Environmental Protests in Europe

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Abstract

Despite growing attention to the resurgence of environmental, and especially climate-related mobilization in Europe, comparative assessments across countries and over time are lacking. Using classic social movement theories (grievances, opportunities, resources), we examine the frequency, profile, and drivers of environmental protest. We conduct a two-step analysis based on the updated PolDem protest event dataset covering 27 European countries from 2000 to 2021. We move from descriptive accounts to dynamic regressions, modeling the cross-national and temporal variation in the number of environmental protests, the participants involved, and their share of all events. The results highlight 2019 as pivotal for environmental protests, with a peak in participants and heightened salience in Europe's protest landscape. Typical environmental protests are well-attended, symbolic, and confrontational actions, exclusively focused on the issue, and draw support from both professional and non-professional organizations. Temporal variation in the number and share of environmental protests is related to proxy measures for resources in the environmental field, while participation rates correlate with political opportunities as measured by governments' positions on environmental protection. Thus, the simultaneous presence of opportunities and resources tends to create an "explosive mix", fuelling environmental protest dynamics.

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Introduction

After the heyday of the so-called new social movements in the 1970s and early 1980s, the social movement literature has mainly described the development of environmental mobilization as a process of gradual institutionalization. Only part of the environmental movement continues to rely on extra-institutional protest tactics, with most of the effort invested in the 'long march through the institutions', leading to the establishment of green parties and a plethora of non-governmental organizations active in this field (e.g., Dalton and Kuechler, 1990; della Porta and Rucht, 2006; Giugni and Grasso, 2015; Kitschelt, 1989; Kriesi et al., 1995; Müller-Rommel, 1989; Poguntke, 1987; Rootes, 2007; Van Der Heijden, 1997). However, these earlier accounts from the scholarly literature are challenged by the recent resurgence of environmental, particularly climate protests. Since 2019, environmental protest appears to be the main 'movement on the streets' in many European countries, consistently attracting large numbers of participants, even in the context of the Covid-19 pandemic (e.g., de Moor et al., 2021; Kriesi and Oana, 2023; Marquardt, 2020; Sorce and Dumitrica, 2023; Zamponi et al., 2022). The recent wave of mobilization has achieved remarkably success in agenda-setting and activist recruitment (e.g., Barrie et al., 2023; Schürmann, 2023; Sisco et al., 2021). The ongoing mobilization represents a path departure not only in the level of participation, but also in terms of strategies and connections to other issues (e.g., de Moor et al., 2021; Marquardt, 2020).

Social movement studies have gathered systematic information on the participants involved in climate protests (e.g., de Moor et al., 2021, 2019; Porta and Portos, 2023; Wahlström et al., 2019) as well as the discourse and the organizational features of the emerging movement (e.g., Barrie et al., 2023; Marquardt, 2020; Schürmann, 2023; Zilles and Marg, 2023). Yet, the scholarly literature still has to account for the comparative strength and driving forces of this new wave of environmental protests. To take up this challenge, we provide a large-N analysis of the big-picture of environmental protests in Europe, offering important macro-level insights for this special issue on Europe's changing protest landscape (Hunger and Hutter, 2024, this issue). We focus on the first phase of the current wave of mobilization, between 2000-2021, characterized by large demonstrations typically associated with actors such as Fridays for Future.[1] We ask three interrelated questions. First, we examine, how widespread has the new protest wave around environmental protection and climate change been? Did it reach countries that are only sporadically covered by the comparative protest literature (e.g., in Central and Eastern Europe - CEE)? Second, what is the profile of the typical environmental protest event compared to protests centered on other issues? Third, what is the role of grievances, opportunities, and resources in driving environmental protest mobilization?

One of the main reasons for the absence of a comparative, pan-European study on environmental protests is the lack of adequate large-N data sources. To address this challenge, we have updated the PolDem Protest Event dataset (Kriesi et al., 2020), which now covers protests in 27 European countries from 2000 to 2021. The dataset is based on a semi-automated content analysis of ten international news wires, resulting in more than 40,000 coded protest events. The countries included cover Northwestern, Southern, and Eastern Europe, regions that differ in terms of the level and form of protest mobilization (Borbáth and Gessler, 2020; Kriesi et al., 2020; Kriesi and Oana, 2023).

We take an issue-centered perspective instead of focusing on the actors organizing environmental protests. Accordingly, we include all protest events that focus on pollution, biodiversity, the environmental impact of large infrastructure or industrial projects, animal rights, climate change, anti-nuclear mobilizations, or other environment-related issues. The crucial advantage of defining environmental protests in terms of their demands is that it allows us to include mobilizations with different forms of action (from demonstrative to more confrontational and violent) or organizational backgrounds, including those sponsored by newly emerging social

[1] More recent and more radical actions, typically associated with actors like the Last Generation and Extinction Rebellion mostly fall outside of our timeframe.

movements. We include climate-related protests under this umbrella term in order to place them in a broader perspective.

