across disparate locations as well as indicating the density of connections between activist, corporate, financial and state actors (Kumar 2014).

The same report (Özkaynak *et al.* 2015) also employed qualitative analysis, based on descriptive statistics from the Atlas to investigate factors that configure the perception of success for EJ based on the answers given to questions on the database form. Responses to "Do you consider this an environmental justice success? Was environmental justice served?" and the justifications given helped understand why the resistance movements consider a particular result as an EJ success or failure in the context of a mining conflict. The Atlas demonstrates how social movements of resistance are able sometimes to stop, or at least delay, the expansion of the extraction frontier, and to redraw its limits. As of May 2015, 18% of cases documented had been qualified as successes in EJ by the respective contributor.

Özkaynak *et al.* (2015) also applied multivariate analysis methods to examine the defining factors in achieving EJ success and to answer the following research questions: In which cases are mobilizations most intense and under what circumstances can projects be stopped? Such analyses in statistical political ecology deepen understanding of how activists perceive environmental justice achievements and can contribute to deepening EJ theory.

This represents a small selection of the types of analyses being drawn from the Atlas within a comparative political ecology framework. Further research will examine the effectiveness of disruptive or direct action tactics, versus institutional forms of contention. Also how the involvement of different actors, e.g. indigenous groups, relates to different conflict outcomes and how mobilizations and outcomes vary across sectors, such as mining, hydroelectric dams or agro-industries given that such projects differ not only in terms of their economic and political context, but also regarding their biophysical dimensions. For example we aim to interrogate potential differences in conflicts related to point resources, such as mining cases, as opposed to abundant resources, such as agricultural and land-grabs. For example Figure 6 shows the varying intensity across conflict types, with water management and mining conflicts exhibiting the highest intensity, down to tourism and recreation conflicts, which exhibit lower levels of conflict. The source is the EJAtlas (with 1,354 cases in April 2015), filtered by type of conflict (10 mutually exclusive categories) and again filtered by the intensity of the conflict according to the categories in the database forms. The statistical significance of such differences and their social meaning, remains to be determined.
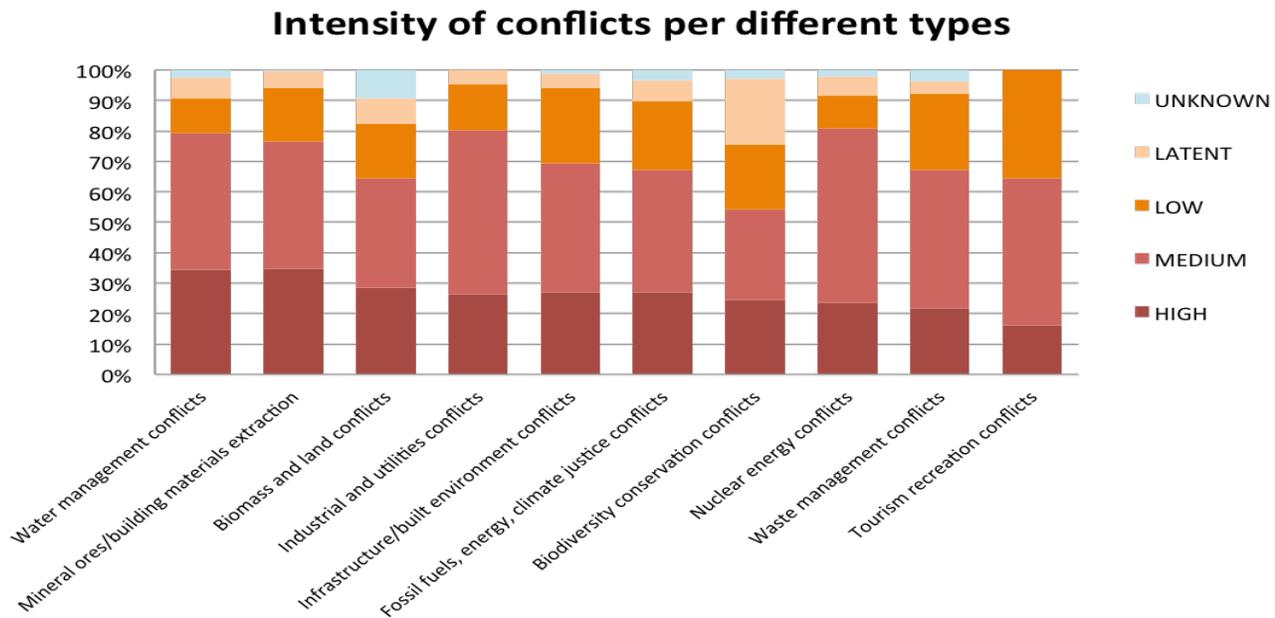
Intensity of conflicts per different types

Figure 6. Intensity of conflicts per different types. Source: authors.

