



Sociologie Românească

ISSN: 2668-1455 (print), ISSN: 1220-5389 (electronic)

ENVIRONMENTAL INJUSTICES IN EUROPEAN CLIMATE HOTSPOTS

*Filip ALEXANDRESCU, Ionuț-Marian ANGHEL, Simona Stănescu,
Lucrina ȘTEFĂNESCU, Alina POP*

Sociologie Românească, 2019, vol. 17, pp. 11-34

<https://doi.org/10.33788/sr.17.1>

Published by:
Expert Projects Publishing House



On behalf of:
Asociația Română de Sociologie

ENVIRONMENTAL INJUSTICES IN EUROPEAN CLIMATE HOTSPOTS

Filip ALEXANDRESCU¹, Ionuț-Marian ANGHEL², Simona Stănescu³,
Lucrina ȘTEFĂNESCU⁴, Alina POP⁵

Abstract: This paper starts from the observation that development projects that create various forms of environmental injustice in Europe are an integral part of the process of biospheric expulsions, that is of pushing out groups from adequate land, water or air, as described by Saskia Sassen (2014). Apart from the environmental, socio-economic and health-impacts of ecologically destructive projects, there is an added dimension of concern that has been less obvious in the past, but tends to become increasingly pronounced in a warming world. Is it possible that accumulating environmental inequalities and forms of injustice can create new and “unnatural” vulnerabilities to the projected climate change impacts? The first question that we tackle is whether environmental justice conflicts in Europe tend to take place disproportionately in climate hotspot areas, which are geographic spaces with above-average social sensitivity, potential vulnerability, potential social impact, potential environmental impacts or response capacity (ESPON, 2011). The second question concerns the distribution of different characteristics of projects and of their associated conflicts in climate hotspot vs. non-hotspot areas. The final goal is to establish, at a preliminary level, the emergence of a climate edge in Europe, a spatial configuration in which vulnerability to climate change impacts is shaped by processes of biospheric expulsion, as postulated at a general level by Sassen. For the analysis, the most current data on environmental justice conflicts (444) from the Environmental Justice Atlas and ESPON climate impact projections, mapped on the Climate Adapt platform, are used. The expected result is to provide a preliminary description of the postulated climate edge.

-
- 1 Research Institute for the Quality of Life, Romanian Academy, Calea 13 Septembrie Street, no 13, Bucharest, Romania. E-mail: filip.alexand@gmail.com.
 - 2 Research Institute for the Quality of Life, Romanian Academy, Calea 13 Septembrie Street, no 13, Bucharest, Romania. E-mail: ionut_angel_2007@yahoo.com.
 - 3 Research Institute for the Quality of Life, Romanian Academy, Calea 13 Septembrie Street, no 13, Bucharest, Romania. E-mail: simona_vonica@yahoo.com.
 - 4 Babeș Bolyai University, Cluj Napoca, Romania. E-mail: lucrina_stefanescu@yahoo.com.
 - 5 “Dimitrie Cantemir” Christian University, Bucharest, Romania. E-mail: alina.pop@ucdc.ro.

Keywords: climate edge; development projects; climate impacts; climate vulnerability; Europe; Environmental Justice Atlas.

Introduction

The Merriam Webster dictionary defines the edge as “a line or line segment that is the intersection of two plane faces”, while the Free Dictionary also adds the meaning of “the point at which something is likely to begin”.

The overall aim of this paper is to establish the climate edge as an empirically grounded concept to explore current processes of vulnerability creation to the expected impacts of climate change in Europe. The climate edge integrates existing notions of climate injustice – whereby class, race, ethnic and gender dimensions shape the distribution of climate risks – but reconstructs them through an explanation of how vulnerability emerges under the current expansion of a particular kind of political economy, that of resource-intensive development projects. The climate edge is the space where vulnerability is shaped by the complementary processes of social expulsion and resistance. In this paper, development projects refer to opencast coal mines, shale gas exploration and extraction, infrastructure expansion projects, tourism infrastructure, urban conflicts and similar interventions that create environmentally unequal outcomes. Equally importantly, development projects are engulfed in controversies, since they appear to threaten rights to health and a clean environment. Noteworthy cases are the shale gas development proposals in the UK or Poland (Lis and Stankiewicz, 2017; Nyberg, Wright and Kirk, 2018) or the continued expansion of open cast mines in Germany (Brock and Dunlap, 2018).

The climate edge is a new concept that builds on two recent research trends. The first is the political economic theory of expulsions and of the systemic edge, advanced by Saskia Sassen (2015, 2014). The systemic edge is the point where a condition takes a form that is so extreme that it fails to be recognisable by governments and experts and hence becomes incomprehensible (Sassen, 2017). In the present context, development projects are seen to generate a host of interrelated impacts on local ecosystems, livelihoods, families and citizenship rights, for which there is no one overarching system that takes all of them into account. Their recognition is further hampered by the framing of some development projects as “strategic” for development, in terms of energy security or key natural resources (e.g. coal or gold) (Cehlár et al., 2016; Dodge, 2016), which makes their side effects less salient. A third reason for the invisibility of impacts is their apparent local nature, which may conceal their frequent occurrence and occasional regional concentrations. For example, the Environmental Justice Atlas shows 455 conflicts in Europe with distinct concentrations in Southern and Eastern Europe (Temper, del Bene and Martinez-Alier, 2015 but updated until 2019).

The climate edge describes the space beyond the systemic edge, namely the uncharted territory where expelled individuals and communities are made to feel

the dangers of a changing climate. In contrast to Sassen's systemic edge, however, the climate edge also captures the forms of resistance that have sprung up among the disenfranchised to counter expulsions (Martinez-Alier et al., 2016). The second research trend is, thus, the remarkable growth of environmental and climate justice research worldwide, and especially in Europe, where it enjoyed little visibility until not long ago (Elvers et al., 2008). Both trends converge in defining a new space of climate justice conflicts which seem more striking, because they are more recent in European societies than elsewhere.

The twofold aim of this article is to use the concept of climate edge to explore these aspects of climate change. The first is to explore to what extent development projects that generate resistance tend to take place in areas that are already affected by multiple environmental impacts that have, in turn, social repercussions. In this sense, the climate edge is the line of intersection between the accumulation of environmental injustice – as engendered by development projects in Europe – and the advancing edge of climate vulnerability, which is revealed by the maps of projected climate impacts across Europe (European Commission, 2009). The second aim is to show that the climate edge is not a deterministic, meta-historical process but one that is shaped by different groups of actors resisting the encroachment of development on their lands.