We conduct our analysis on two levels. First, we map out the profile of a 'typical' environmental protest, using two-way fixed effects models with single protest events as units of analysis. Second, we account for the longitudinal dynamics of mobilization, and use Prais-Winsten regression models with aggregated yearly values of environmental protests. For the latter analysis, we rely on a three-fold differentiation to measure our dependent variable: 1. the number of events; 2. the number of participants; 3. the relative share of environmental events out of all protests in a given country and year. The three-fold differentiation allows us to *describe* the multifaceted nature of the strength of environmental protests. Going beyond the descriptive account, we use proxy indicators of grievances, opportunities, and resources to *explain* the temporal variation of the three different features.

The article offers three sets of findings to ongoing debates in social movement studies and the scholarly literature on the politics of climate change (Adedoyin et al., 2020; Barrie et al., 2023; Schürmann, 2023; Sisco et al., 2021; Zilles and Marg, 2023): First, in line with the existing literature (e.g., de Moor et al., 2021, 2019; Marquardt, 2020; Wahlström et al., 2019) our descriptive findings highlight the importance of 2019 for environmental protest in Europe. We demonstrate that 2019 represents a peak, particularly in terms of the number of protesters and the relative importance of environmental issues in the protest arena. Moreover, this peak is observed in several countries, not only in Northwestern Europe but also in Central and Eastern Europe. After this peak, in 2020, the Covid-19 pandemic broke out, and mobilization fell back to its pre-2019 levels, where it remained until 2021 (for general trends, see Oana et al., 2024, this issue). Second, compared to other protest issues, environmental protests tend to be better attended, more closely associated with professional and non-professional NGOs (as opposed to political parties and trade unions), and more focused on environmental issues alone, without linking these demands to other issue areas. Furthermore, compared to other protest issues, the action repertoire of environmental protests is more likely to include less contentious activities (such as petitions and symbolic forms of protest) and confrontational forms (such as blockades and other forms of civil disobedience), but not demonstrative and violent actions. Finally, the over-time analysis, tracing the associations between the three protest measures with the proxy variables for grievances, resources, and opportunities suggests that resources are crucial for explaining the absolute number of environmental issues and their relative share in the protest arena. In contrast, political opportunities are associated with a higher protest turnout. Thus, we argue that the combined presence of opportunities and resources constitutes an 'explosive mix' of factors that fuel the environmental movement.

In what follows, we first present our theoretical framework. We formulate hypotheses based on the analytical distinction between grievances, opportunities, and resources. Next, we introduce our data and methods. The following results section presents both descriptive analysis and classical hypotheses tests. The concluding section contextualizes our findings in the broader debates on the prospects of environmental and climate-related mobilization.

Towards a theory of environmental protest mobilization

Recent literature on environmental mobilization has primarily focused on explaining the emergence of green parties and their transformative effect on party system dynamics (Abou-Chadi, 2016; Spoon et al., 2014), largely neglecting non-electoral and protest mobilization. The social movement literature, in turn, is driven by a focus on single issues or specific actors that dominate protest politics in a given period. Examples range from the classic literature on anti-nuclear protests (e.g., Rucht, 1990) to recent studies on the mobilization of climate-related social movement organizations such as FFF or XR (e.g., de Moor et al., 2021; Gardner et al., 2022; Zamponi et al., 2022). An important exception that systematically covers different forms of environmental protest is the work of Rootes et al. (2007). However, their analysis of environmental protest covers only the period 1988-1998 in a handful of Western European countries. Comparative accounts that map and explain the current dynamics of environmental protest in a variety of contexts are still lacking. This is an important gap, given the strong scholarly and public claims about the significance of the recent wave of climate protests for politics in Europe and beyond (e.g., Adedoyin et al., 2020; de Moor et al., 2021; Porta and Portos, 2023; Valentim, 2023; Zilles and Marg, 2023).

Based on the contested issue, the environmental movement represents a typical form of new social movement mobilization, which emerged in the aftermath of 1968 (Kriesi et al., 1995). Green parties - as an institutionalized form of new social movements - carried forward the legacy of this mobilization and made inroads in the party systems of many Northwestern European countries. While the heyday of new social movement mobilization was in the 1970/early 1980s, the rise of Green parties did not lead to the decline of environmental protests (on the contrary, see: Valentim, 2023). In fact, new social movements became the dominant actor organizing in Northwestern European protests, with environmental events resembling the typical form of mobilization (Dalton and Kuechler, 1990; Hutter, 2014; Müller-Rommel, 1989).