Further research will examine how networked resistance and tactics differ when contesting the activities of companies and financial institutions from the developed economies, as opposed to the increasingly relevant role of those from the emerging economies, and examining how this shapes repertoires of contention, alliance-building, and outcomes.

Such mapping of socio-ecological relations, institutional arrangements and environmental change at multiple scales offers the potential for analysis that pays attention simultaneously to the workings of capital, the makings of meaning, and ecological flows of materials and energy. At the same time, such analytical exercises, co-produced with activists, can be seen as a source of engaged knowledge creation, which is increasingly being recognised as a pertinent method to inform scientific debate with policy implications.

5. Conclusions

The EJAtlas provides empirical material for a research agenda that contributes to understanding how inequalities are shaped through socio-metabolic transformations in the economy, and how they are contested and to what outcomes. This article has introduced the theoretical framework of the EJAtlas mapping project on ecological distribution conflicts, and the methodology behind the collective data gathering process. We argue that this exploratory exercise holds significant promise for extending the praxis and the theory of environmental justice and geographical scholarship:

1. By integrating further activist knowledge into analysis to contribute to the theoretical development of EJ and through new forms of knowledge co-production;
2. Through a multi-scale framework that allows a wider geographical analysis of relationships and interconnections between actors, struggles, and financial and metabolic flows. Such a framework can help discern the coalitions of power that produce and benefit from prevailing patterns of production and consumption, and the groups that suffer the most and provide a useful point of departure for constructing coalitions or policy-based interventions to protect the rights of vulnerable groups;

3. And also, a geographical perspective that through geo-location and cartographic data allows an interface between the natural and social sciences, revealing features of the territory and social, institutional and cultural processes.

Further specific questions will surely emerge in a process of co-design with partners and other stakeholders, building on the need to understand environmental changes as social processes embedded in specific social and ecological systems (Mauser *et al*. 2013). This form of co-production of knowledge does not come without its tensions and risks. The blurring of the boundaries between academia and the world beyond can sometimes lead to undermining the system which maintains academic power, as it can be seen to compromise the pedagogical authority of education (Fuller and Kitchin 2004). This has been an important question within the process of co-production of knowledge in the EJAtlas. A key challenge has been to combine activist knowledge with scientific rigour and peer-review processes. This invariably leads to tensions and "colliding epistemologies which can be immensely productive in themselves" (Brown and Knopp 2008). A deeper future enquiry and a critical reflection into the epistemology of the EJAtlas should examine the politics and strategies of representation and question voices and authorship, however this is a task that must be reserved for its own article as we do not have space to engage fully with the range of issues that have presented themselves here. This could provide a deeper assessment of whether the EJAtlas is a repository of stories and struggles that is accessible to people with a sociopolitical agenda that could transform "power hierarchies embedded in research" (Nagar and Ali 2003).

The process of the design and creation of the EJAtlas is a collaborative, iterative process in participatory GIS that is still unfolding (Kitchin *et al*., 2013). The online EJAtlas is a living document, and its contents, form and layers of information are constantly being expanded, co-created with its users through a process of continual co-design. Through this "performative epistemology of research" the project endeavors to bring to the forefront hidden and alternative understandings of the world, and while doing so, making them "potential objects of policy and politics" (Gibson-Graham 2008:620).

Through cooperation with EJOs and their networks in a 'hybrid research collective' we hope to further develop and contribute to the concept of a global EJ movement that is already growing, and that will continue to cohere globally, to formulate more strategic positions and be more inclusive, at the same time as it takes on local difference. We hope to be able to describe these processes and to analyze new concepts coming from grassroots movements, and to map roughly the patterns in the participation of women leaders, of Indigenous Peoples, of local and international EJOs, of labour unions and religious groups, of helpful scientists, of judicial instances, and their different ways of intervening in conflicts for environmental injustice. As conflicts intensify, especially along the commodity extraction frontiers and through the creation of new commodities, we aim to research, exchange and disseminate information. Beyond academic research in political ecology, the EJAtlas aims to be socially and politically relevant by 'naming and shaming' the actors behind injustices. It can also serve as a tool for activists by illustrating critical environmental issues and informing public debate over the distribution of risks, burdens and benefits, and the claims of local communities.

Our hope is that EJAtlas can serve as a tool that can benefit from case studies but also go beyond them, for fruitful comparisons across time and space in a comparative political ecology supported and informed by new statistical insights. We hope it supports the voices from EJ movements that argue that ecological modernization and the 'greening of the economy' will not address social and environmental injustices, and that only a radical reduction and restructuring of global social metabolism, and eradication of impunity, combined with a community-based definition of needs and priorities can begin to address the joint challenges of environmental and social crises.

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