Theoretical framework

The article is based on three streams of social scientific literature, which are detailed below. The first concerns social vulnerability to climate change, the second introduces the concept of expulsions and the systemic edge, while the third discusses current environmental justice movements.

Social Vulnerability to Climate Change

The recognition of vulnerability to climate change and the importance of adaptation have undergone a spectacular increase in the scientific and policy arenas over the last three decades. The International Panel on Climate Change (IPCC) stated in 2001 that due to the role of vulnerability and its causes in producing impacts on society, it is as essential to understand the dynamics of vulnerability as it is to understand the climate system itself (Smit and Pilifosova, 2003). Vulnerability is unequally distributed in society, depending on the socio-economic and cultural conditions of different groups exposed to climate change impacts. Where such conditions are biased against certain groups or individuals, such as ethnic minorities or indigenous groups, there is a problem of environmental or climate injustice (Pellow and Brulle, 2005). More generally, a sociological perspective on vulnerability fleshes out the social conditions underlying vulnerability, the choices

available to different actors in given situations and the social decisions that shape individual or collective climate change adaptation efforts (Carmin et al., 2015).

However, most research on adaptation employs a scientific framing in which the changing climate system generates impacts on society, seen as a steady-state system, and the impacts need to be assessed to devise technical and managerial adaptation measures (Bassett and Fogelman, 2013). The alternative model is much less visible in the scientific or policy arenas, albeit it can offer a more realistic and applicable perspective: it centres on human security and postulates that adaptation will be successful if individuals have options to mitigate or adapt to climate risks and can make use of them (O'Brien et al., 2007). The climate edge advances the human security framing by revealing where the limits of human security lie under conditions of expulsion from the societal safety nets.

Recent sociological research on vulnerability has underscored the role of human agency, in particular the ability of weaker groups to mobilize in order to reduce their vulnerability by securing access to resources and entitlements (Bassett and Fogelman, 2013). According to Wisner and his colleagues (2014), the social processes creating vulnerability are recognized and opposed by people who sometimes have the capacities to resist, avoid or mitigate the sources of their vulnerability. The paper aims at a conceptual and empirical breakthrough by showing that people do not react to some abstract processes taking place away from their everyday experiences but to concrete expulsions that threaten their immediate life spaces.

The Age of Expulsions and the Systemic Edge

Sociological work on the environmental implications of the political economy of advanced capitalist societies has a long and distinguished career (Gould, Pellow and Schnaiberg, 2004; Schnaiberg, 1980; Schnaiberg and Gould, 2000). Schnaiberg explored the distributional impacts of environmental policies, in particular their effects on the lower classes (1975). Leading scholars of political economy have recently taken up the topic of ecological and climate crisis in discussing the future of capitalism (Collins, 2013).

This paper builds on the recent work of sociologist Saskia Sassen (2014, 2015, 2017), in particular on her related concepts of expulsions and the systemic edge. Expulsions are an accelerating and acute process of growing social inequalities which push the poor and middle classes out of their living spaces and the rich out of the responsibilities of societal membership (Sassen, 2014). The systemic edge is the space where a condition takes on a form that is so extreme that it fails to be visible to the standard ways of knowing and measuring available to governments and experts and hence becomes ungraspable (Sassen, 2015).

This paper applies the notion of expulsions to account for the profound reshaping of social and environmental relationships in Europe through the expansion of intrusive forms of environmental exploitation. For example, the recent boom in

unconventional hydrocarbon exploration in a dozen EU member states (JRC, 2017; Stephenson, 2016) has added to earlier widescale extraction projects. For example, despite its well-known transition towards renewable energy, German companies still operate and enlarge their opencast lignite mines, obliterating villages and destroying farms and forests in their path (Weber and Cabras, 2017).

Expulsions are created through chains of political, economic and technological factors that lead to what Sassen calls brutalities, which are the sudden, intense and socially meaningless eviction of people from their life spaces in the name of short-lived and highly risky industrial activities. The expulsion concept encapsulates this whole chain, which often originates in decisions taken at transnational or intergovernmental levels (e.g. the energy strategies of the EU, such as its “Projects of Common Interest” (EJAtlas, 2018)) and make their way unabated to the lowest scale of individuals’ households or bodies.

The systemic edge is the result of this process of expulsion that is a new space in which the taken-for-granted values and norms of social interaction are profoundly reshaped. In the spaces of the expelled created by development projects, for example, properties are devalued, means of livelihood are obliterated, and life projects are rendered unattainable. The systemic edge is a space of extremes – of social destitution, political disenfranchisement or cultural disorganization – that appears as a hole in the tissue of societal solidarity. Questions of what is worth recognizing or defending, for instance, in the face impeding climate impacts, become muted, as these spaces descend to the status of “sacrifice zones” (Harlan et al., 2015).

The loosening of societal safeguards – structural, institutional and societal (Carmin et al., 2015) – against the effects of a changing climate is especially problematic in those places where significant impacts are expected, and this happens on the development projects frontier, as in selection of case studies presented in this article. We use such frontiers as entry points for investigating the broader ramifications of vulnerability-making expulsions. However, the stories from the climate edge are not solely ones of ineluctable loss. The occasionally over-deterministic tone of Sassen’s argument needs to be brought into productive dialogue with the burgeoning literature on environmental justice activism.

Environmental Justice Movements

The topic of environmental injustice has seen increasing scholarly attention over the last few decades. Interestingly, this perspective has been co-constituted with the increasingly influential environmental justice movement (Martinez-Alier et al., 2016). The famous case of contamination in the Love Canal residential area of Niagara Falls, US, started a movement against “dumping toxins” on the poor (Bullard, 1990). Only a handful of studies on environmental justice were written throughout the 1970s. Their number increased to 999 in the decade before the new millennium and to as many as 7400 since 2011 (*Google scholar*). The unequal

exposure to environmental harms highlighted the plight experienced by the urban poor and communities of colour (Burch, 1971). Since then, environmental justice has become an established scholarly field in the United States.