In contrast to Northwestern Europe, in Southern and Eastern Europe environmental protests are less dominant, although they constitute a constant presence in the protest arena. Until recently, in Southern Europe, new left forces needed to mobilize without the support of other institutional or partisan allies (Biancalana, 2020; della Porta et al., 2017). In Central and Eastern Europe, environmental mobilization builds on both the pre-1989 apolitical tradition of tourism or environmental protection groups, as well as the human rights movements of the transition period (Císař, 2022; Steger et al., 2017). The tension between the two results in an internally divided civil society landscape, that faces the additional difficulty of a protest arena characterized by low, and predominantly right-wing mobilization (Borbáth and Gessler, 2020) highly contingent on party politics (Císař and Vráblíková, 2019). Nevertheless, both in Southern and Eastern Europe the environmental movement has been able to establish itself, and can mobilize in years-long, resource-intensive protest campaigns. Illustrative examples are the No TAV movement in Italy that organised against the planned high speed train connecting Turin and Lyon via the Susa Valley (Biancalana, 2020); or the Roșia Montană protest in Romania organised against a planned gold mine using cyanid based extraction in the Carpathian region (Soare and Tufiș, 2021).

Rather than focusing on the profile of participants in environmental protests (e.g., de Moor et al., 2019; Porta and Portos, 2023; Wahlström et al., 2019; Zamponi et al., 2022), in what follows we zoom in on the explanatory factors associated with the emergence of this form of mobilization. We draw on classical theories of collective mobilization from social movement studies and distinguish analytically between factors related to grievances, resources, and opportunities (Kriesi et al., 1995; McAdam et al., 2001; Tarrow, 1998; Verba et al., 1995). Even if these three factors do not drive environmental protest in isolation, the analytical distinction allows us to disentangle their effects and to specify hypotheses related to each of the three (for a similar research design on far-right protests, see Castelli Gattinara et al. 2022).

Grievances

Social movement research is divided by the emphasis on the effects of grievances on protest mobilization. One strand of the literature argues that negative change in the status quo leads to increased mobilization (Gurr, 1970; Klandermans et al., 2008; Snow et al., 1998). According to these authors, grievances influence protest also on the macro-level (e.g., della Porta, 2015; Kriesi et al., 2020). Another strand of literature has argued that grievances do not carry much explanatory power (McCarthy and Zald, 1977) due to their relative over time stability (Jenkins, 1983, p. 530). From this perspective, there is always a sufficient supply of grievances to form a potential for protest mobilization. Whether it is mobilized or it is not mobilized is explained by factors other than the presence of grievances.

Grievances related to the environment revolve around two sets of factors. First, Sisco et al. (2023) formulate the finite pool of attention hypotheses according to which what have been called fast-burning crises crowd out attention to non-crisis issues. Using the example of the onset of the Covid-19 pandemic, they argue that attention to climate change is crowded out by attention to other grievances related to those crises. Attention to climate change might be especially likely to be crowded out by other issues due to the hypothetical nature of the threat it carries compared to the more tangible effects of a pandemic or an economic recession. Thus, the classical literature suggests that environmental concerns are secondary to material concerns (e.g., Inglehart, 1977). According to this perspective, in times of economic misery, when individuals are faced with material worries, attention to environmental issues is rare, and environmental protests should be less frequent.

However, climate change's hypothetical, slow-burning nature depends heavily on the frequency of natural disasters and extreme weather events. Exposure to large storms, floods, wildfires, and the like make the effects of climate change more tangible to an increasing portion of society. Moreover, deteriorating circumstances in other aspects of the environment, such as pollution and biodiversity, may be less hypothetical than climate change. Thus, we expect that grievances invoked by natural disasters are another potential, yet definitely not sufficient, driver of environmental protests.

In addition to economic hardship and natural disasters, the third set of grievance-related factors refers to the (in)adequate response of state actors in addressing environmental problems and achieving established policy targets. Environmental governance is an increasingly complex policy area, with specific instruments designed to address interrelated problems (Boasson and Tatham, 2023). State actors are under pressure to address and mitigate the environmental impacts of interrelated policy issues, and citizens expect resources to be devoted to this area. The issue is politicized by both political parties (Carter et al., 2018; Farstad, 2018) and civil society organizations (Bernauer et al., 2013) that mobilize citizens to pressure governments to address environmental problems. While the state's effort to invest in achieving environmental goals might feed into a positive feedback loop and may also result in increased protest mobilization, a government that does not address the issue is, according to our perspective, will likely face environmental protests (for the role of non-representation in driving protest, see Nonnemacher 2023).

Based on the above, we formulate three hypotheses about the effects of grievances on environmental protests:

H_{1A}: *Economic misery is negatively related to environmental mobilization.*

H_{1B}: *Natural disasters are positively related to environmental mobilization.*

H_{1C}: *The government's environmental performance is negatively related to environmental mobilization.*

Opportunities

A simple model based on grievances is only able to account for the potential to protest, since it does not take into account broader political dynamics related to the context of mobilization (McAdam, 1982). In contrast, political opportunities focus the attention on explaining mobilization as a function of external conditions, mainly access to the political system (de Moor and Wahlström, 2022; Kriesi et al., 1995).

Scholars distinguish between institutional and discursive opportunities. The former refers to the institutional openness of the system in terms of the presence of access points, and it is typically operationalized with party system features (e.g., Quaranta, 2014), corporatism, and the role of the state more generally (e.g., Schofer and Fourcade-Gourinchas, 2001; Vráblíková, 2017). Amongst others, this perspective emphasizes the importance of allies in the party system (e.g., Císař and Vráblíková, 2019; Goldstone, 2003; Rucht, 2004). The assumption is that protest is more likely to succeed in a context where party allies can represent and carry forward protest demands in institutional politics. Discursive opportunity structures, by contrast, refer to the discursive context of political mobilization (Koopmans and Statham, 1999). Scholars in this tradition argue that beyond the institutional context, discourses might reinforce or suppress the resonance of protest claims.

Specifying how political dynamics matter for protest, the literature notes an important distinction between the effect of the parliamentary and the governmental arenas. Previous empirical work shows that although allies in the party system positively relate to street protest, when forces with the same ideological background are in government, protest declines (e.g., Borbáth and Gessler, 2020; Kriesi et al., 1995; Rootes, 2007). This is due to a mechanism of moderation and lack of mobilizing capacity: with access to institutional channels, organizations that typically mobilize on the 'streets' resort to less contentious tactics with their allies in power. In the context of environmental mobilization, this suggests that in geographic and temporal contexts where green parties, the historical ally of the environmental movement is in parliament (Kitschelt, 1989; Müller-Rommel, 1989) protest increases, but it declines when green parties enter national governments (e.g., Biancalana, 2020).

In the case of the Fridays for Future movement, Berker and Pollex (2023) show that left and green parties have generally supported the movement, although their analysis is inconclusive with regards to government-opposition status. From the movement's perspective, Marquardt (2020, p. 7) shows that Fridays for Future activists are divided about cooperating with the German Green Party. While some prominent members, including Luisa Neubauer are a member of the party, others refuse the professionalization trajectory that in their view an association with the Green Party would imply. From a comparative perspective, Fridays for Future targets policymakers while simultaneously emphasizing the role of individual responsibility in enhancing social change (de Moor et al., 2021; de Moor and Wahlström, 2022).

Despite these more recent developments concerning Fridays for Future, when examining a long time period, we rely on the expectations of the general literature on political opportunity structures. To account for the distinction between institutional and discursive opportunity structures, we focus on the effect of organizational allies in the form of Green parties and the salience of environmental issues in party politics. The two are not necessarily related since, as the party system literature shows, the salience of the environment as a political issue is a factor of both green party politicization and mainstream party reactions (e.g., Abou-Chadi, 2016; Spoon et al., 2014). To account for the potentially differential effect of parliamentary and governmental representation, we formulate the following expectations:

H_{2A}: The salience of the environmental issue in the party system is positively related to environmental mobilization.

H_{2B}: Green party presence in parliament is positively related to environmental mobilization.

H_{2C}: The salience of the environmental issue in government is negatively related to environmental mobilization.

H_{2D}: Green party presence in government is negatively related to environmental mobilization.

Resources

One weakness of grievance- and opportunity-based accounts is the lack of attention devoted to the agency of mobilizing actors. In that respect, the emphasis on resources complements the structural focus on grievances and opportunities by introducing the meso level and highlighting the role of strategies and alliances (Van Dyke and McCammon, 2010). Although grievances and opportunities constitute a potential to mobilize, meso-level actors exploit that potential, frame key demands, and organize events that the public can join (Jenkins, 1983; McCarthy and Zald, 1977). From this perspective, resourceful actors are expected to succeed more in mobilizing for protest than less well-endowed actors.

While it seems impossible to capture the intricate links between agency and protest in a cross-national study covering protest events in 27 countries for more than two decades, we take the existing broader field of organizations active in environment-related issues as a rough proxy for the available resources. Organizations provide material and non-material resources (e.g., know-how, credibility). Therefore, we consider the overall strength of the growing sector of environmental non-governmental organizations (ENGOs) as a key to assessing the mobilizing capacity for the issue at stake (for comparative assessments of the sector, see Bernauer et al. 2013; Partelow et al. 2020). While not all of these organizations might get directly involved in protest actions (Rootes, 2007, p. 246), they provide essential organizational resources for mobilization well beyond their own ranks. A strong network of such organizations in a given country allows for knowledge accumulation, social embedding, branding, and public awareness, all of which can ultimately contribute to the frequency and popularity of environmental protests.