The field has gradually grown through geographic expansion and theoretical enrichment. The expansion has taken place in the Global South, where problems of contamination have been accompanied by those of massive resource extraction (e.g. mines or hydroelectric dams) (Agyeman, Bullard and Evans, 2003). This literature is highly relevant for this paper as it provides criteria for expulsion processes at the local or community level, for example through displacement, loss of livelihood or disenfranchisement (Cernea and Mathur, 2008; Oliver-Smith, 2011). There is also a newer strand of the environmental justice literature that this paper also links to expulsions.

We claim that the precise outcomes of expulsion are blurred by an increasingly powerful resistance movement against energy or resource extraction. Impoverishment and other deleterious effects do not occur automatically. This has led to the emergence of a transnational conflict zone famously called “Blockadia” (from “blocking” pipelines or mines) (Klein, 2014). There are sufficient examples of resistance to development projects world-wide (Temper et al., 2015), some of which are interlinked, to justify its description as a global process. The struggle is waged by coalitions of local and international environmental justice NGOs, subsistence farmers, fishers, hunters, herders, artisanal miners or all those who, according to Sassen, are pushed on the edge. The struggle of resistance movements is framed in relation to distinct parts of the expulsion chain (e.g. policy decisions, particular technologies, new industrial practices). Activists do often develop scale frames to address this multi-scalar process of expulsion (Kurtz, 2003). In contrast to the systemic edge, the climate edge is characterized by an expulsion – response nexus, rather than by mere structural expulsion.

At the empirical level, this paper is made possible by the trailblazing contribution to map environmental justice conflicts worldwide through the EJA, an atlas developed by the EJOLT project (2011) and continued by ENVJUSTICE (2016). The Academic-Activist Co-Produced Knowledge for Environmental Justice (Acknowl-EJ, 2016) is a project-*cum*-network that explores the transformative potential of citizen mobilizations, and their efforts to develop alternative knowledge bases for advancing environmental justice.

In sum, development projects are seen to change the vulnerability of various marginalised groups. This can happen in two complementary ways. The first is the process of accumulating environmental injustice that progressively make selected groups vulnerable and “prepare the ground” for future climate impacts on these groups. The second is a complementary and possibly opposed process, in which local mobilizations and social movement activity can strengthen the capacity of local communities to resist development projects and also possibly their capacity to work collectively to better adapt to projected climate impacts.

Sassen (2014) documents how a variety of resource extraction or manufacturing industries (mines, smelters, plantations) have created “dead land and dead water.” She defines these as “holes in the tissue of the biosphere, [as] sites marked by the expulsion of biospheric elements from their life space”. Whereas Sassen’s argument is based on several textbook cases of massive environmental destruction worldwide, we need to construct a micro-level equivalent of expulsions, which can be discerned at a European level. Fortunately, during the last decade, environmental justice issues have been increasingly recognized in Europe (Laurent, 2011). In support of the argument developed here, Elvers, Gross and Heinrichs (2008, 836) point to the important role of “localized sites of sometimes rapid change”. It is precisely such sites that this article uses to illustrate the piecemeal social and environmental impacts that lead to a broader puzzle of vulnerability creation.

On the one hand, development projects *weaken* affected groups by polluting and transforming their local ecosystems, by affecting their health, by undermining local economies and livelihoods, and creating or entrenching social insecurity. On the other hand, the grassroots mobilisation against fossil fuel projects can mediate the vulnerability of those most at risk, by enhancing their adaptive capacity. This happens through collective action: once actors can mobilize to resist development projects, they learn how to marshal individual and collective resources to advance community goals, including a superior level of adaptation.

Methods and Data Collection

The research uses secondary data to provide some preliminary empirical evidence for the climate edge concept. Providing such evidence amounts to identifying circumstances or cases in which environmentally destructive projects take place in communities that are simultaneously under threats of climate change impacts. We do not assume a causal relationship between expanding development projects and their location in climate sensitive areas, but rather highlight the overlap of the two processes in specific areas. Such areas are the first indication of an emerging climate edge where vulnerabilities to climate change are systematically produced.

To account for these overlaps, two data sources are used: one is the Environmental Justice Atlas (henceforth EJAtlas), which is a contributor-based and publicly available platform of environmental justice conflicts worldwide. The second data source is the European Climate Adaptation Platform (Climate-ADAPT), in particular its climate map viewer facility. The overall approach is to explore the overlaps between these two maps, as shown in *Figure 1*.



Figure 1: Environmental justice conflicts (upper map) and climate impact areas (bottom map) used for exploring overlaps

Sources: Temper, del Bene, and Martinez-Alier (2015) (EJAtlas data updated as of June 2018) and Climate ADAPT (European Commission 2009).

The EJAtlas consists of a zoomable map of the world on which environmental justice conflicts are displayed. The cases are organized by different criteria, such as category (nuclear, fossil fuels and climate change, etc.), region or country, characteristics of the conflict, impacts and outcomes. Moreover, the EJAtlas features a filtering function, which allows the selection of environmental justice conflicts by individual criteria or complex combinations of criteria, using logical connectors (“and”, “or” and “not”). For the purposes of this article, we selected cases by “region”, covering cases in North-Western, Southern and Eastern Europe, totalling 436 entries. The EJAtlas contains case studies that are compiled by volunteer contributors, be they environmental activists or scholars. The information from these case studies are not validated by official expert systems, such as governmental

agencies or ministries. For example, the EJAtlas does not contain only formal data on development projects but also documents their histories, conflict dynamics and visible/potential impacts. Since the EJAtlas is under continuous expansion, we limited the data collection to the middle of 2018. Further refinements of the number of cases had to be carried out due to the features of the second data source, the Climate-ADAPT platform, which is presented below.

This climate data platform includes several layers of climate data, stemming from different research projects (e.g. ENSEMBLES, ClimWatAdapt, etc.). For our purposes, we used information from the ESPON Climate project, which collected data at the EU-level in 2009. One limitation of this data is that it excludes from the analysis the countries of former Yugoslavia. This meant that the EJAtlas data had to be tailored to the same countries for which climate impact data are available. For this reason, the number of usable cases was reduced to 296.

Our analysis focuses on place-specific instances of environmental conflicts (cf. Elvers et al., 2008), hence the cases of environmental conflicts that occur at the national level in each country, had also to be removed. As a result, the final database consisted of 279 cases.

A specific group of indicators was used from each database to illustrate the dimensions of *accumulating environmental injustices* and of *resistance-cum-adaptation* respectively. For the accumulating environmental injustices, the data from the EJAtlas were selected based on several key dimensions discussed by Sassen in her book on *Expulsions* (2014). These include the effects of environmentally destructive projects on the ecosystem, or what Sassen (2014, 150) refers to as biospheric expulsions. Further considered were the impacts of such projects on human health (Sassen, 2014, 210), on livelihoods and local economies (Sassen, 2010, 28; 2014, 29), and on the fresh creation or entrenching of social insecurity, as theorized by Wacquant (2010). Each of these dimensions has a number of corresponding indicators in the EJAtlas, as shown in Table 1. For each of these indicators we used a dummy variable, with 1 representing the presence of every characteristic (i.e. each particular impact) and 0 for its absence. These values are attributed by the volunteer contributors to the EJAtlas. Each contributor had three options: to ascertain that a given impact took/takes place, and hence is “deemed” visible, that it is “potential” or that it is absent. We coded with 1 only those cases where the impact was deemed “visible” and used 0 for the other two possibilities.

On climate impacts, we used information from the ESPON Climate project, which includes about 20 indexes of climate impacts and their corresponding maps. Five of these were selected for the analysis, due to their relevance for assessing the social aspects of climate change impacts. These are potential environmental impact, potential social impact, social sensitivity, potential vulnerability and response capacity. Each of these is explained in the last column in Table 1. Similar to the treatment of the data from the EJAtlas, we used dummy variables for each of these indexes. More specifically, we used 1 when social sensitivity

was high or very high, otherwise we entered 0. For potential social impact and potential environmental impact we used 1 for medium or high negative impact and 0 otherwise. For potential vulnerability, 1 was attributed to medium or high negative vulnerability and 0 in the other cases. Finally, for response capacity we used 1 for low adaptive, low mitigative and for low adaptive, high mitigative, and 0 for the remaining values.

In order to collect both environmental justice data and climate at community – (or small area) – level, we used the names listed in the EJAtlas as sites of conflict. These same names were the included in the search function of Climate-ADAPT to locate these places on the maps for each of the five indicators.

Table 1: Dimensions of expulsion, environmental justice (EJAtlas) indicators and indexes of climate vulnerability

Dimensions of expulsion (Sassen, 2014)	EJAtlas indicators (Temper et al., 2015) (Updated 2018)	Climate ADAPT indicators (European Commission, 2009)
Ecosystem	Air pollution Biodiversity loss (wildlife, agro-diversity) Deforestation & loss of vegetation cover Desertification Fires Floods (river, coastal, mudflow) Food insecurity Genetic contamination Global warming Groundwater pollution or depletion Large-scale disturbance of hydro and geological systems Loss of landscape/ aesthetic degradation Mine tailing spills Noise pollution Oil spills Other environmental impacts Reduced ecological/ hydrological connectivity Soil contamination Soil erosion Surface water pollution/ decreasing water quality Waste overflow	Potential environmental impact (=combined potential impacts of changes in summer & winter precipitation, heavy rainfall days, annual mean temperature, summer heat days, frost days, snow cover day and annual mean evaporation on soil erosion, soil organic content, protected natural areas and forest fire sensitivity).

Dimensions of expulsion (Sassen, 2014)	EJAtlas indicators (Temper et al., 2015) (Updated 2018)	Climate ADAPT indicators (European Commission, 2009)
Health	Accidents Deaths Exposure to unknown or uncertain complex risks Health problems related to alcoholism or prostitution Infectious diseases Malnutrition Mental problems (stress, depression, suicide) Occupational diseases & accidents Other environmentally related diseases Other health impacts Violence-related health impacts (homicides, rape)	Potential social impact <i>(=combined potential impacts of change in inundation depths of a 100 year river flood and a sea level rise adjusted 100 year storm event as well as changes in flash flood potential and summer heat on population).</i>
Local economy and livelihoods	Displacement Lack of work security, labour absenteeism, firings, unemployment Land dispossession Migration/ displacement Loss of landscape/ sense of place Loss of livelihood Loss of traditional knowledge/ practices / culture Other socio-economic impacts	Potential vulnerability <i>(=combination of regional potential of climate change and regional capacity to adapt to climate change¹).</i> Response capacity <i>(=a total of 15 indicators were used to calculate the adaptive capacity index, while ten indicators were used for the mitigative capacity index.</i>
Social insecurity	Increase in corruption/ cooperation of different actors Increase in violence & crime Specific impacts on women Violation of human rights Militarization & increased police presence Repression Violent targeting of activists Social problems (alcoholism, prostitution)	

Source: see the heading of each column for specific references.

For the *resistance-cum-adaptation* dimension, we also used indicators from the EJAtlas, this time pertaining to the dynamics of conflict. These pertain to conflict dynamics (the highest intensity reached by each conflict), to the extent of local and transnational mobilizations and to the conflicts' empowering outcomes. The intensity of conflicts was measured on a four-point scale, from 1 (the lowest) to 4 (the highest value). Local mobilization was computed by summing up the number of mobilizing groups. Local empowerment was similarly calculated as the sum of each of the four conflict outcomes listed in Table 2. The relevant climate impact index was considered potential vulnerability, because it includes information on the regional populations' knowledge and awareness of climate change.

Table 2: Dimensions of expulsion, environmental justice (EJAtlas) indicators and indexes of climate vulnerability

Dimensions of resistance	EJAtlas indicators (Temper et al., 2015) (Updated 2018)	Climate ADAPT indicators (European Commission, 2009)
Conflict dynamics	Intensity of the conflict (latent, low, medium, high)	Potential vulnerability (<i>includes knowledge and awareness of climate change</i>)
Local mobilization & transnational alliances	Number of mobilizing groups (total number, number of local and of transnational groups)	
Local empowerment	Court decision (victory for environmental justice) Fostering a culture of peace Strengthening of participation Negotiated alternative solution	

Source: see the heading of each column for specific references.

Findings and Interpretation

This section provides an overview of the environmental justice conflicts that occur to different degrees in climate vulnerable areas throughout Europe. Each of the two dimensions – accumulating injustice and resistance-cum-adaptation – are discussed in turn.