Beyond the specific field of environmental organizations, environmental action is embedded in the broader dynamic of mobilization in the protest arena. While the environment has typically been seen as the main issue of new social movement organizations, as it comes to dominate protest politics, many other formal organizations mobilize environmental concerns (Giugni and Grasso, 2019). Put differently, next to such specialized ENGOs, a diverse set of actors - from political parties, and unions to various kinds of professional and informal organizations - might take the issue to the streets. Therefore, we also account for the presence of organized actors in protests that might facilitate environmental protests. We consider the presence of such actors in environmental protests a key resource for sustaining mobilization and reaching large segments of society.

Based on the above discussion, we formulate the following hypothesis:

H_{3A}: *The strength of the ENGO sector is positively related to environmental mobilization.*

H_{3B}: *Being embedded in a mobilization network dominated by organized actors is positively related to environmental mobilization.*

Data and methods

Having outlined our hypotheses, we now present our empirical strategy. We rely on the updated version of the publicly available PolDem protest event dataset (Kriesi et al., 2020) to study environmental mobilization across Europe. The original version of the dataset covered 30 European countries for the years 2000 to 2015, the updated version includes the years up to 2021. We restrict the sample to 27 countries.[2] The data has been collected using semi-automated tools, based on the coverage of ten international news wires (for further details on the data collection, see `https://poldem.eui.eu/` and Appendix F). Due to the type of data source, newswires, events that take place in larger countries, are attended by more people, organized in national capitals, and are sponsored by comparatively fewer organizations have a somewhat higher chance of being included. However, as Wüest and Lorenzini (2020) show there are no trends in terms of under- or over-representation of actors or issues, and the differences compared to national newspaper data are small. The data is relatively well-established in protest research, it has been used in several recent publications (e.g., Kriesi et al., 2020; Kriesi and Oana, 2023).

The data cover 40,599 protest events. 2,975 were organized around environmental issues, or 7.3 percent of all coded events. As noted above, the "environment" category includes all protest events with claims about anti-nuclear mobilizations, pollution, biodiversity, the environmental impact of large infrastructure or industrial projects, animal rights, climate change, or other environment-related issues. With this category, we can make an important contribution to the scholarly literature by mapping the frequency, profile, and drivers of environmental protests across many countries and over time. However, we also acknowledge that the coding scheme does not allow us to differentiate the (changing) salience of different environmental issues.

According to the dataset, a total of about 13 million people participated in environmental events. The dataset includes information on the date, the number of participants, the form of action (demonstrations, petitions and symbolic actions, confrontations, violence, other), the organizer (parties, unions, professional organizations, non-professional organizations, social groups), and the issue of the

[2]The three countries that are dropped include Iceland, Malta and Luxemburg. Each of them registered less than a total of 100 protest events in the PolDem dataset between 2000-2021, and only a handful of environmental events (IS: 5/77 MT: 5/67, LU: 1/41). Any inferences drawn for these three countries on the dynamic of environmental events would be highly uncertain.

protest event. In addition to the environment category, the detailed issues coded were grouped into four larger categories: economic (private and public), cultural (liberal, conservative, xenophobic, immigration, Covid-19), political (political, regionalism, Europe), other (other, education, health, missing). The coding scheme is introduced and discussed in more detail by Kriesi et al. (2020). In all the analyses we present, we use the weighted number of events and participants to account for the differences in the size of the countries and the data collection strategy (for details, see: Kriesi et al., 2020, and Appendix F).

We conduct a two-step empirical analysis focusing on 1) the differences between environmental and other events, and 2) the yearly dynamics of environmental events. In the first step, at the event level, we define a binary dependent variable using the demand of the protest event, which indicates whether it is a protest with an environmental issue or not. We include the issues of the events (since the same event can have multiple demands), their form of action, the organizer, and the participation rate (standardized to range between 0 and 1) as predictors. We run a two-way fixed effects logistic regression model with clustered standard errors, controlling for observed and unobserved geographic (country) and temporal (year) heterogeneity, while acknowledging the limitation of this specification in accounting for nonlinear additive effects (Imai and Kim, 2021).

In the second step, we measure all of our variables at the country-year level. We focus on three dependent variables: the number of environmental events, the number of participants in environmental events, and the share of protest events on the environmental issue out of all protest events coded for a given country and year. The country and year level of aggregation provides an optimal balance between the sparsity of environmental events and enough variation to conduct our analysis. To account for panel-specific serial AR(1) correlation, we rely on a Prais-Winsten solution. We use this as an alternative to a lagged dependent variable specification, as it has been shown that models with lagged dependent variables lead to biased estimates and are likely to wash out the effect of the variables of theoretical interest

(Plümper et al., 2005). In the dynamic regressions we report, we include country fixed effects. However, to disentangle cross-sectional and time effects, we ran all regression models with country means in both a bivariate and a multivariate (OLS) specification (see the results in Appendix C).