Accumulating Environmental Injustices and their Occurrence in Climate-Sensitive Areas

The most significant finding is that most of the environmentally unjust projects in Europe (67%) do take place in areas that have at least one above-average climate vulnerability, potential social or environmental impact or social sensitivity. The finding does not imply any past causality, in the sense that development projects target climate-sensitive areas. Rather, the implication is that many areas that suffer underdevelopment impacts of the kind listed in Table 1 are the ones that will simultaneously see some of these impacts magnified by climate change. This shows that in a climate policy jurisdiction generally seen as progressive (Rayner and Jordan, 2016), there are growing vulnerabilities resulting from extractive and development activities. The climate edge theory explains these interactions between development project impacts and upcoming risks as unrecognizable by governments and expert systems.

Interestingly, most cases (38%) cluster in the category with two impacts, rather than in the one impact group (20%). For this reason, we will choose this modal category for further analysis.

Table 3: The distribution of cases of environmentally unjust projects by climate vulnerability/impact score

	Number of cases	Percent
No impact	90	32.3
One above average impact	57	20.4
Two above average impacts	105	37.6
Three above average impacts	22	7.9
Four above average impacts	5	1.8
Total	279	100.0

Source: Authors' analysis of the EJAtlas data (2018) using IBM SPSS 20.

In terms of response capacity to climate change, 73% cases fall in the “low adaptive” category, which means that they struggle to adapt, regardless whether their mitigative capacity (i.e. the ability to reduce emissions) is low or high). This complements the findings in Table 3, namely that environmentally deleterious projects take place in areas that are at risk of climate change impacts, and that also have a low capacity to adapt to such impacts.

To refine the analysis, we turn to the main categories of projects covered in the EJAtlas. In order to obtain an accurate picture of where real projects are located, we select only projects that are either under construction, under operation or have been stopped after a certain time in which they were in operation (N=174). In

these cases, it can be assumed with some degree of confidence that such projects have already created environmental and other impacts. Not considered here are situations in which projects are proposed or planned, both instances in which it is not yet clear that they have had the time to make their (negative) impacts visible to observers.

Our analysis shows some noticeable variability among the nine categories by climate vulnerability/sensitivity score. This means that the modal group for each category of project is placed under different climate scores (see the highlighted cells in Table 4). Five of the nine categories of projects occur mostly in areas with two above-average climate impacts or vulnerabilities and two more categories in areas with one above-average impact.

Tourism recreation projects appear to be the most common in the modal group, with 9 cases (82% of all tourism recreation projects). This is followed by water management projects (6 cases or 55%), industrial and utilities projects (11 cases or 52%), waste management (8 projects or 50%), and biodiversity conservation / biomass conflicts (9 cases, representing 45%). Surprisingly, fossil fuel and climate justice / energy projects tend to occur most often in regions that have no above-average climate vulnerability/ impact score (20 cases or 65%). The same applies to nuclear projects, although to a lesser extent (11 projects or 46%).

Table 4: Breakdown of categories of environmental projects by climate vulnerability/sensitivity score (First row: frequency of cases; second row: percentages adding up to 100% for each row) (N=174)

	No above average	One above average	Two above average	Three above average	Four above average	Total
Biodiversity & biomass conflicts	5 25.0%	4 20.0%	9 45.0%	1 5.0%	1 5.0%	20 100.0%
Fossil fuels and climate justice, energy	20 64.5%	2 6.5%	6 19.4%	2 6.5%	1 3.2%	31 100.0%
Industrial and utilities conflicts	2 9.5%	3 14.3%	11 52.4%	4 19.0%	1 4.8%	21 100.0%
Infrastructure and built environment	8 33.3%	8 33.3%	4 16.7%	4 16.7%	0 0.0%	24 100.0%
Mineral ores and building material extraction	2 12.5%	6 37.5%	5 31.3%	2 12.5%	1 6.3%	16 100.0%

Nuclear	11 45.8%	5 20.8%	7 29.2%	1 4.2%	0 0.0%	24 100.0%
Tourism recreation	1 9.1%	0 0.0%	9 81.8%	1 9.1%	0 0.0%	11 100.0%
Waste management	2 12.5%	5 31.3%	8 50.0%	0 0.0%	1 6.3%	16 100.0%
Water management	3 27.3%	2 18.2%	6 54.5%	0 0.0%	0 0.0%	11 100.0%
Total	54 31.0%	35 20.1%	65 37.4%	15 8.6%	5 2.9%	174 100.0%

Source: Authors' analysis of the EJAtlas data (2018) using IBM SPSS 20.

In order to test the association between project category and climate vulnerability, we transform the latter in a dichotomous variable, which takes a value of 0 if projects are developed in areas with no above average impact or 1 if they occur in areas with one to four impacts. Using the chi square test, we find that the null hypothesis that the two variables are independent can be rejected at the level of 0.001^2 (see Table 5). This means that while most categories of projects do occur in climate-vulnerable areas, there are some noteworthy exceptions to this trend. One are fossil fuel projects which often occur in areas that are not vulnerable (65%). A preliminary analysis, that is not reported here, showed that coal extraction projects taking place in Germany (overall low in climate vulnerability) are largely responsible for this surprising finding. Another exception are nuclear projects, which are almost evenly split between climate vulnerable and non-vulnerable areas.

Table 5: Breakdown of categories of environmental projects by climate vulnerability/sensitivity (simplified version of Table 4)

	Cases occurring in areas with:		Total
	No sensitivity/ vulnerability	At least one sensitivity/ vulnerability	
Biodiversity & biomass conflicts	5 25.0%	15 75.0%	20 100.0%
Fossil fuels and climate justice, energy	20 64.5%	11 35.5%	31 100.0%

Industrial and utilities conflicts	2 9.5%	19 90.5%	21 100.0%
Infrastructure and built environment	8 33.3%	16 66.7%	24 100.0%
Mineral ores and building material extraction	2 12.5%	14 87.5%	16 100.0%
Nuclear	11 45.8%	13 54.2%	24 100.0%
Tourism recreation	1 9.1%	10 90.9%	11 100.0%
Waste management	2 12.5%	14 87.5%	16 100.0%
Water management	3 27.3%	8 72.7%	11 100.0%
Total	54 31.0%	120 69.0%	174 100.0%

Source: Authors' analysis of the EJAtlas data (2018) using IBM SPSS 20.

In what follows, the focus will be on the distribution of these cases in terms of location (country), as well as environmental, health and socio-economic impacts. The picture suggested by these numbers will be complemented by drawing on several concrete examples.

The distribution of these cases by country reveals a noteworthy pattern. It is mostly Southern European countries where environmentally unjust projects take place namely Spain, Italy, Bulgaria, Portugal and Greece. The share of these projects in the total number of projects in each country is also very high, ranging from 100% in Bulgaria to 77% in Italy.

Table 6: The distribution of cases by country and climate sensitivity or vulnerability for projects under construction, in operation or stopped

Country	Cases occurring in areas with:		Total no. of cases (100% in each case)
	No sensitivity/ vulnerability	At least one sensitivity/ vulnerability	
Spain	1 1.3%	75 98.7%	76

Italy	4 15.4%	22 84.6%	26
Bulgaria	0 0.0%	17 100.0%	17
Portugal	3 23.1%	10 76.9%	13
Greece	2 18.2%	9 81.8%	11
.....			
Germany	18 90.0%	2 10.0%	20
Ireland	1 33.3%	2 66.7%	3
Netherlands	0 0.0%	2 100.0%	2
Poland	6 75.0%	2 25.0%	8
Sweden	13 86.7%	2 13.3%	15

Source: Authors' analysis of the EJAtlas data (2018) using IBM SPSS 20

Note: of the 23 countries, only the top five and some of the bottom five (those with more cases) are shown.

At the other end of the spectrum are mostly western and northern European countries, which offer a mixed picture. Germany or Sweden, for example, have low shares of projects in climate vulnerable areas (10% and 13%, respectively), despite the fact that each has a relatively high number of projects (20 and 15).

Most of these projects, more exactly 61% are accompanied by environmental impacts, which can range from one to thirteen. Moreover, 79 projects (45% of the 174 cases) occur in areas with at one least above-average climate vulnerability/sensitivity, as opposed to only 27 cases. The most common environmental impacts occurring in climate vulnerable areas are loss of landscape/ aesthetic degradation (28% of 49 cases), biodiversity loss (24% or 41 cases) and surface water pollution or decreasing water quality (17% or 30 cases), thus confirming to some extent the main hypothesis of this paper. This means that accumulating environmental degradation have occurred in places that are under adaptive stress in the face of expected climate impacts. The relationship is statistically significant at the level

0.05 using the chi-square test (see Table 7). These findings also provide *prima facie* for Sassen’s argument on “dead land and dead water” even within Europe, and not only in the Global South (Sassen, 2014).

Table 7: Environmental, health and socio-economic impacts in climate-sensitive areas

	Environmental impacts	Health impacts	Socio-economic impacts
Total no. of cases	106	63	93
Cases occurring in climate-sensitive/vulnerable areas	79 (75%)*	45 (71%)**	62 (67%)**

*Statistically significant using the chi-square test at the level <0.05 .

** No statistically significant relationship (chi-square).

In terms of health impacts, they are less prevalent than the environmental ones, with 63 cases, out of which 45 (71%) display one or several (up to four) health impacts in climate-sensitive areas. However, they do not occur systematically in such areas, as indicated by the chi-square test (Table 6). The most common environmental impact is the exposure to unknown or uncertain complex risks (16% or 27 cases). Less often reported, but still noteworthy are reports of accidents (for 12 projects) and even deaths (11 cases). Environmental impacts coupled with health impacts indicate that development projects affect the lives of local residents in mediated ways, but an analysis of co-presence will not be attempted here.

Finally, the socio-economic impacts of projects under construction, in operation or stopped occur in 93 cases, 62 of which (67%) occur in climate-sensitive areas. The statistical association is nevertheless not significant at the 0.05 level (chi square). The most common such impacts concern the loss of landscape or sense of place (39 cases or 42%), loss of livelihood (27%), increase in corruption or co-optation of different actors (24%) and land dispossession (18%).

A useful case that illustrates how environmental impacts accumulate in an area of high climate vulnerability is located in South Eastern Spain. The largest aquifer in the Province of Almeria, the Sorbas-Tabernas Basin, is located in the province of Almeria in Andalucía (Dene, 2015). The aquifer supplies water to 15 towns, to numerous small villages, which would otherwise have no access to water, and also to subsistence farmers. However, Spain’s Department of the Environment has allowed in 2014 that 3,600 hectares of land above the aquifer be planted with an estimated two million olive trees. The spring of El Rio De Aguas is the largest and most important spring carrying water from the aquifer and it is also the only access to water for villagers and subsistence farmers down-stream from the spring. With the spring captured, the latter see “the total loss of their livelihoods” (Dene, 2015). According to the author of this article, some irrigation lines previously used to

water fruit trees and vegetable gardens are running dry, the trees other than olives are dying, and the land has become difficult to use. These villagers and farmers are said to be under pressure to be relocated but have nowhere to go. Compounding this anthropic crisis, rainfall is insufficient to re-charge the aquifer so that underground water levels are continuing to drop. Indeed, the area is located in a region that has above-average potential vulnerability and environmental impact, and is also characterized as having a low response capacity to the challenge of adaptation.

All these show that recent “development” decisions intersect with long-term trends of climate vulnerability and push places such as Sorbas-Tabernas Basin towards a point of no return. Adaptation at the local level becomes thus highly impossible, and the situation can only be solved through migration, which puts stress on neighbouring regions.

Resistance-cum-Adaptation in Climate-Sensitive Areas

To measure the resistance to development projects in Europe, we use several measures from the EJAtlas. These are the intensity of the conflict (latent, low, medium, high), the number of mobilizing, as well as the outcomes that suggest some forms of local empowerment (victory for environmental justice through court decisions), fostering a culture of peace, strengthening of participation and negotiated alternative solution).

In contrast to environmental or health impacts, the intensity of conflicts can be measured even for projects that are not yet in operation. This is because groups can mobilize in anticipation of possible impacts, being aware that preventing development projects before they even reach the operational phase is the most effective way to protect their communities, their land and water. However, in order to ensure comparability with the previous tables, we still refer in the following two tables to projects under construction, in operation or stopped (N=174).

Interestingly, the EJAtlas data suggest that the conflicts having the highest intensity do occur in the areas with some climate vulnerability (55%) (*Table 8*). However, in climate vulnerable areas, medium and low intensity of conflicts are more prevalent (up to 73%). No statistically significant association was found between conflict intensity and climate vulnerability, using the chi-square test.

The pattern of high intensity conflicts can be explained more appropriately by the political culture of different countries, rather than as a reaction to projected climate change. For example, most high-intensity conflicts take place in Germany, France, the United Kingdom or Sweden, all in areas that are less vulnerable to climate change. In contrast, among the numerous conflicts taking place in Spain (76 overall), in areas of climate vulnerability, only 10 where *high intensity*.