To conduct the dynamic regressions, we limit our analysis to the countries for which the PolDem data reports at least 20 environmental protests over the 21 years. This restriction leaves a total of 17 countries.[3] Focusing on this more limited set of countries allows us to model time trends instead of episodic mobilization under conditions of low or no protest on the issue (however, see the replicated analysis with the complete list of countries in Appendix E). We fill the panel, so years, when no environmental mobilizations were reported in the international news wires are included with zeros.

A challenging task was to find valid measures for the three sets of drivers (grievances, opportunities, and resources) of environmental protest. As the following discussion shows, we were able to find data covering all three for the large number of countries and years examined. However, most of these are proxy indicators. To begin with, we rely on three variables to test our hypotheses about the effects of grievances. First, we measure the state of the economy with the economic performance index, as conceptualized by Khramov and Lee (2013). The index is a linear function of inflation, unemployment, budget deficit, and GDP growth. The underlying data comes from the OECD and the World Bank. Second, we include the number of natural disasters from the International Disaster Database (Guha-Sapir et al., 2014). Third, we measure the way policy-making addresses environmental problems with the environmental performance index (EPI - Wolf et al., 2022). The EPI measure is designed to compare to what extent countries meet established environmental policy targets. Accordingly, the index is adjusted to isolate changes due to policies rather than cyclical effects, economic fluctuations, etc. The aggregated EPI score

[3]The 17 countries are: Austria, Belgium, Czechia, Denmark, Estonia, France, Germany, Greece, Italy, Latvia, Netherlands, Poland, Romania, Spain, Sweden, Switzerland, and the United Kingdom. For more information, see Appendix A, Figure 1.

is based on the weighted value of three components: climate change performance, environmental health, and ecosystem vitality, based on 40 performance indicators across 11 issue categories (see Appendix D for the replicated analysis with the disaggregated EPI).

To measure political opportunities stemming from allies and environmental issue salience in parliament and government, we rely on the Manifesto Project (Lehmann et al., 2023) and the ParlGov datasets (Döring et al., 2023). To measure the presence of green parties in parliament and in government, we take the ParlGov categorization of party families and consider formations coded as 'Green/Ecologist'. To measure the salience of the environmental issue in parliament, we rely on the mean of the salience of environmental protection in manifestos weighted by party vote shares. The measure is directly coded by the Manifesto Project (per501) and it includes references in favor of protecting the environment, fighting climate change, and other "green" policies. To calculate the salience of environmental protection in the manifestos of government parties, we merge the ParlGov and Manifesto Project datasets, relying on the updated code of Wratil (2022).

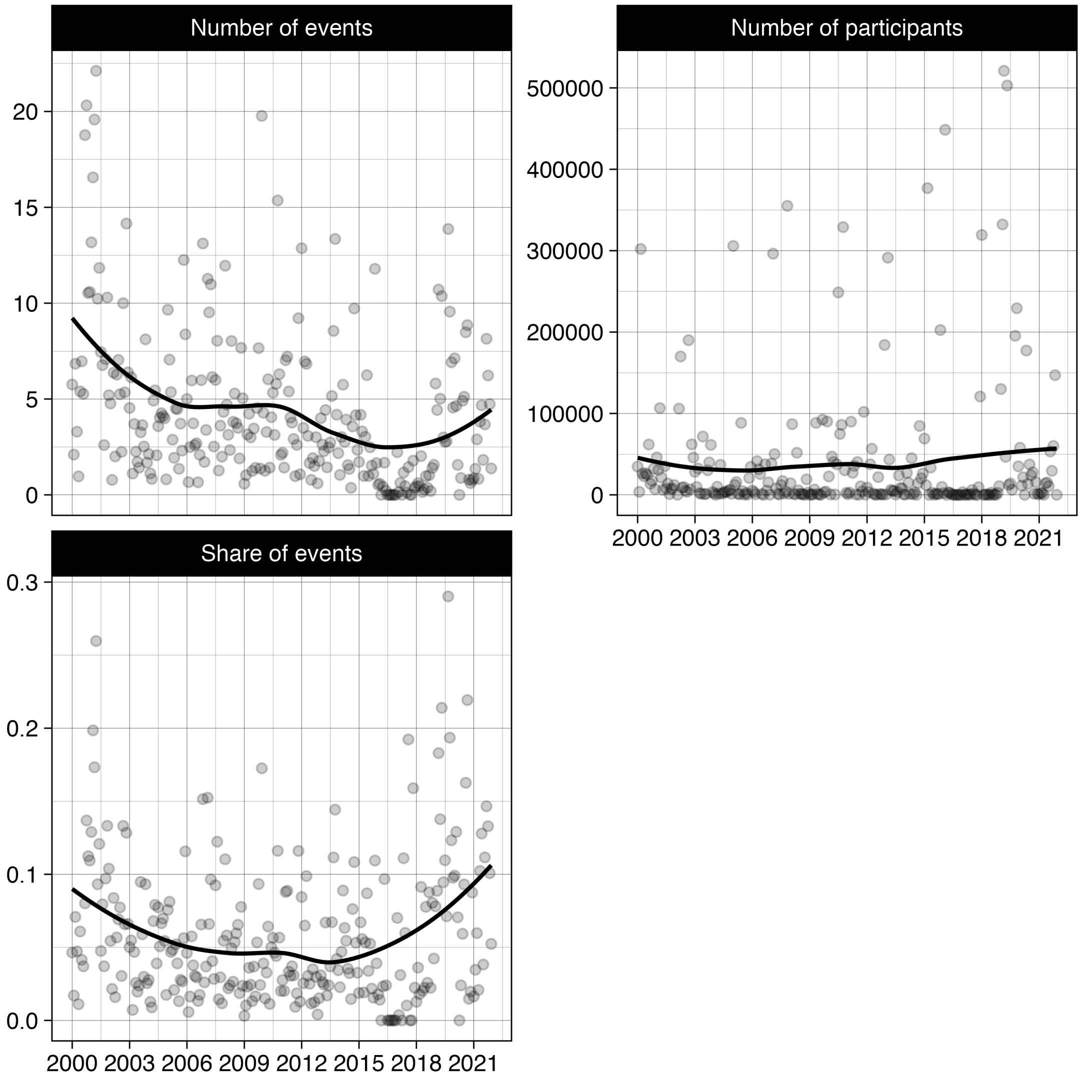
To measure resources, we rely on two proxy indicators that allow us to compare between countries and over time. The empirical indicators available to cover many countries and years tend to be contextual and are of limited use for identifying the theoretically emphasized role of agency in environmental mobilization. Similarly to previous comparative studies (e.g., Kriesi et al., 2020), we rely on these non-agentic indicators. As a proxy measure of the strength of the sector of environmental non-governmental organizations, we rely on the number of ENGO members registered with the International Union for Conservation of Nature (IUCN). This data has previously been used to measure the size of the ENGO sector since the IUCN claims to be "the world's largest and most important conservation network", with members from 181 countries (Bernauer et al., 2013, p. 98). The IUCN website includes information on when each organization joins. We scraped this data to calculate each country's yearly sum of ENGO organizations. As a measure of the extent to which the network of environmental protests is dominated by organizations, we take the share of environmental events that had a political party, trade union, professional organization, or non-professional organization named as a sponsor, from the total of all environmental events in a given country-year context. To calculate this measure, we rely on the PolDem dataset.

Results

The strength of environmental protest mobilization

How strong is environmental protest mobilization in Europe? To what extent has 2019 been a turning point? We start the presentation of our results with the descriptive analysis of our three aggregate variables for the strength of environmental mobilization across the 27 countries. Figure 1 shows the over-time evolution of (a) the number of environmental events; (b) the number of participants in environmental events; and (c) the share of environmental events from all protest events (for the original country-specific values, see Figures 2-4 in Appendix A).

Figure 1: Trends in environmental mobilization across 27 countries (2000-2021)



The figure shows the a) sum of environmental protest events; b) the sum of participants in environmental protest events; c) the share of environmental protest events from all protest events on the monthly level. The trend line represents a loess regression line. Please note that two outliers on the panel with the *Number of participants* have been omitted in the graphical representation. These are January 2002, when a large petition in Austria against the Temelin nuclear power plant contributes to a total number of 0.93 million participants, and September 2019, when the large climate strikes, especially in Germany and Italy, resulted in a total of 1.68 million participants. Also see Appendix A, Figures 1-4.

The figure helps us to qualify some of the most common narratives about the evolution of environmental protests. We observe peaks in the number of environmental protests in the early 2000s, with a declining trend thereafter. More recently, the number of events partly increases, which contributes to the relative share of environmental events surpassing its earlier peak in 2000. The number of participants in environmental protests mostly stays stable with a small, incremental over time increase. One could read these findings of comparatively fewer events, coupled with stable participation rates and increasing importance in the protest landscape as an indication of increasing coordination, as opposed to fragmentation.