Table 8: The distribution of environmental justice conflicts by conflict intensity, in climate vulnerable/ sensitive areas

Intensity of conflict	Cases occurring in areas with:		Total (100% in each case)
	No sensitivity / vulnerability	At least one sensitivity / vulnerability	
High	17 44.7%	21 55.3%	38
Medium	28 29.8%	66 70.2%	94
Low	7 26.9%	19 73.1%	26
Latent	1 10.0%	9 90.0%	10
Unknown	1 50.0%	1 50.0%	2
NS	0 0.0%	4 100.0%	4
Total	54 31.0%	120 69.0%	174

Source: Authors' analysis of the EJAtlas data (2018).

When the number of mobilizing groups in each conflict is considered, the pattern conforms to the theoretical expectations, to some extent. Regardless of the number of mobilizing groups, they are more active in climate sensitive areas. However, there is no observable trend for higher numbers of groups to be mobilized in the climate sensitive areas. For example, nine or more groups mobilize most often in climate sensitive areas (90%), but these are followed by two groups or less (78%). (see *Table 9*).

Table 9: The distribution of environmental justice conflicts by number of mobilizing groups in above-average climate vulnerability / impacts scores

Number of mobilizing groups	Cases occurring in areas with:		Total
	No sensitivity/ vulnerability	At least one sensitivity/ vulnerability	
Two or less	6 22.2%	21 77.8%	27
Three to five	30 36.6%	52 63.4%	82

Six through eight	17 31.5%	37 68.5%	54
Nine or above	1 10.0%	9 90.0%	10
Total	54 31.2%	119 68.8%	173

Source: Authors' analysis of the EJAtlas data (2018).

The measures that capture local empowerment, namely victory for environmental justice through court decisions, fostering a culture of peace, strengthening of participation and negotiated alternative solutions, occur with varying frequency in climate sensitive areas. Overall, they occur in one third of cases, at most, in both climate sensitive areas and in areas that are not sensitive. The strengthening of participation occurs most frequently in vulnerable areas, but still does not exceed 35% of projects in such areas. This is followed by victories for environmental justice, through court decision, which take place in 23% of projects occurring in climate vulnerable areas. At the opposite end is the fostering of a culture of peace, occurring in just one case. Overall, it may be said that the evidence for an adaptative effect of resistance cannot be ascertained by the available data.

Conclusion

The article has sought to articulate the climate edge as a dynamic concept with which to capture climate change as a process that deepens already occurring environmentally unjust practices at local level. We have found preliminary evidence that different categories of projects occur in areas with one or several above-average impacts or vulnerabilities. This shows that Sassen's claim that dead land and dead water are an increasingly common condition is borne out by the available data. In this sense, the article provides a useful contribution to the environmental justice literature, as it reveals patterns that were little visible in the case of Europe. In this way, it provides some empirical evidence that Sassen's argument about the systemic character of extreme conditions (environmental, health and socio-economic) is born out even in the case of the European Union. This is significant since the EU is generally seen as a progressive force in climate and environmental justice.

On the other hand, we have noticed that the climate impact categories do not make a clear-cut difference among the projects included in the EJAtlas. This suggests that the influence of projected climate changes needs to be better specified, rather than assuming that the climate vulnerable areas themselves have intrinsic characteristics that are noticeable in relation to the characteristics of development

projects. A processual model seems to be needed to more systematically hypothesize how climate vulnerability is enhanced by environmentally unjust projects. This, however, shall be the focus of future research.

Acknowledgments

This work was supported by a grant of Ministry of Research and Innovation, CNCS - UEFISCDI, project number PN-III-P1-1.1-TE-2016-2260, within PNCDI III. Thanks are also due to the developers and contributors of the Environmental Justice Atlas.

Notes

¹ In turn, the potential impacts are a combination of regional exposure to climate change and physical, economic, social, environmental and cultural sensitivity to climate change. The adaptive capacity is a combination of economic, infrastructural, technological and institutional, as well as knowledge and awareness of climate change.

² The Pearson Chi-Square has a value of 31.316 with 8 degrees of freedom.

References

- Agyeman, J., Bullard, R. D. and Evans, B. (Eds.) (2003) *Just Sustainabilities: Development in an Unequal World* (1 edition). Cambridge, Mass: The MIT Press.
- Bassett, T. J. and Fogelman, C. (2013) Déjà vu or something new? The adaptation concept in the climate change literature. *Geoforum*, 48, 42-53.
- Brock, A. and Dunlap, A. (2018) Normalising corporate counterinsurgency: Engineering consent, managing resistance and greening destruction around the Hambach coal mine and beyond. *Political Geography*, 62, 33-47.
- Bullard, R. (1990) *Dumping in Dixie: Race, Class, and Environmental Quality*. Available at <http://www.ciesin.org/docs/010-278/010-278chpt2.html>. Accessed on 10.02.2019.
- Burch, W. R. (1971, August) *The Peregrine Falcon and the Urban Poor. Some Sociological Interrelations*. Presented at the American Sociological Association Annual Meeting, Denver, Colorado. Available at <http://eric.ed.gov/?id=ED056144>. Accessed on 10.02.2019.
- Carmin, J., Tierney, K., Chu, E., Hunter, L. M., Timmons Roberts, J. and Shi, L. (2015) Adaptation to Climate Change, in R. E. Dunlap and R. J. Brulle (eds.), *Climate change and society: sociological perspectives*. New York, NY: Oxford University Press, 164-198.
- Cehlár, M., Domaracká, L., Šimko, I. and Puzder, M. (2016) Mineral resource extraction and its political risks in M. Majerník, N. Daneshjo and M. Bosák, *Production Management and Engineering Sciences*, London and New York: Routledge, 39-43.
- Cernea, M. M. and Mathur, H. M. (Eds.) (2008) *Can Compensation Prevent Impoverishment?: Reforming Resettlement through Investments*. Delhi: Oxford University Press.

- Collins, R. (2013) The End of Middle Class Work: No More Escapes, in I. M. Wallerstein, R. Collins, M. Mann, G. Derluguian and C. Calhoun (Eds.), *Does capitalism have a future?* Oxford, New York: Oxford University Press, 37-69.
- Dene, D. (2015, January 16) End Ecocide of El Rio De Aguas, Paraje Natural Karst, Almeria, Spain. Retrieved from Environmental Justice Atlas website. Available at <https://ejatlas.org/conflict/end-ecocde-el-rio-de-aguas-paraje-natural-karst-enyesos-sorbas-almeria>. Accessed on 19.02.2019.
- Dodge, R. (2016) Unconventional Drilling for Natural Gas in Europe, in Y. Wang and W. E. Hefley (Eds.), *The Global Impact of Unconventional Shale Gas Development: Economics, Policy, and Interdependence*, Switzerland: Springer, Cham, 97-130.
- Elvers, D. H.-D., Gross, M. and Heinrichs, H. (2008) The Diversity of Environmental Justice. *European Societies*, 10, 5, 835-856.
- European Commission (2009) Map viewer - Climate-ADAPT. Retrieved November 24, 2018. Available at <https://climate-adapt.eea.europa.eu/knowledge/tools/map-viewer>. Accessed on 24.11.2018.
- Gould, K. A., Pellow, D. N. and Schnaiberg, A. (2004) Interrogating the Treadmill of Production: Everything You Wanted to Know about the Treadmill but Were Afraid to Ask. *Organization & Environment*, 17, 3, 296-316.
- Harlan, S. L., Pellow, D. N., Timmons Roberts, J., Bell, S. E., Holt, W. G. and Nagel, J. (2015) Climate justice and inequality, in R. E. Dunlap and R. J. Brulle (Eds.), *Climate change and society: sociological perspectives*, 127-163. New York, NY: Oxford University Press.
- JRC, J. R. C.-E. U. H. P. (2017, October 10) Database of hydrocarbons wells in the EU. Available at https://openecho.jrc.ec.europa.eu/database?field_country2_tid=59. Accessed on October 10, 2017.
- Klein, N. (2014) *This changes everything: Capitalism vs. the climate*. Toronto, Ont: Alfred A. Knopf Canada.
- Kurtz, H. E. (2003) Scale frames and counter-scale frames: Constructing the problem of environmental injustice. *Political Geography*, 22, 8, 887-916.
- Laurent, É. (2011) Issues in environmental justice within the European Union. *Ecological Economics*, 70, 11, 1846-1853.
- Lis, A. and Stankiewicz, P. (2017) Framing Shale Gas for Policy-Making in Poland. *Journal of Environmental Policy & Planning*, 19, 1, 53-71.
- Martinez-Alier, J., Temper, L., Bene, D. D. and Scheidel, A. (2016) Is there a global environmental justice movement? *The Journal of Peasant Studies*, 43, 3, 731-755.
- Nyberg, D., Wright, C. and Kirk, J. (2018) Dash for Gas: Climate Change, Hegemony and the Scalar Politics of Fracking in the UK. *British Journal of Management*, 29, 2, 235-251.
- O'Brien, K., Eriksen, S., Nygaard, L. P. and Schjolden, A. (2007) Why different interpretations of vulnerability matter in climate change discourses. *Climate Policy*, 7, 1, 73-88.
- Oliver-Smith, A. (2011) *Defying Displacement: Grassroots Resistance and the Critique of Development*. Austin, Tex.; Chesham: University of Texas Press.
- Pellow, D. N. and Brulle, R. J. (2005) Power, Justice, and the Environment: Toward Critical Environmental Justice Studies, in D. N. Pellow and R. J. Brulle (Eds.), *Power,*

- Justice, and the Environment: A Critical Appraisal of the Environmental Justice Movement.* Cambridge MA: The MIT Press, 1-19.
- Rayner, T. and Jordan, A. (2016) Climate Change Policy in the European Union. In *Oxford Research Encyclopedia of Climate Science*. Available at <https://oxfordre.com/view/10.1093/acrefore/9780190228620.001.0001/acrefore-9780190228620-e-47>. Accessed on 24.02.2019.
- Sassen, S. (2010) A Savage Sorting of Winners and Losers: Contemporary Versions of Primitive Accumulation. *Globalizations*, 7, 1-2, 23-50.
- Sassen, S. (2014) *Expulsions*. Cambridge and London: Harvard University Press.
- Sassen, S. (2015) At the systemic edge. *Cultural Dynamics*, 27, 1, 173-181.
- Sassen, S. (2017) De-theorizing in Order to Re-theorize Emergent Alignments: A Rumination, in M. Burchardt and G. Kim (Eds.), *Beyond Neoliberalism: Social Analysis after 1989*, 17-27.
- Schnaiberg, A. (1975) Social syntheses of the societal - environmental dialectic: The role of distributional impacts. *Social Science Quarterly*, 5-20.
- Schnaiberg, A. (1980) *The Environment: From Surplus to Scarcity* by ALLAN SCHNAIBERG. Available at https://web.archive.org/web/20080828204350/http://media.northwestern.edu/sociology/schnaiberg/1543029_environmentsociety/index.html. Accessed on 19.02.2019.
- Schnaiberg, A. and Gould, K. A. (2000) *Environment and Society: The Enduring Conflict*. Caldwell, N.J.: The Blackburn Press.
- Smit, B. and Pilifosova, O. (2003) Adaptation to climate change in the context of sustainable development and equity, in J. J. McCarthy, O. Canziani, N. A. Leary, D. Dokken and K. S. White (Eds.), *Climate Change 2001: Impacts, Adaptation and Vulnerability*, 877-912.
- Stephenson, M. H. (2016) Shale gas in North America and Europe. *Energy Science & Engineering*, 4, 1, 4-13.
- Temper, L., del Bene, D. and Martinez-Alier, J. (2015) Mapping the frontiers and front lines of global environmental justice: The EJAtlas. *Journal of Political Ecology*, 22, 255-278.
- Wacquant, L. (2010) Crafting the Neoliberal State: Workfare, Prisonfare, and Social Insecurity1: Crafting the Neoliberal State. *Sociological Forum*, 25, 2, 197-220.
- Weber, G. And Cabras, I. (2017) The transition of Germany's energy production, green economy, low-carbon economy, socio-environmental conflicts, and equitable society. *Journal of Cleaner Production*, 167 (Supplement C), 1222-1231.
- Wisner, B., Blaikie, P., Cannon, T. and Davis, I. (2014) *At Risk: Natural Hazards, People's Vulnerability and Disasters*. New York: Routledge.