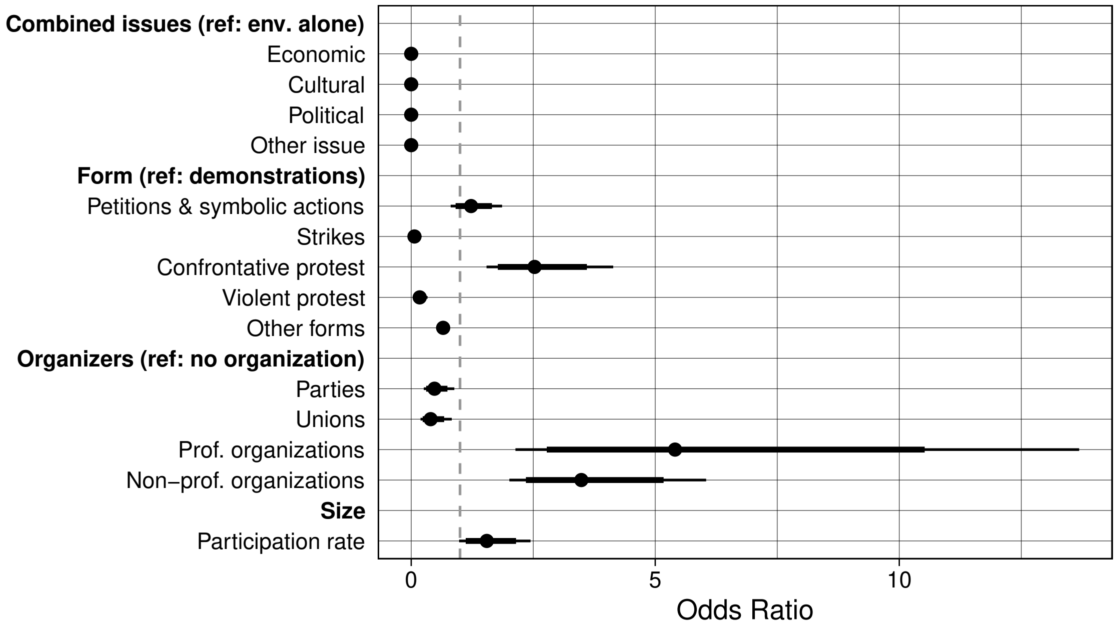
Notably, 2019 represents a (local) peak in the dynamics of all three indicators. 2019 stands out the most in terms of the number of participants in environmental protests. The data also show that in 2020, with the outbreak of the Covid-19 pandemic, all three indicators took values far below the 2019 peak. They do not return to the 2019 peak in 2021 either, which indicates both the exceptional nature of mobilization during the Covid-19 pandemic (see: Kriesi and Oana, 2023; Sorce and Dumitrica, 2023) and the importance of 2019 as a year of environmental mobilization.

These average trends hide substantial differences across countries. In terms of all three indicators of the strength of environmental protest (see Figure 1, Appendix A), in some countries the movement is substantially stronger both in absolute and in relative terms (AT, DE, UK, CZ, IT) while in others, it remains more marginal (SI, PT, HU, NO). Similarly, in about half of the countries, 2019 stands out mainly for the high number of participants in environmental events (CH, DE, DK, FI, FR, GR, IT, NL, PL, PT, SE, UK), while in others it does not (AU, CZ, ES, LV, BE, RO, EE, IE, SK, BG, LT, NO, CY, HU, SL). A number of countries have experienced a substantial protest wave after 2019 based on all three indicators. They include cases from Northwestern Europe (United Kingdom, Germany, France, Sweden, Switzerland), Southern Europe (Italy, Portugal), and CEE (Estonia, Poland, Czechia). The list is fairly heterogeneous, and it does not follow long-established regional divides. This suggests the importance of pan-European diffusion in 2019, rather than long-standing national-level dynamics in setting the strength of environmental mobilization. However, to fully uncover these dynamics, we would need more fine-grained and extensive national protest event data

The profile of environmental protest events

Next, we present the results of our event-level analysis. To map the profile of a typical environmental protest event, the logistic regression includes both country and year-fixed effects. Figure 2 presents the results, with estimates shown as odds ratios (1 means no discernible effect).

Figure 2: Two-way fixed effects model of environmental events from all protests



Calculated based on the regression model presented in Appendix A, Table 1. Thinner lines represent 95% confidence intervals, thicker lines represent 84% confidence intervals. If the 84% confidence intervals do not overlap, the difference is statistically significant at the $p < 0.05$ level (see: Bolsen and Thornton, 2014). The model includes country and year fixed effects, and standard errors clustered by country and year.

The results show that environmental events are unlikely to be combined with other claims. This includes events with economic, cultural, political, or other demands. Compared to the average demonstrations, environmental events are more likely to be both less contentious (symbolic actions and petitions) and more confrontational (e.g., blockades or other forms of non-violent disobedience), but not violent. Environmental events are likely to be organized by both professional and non-professional NGOs. The former include organizations with paid staff and internal hierarchies (e.g., Greenpeace), while the latter include informal networks such as XR and FFF. In comparison, political parties and trade unions are less likely to sponsor environmental events. Environmental protests are well attended and are among the largest protest events.

We split the sample and ran separate analyses for the pre- and post-2019 period (see Appendix A, Table 1 and Figure 6). The results show that in the post-2019 environmental events become even less likely to include any other issue, they are more similar to an average demonstration, and are attended in even higher numbers. Namely, in 2020 and 2021, environmental events are less likely to be confrontational, petitions, or symbolic actions. This suggests that over time, environmental events resemble the 'typical' protest event in the European protest scene, able to mobilize large numbers of participants around a differentiated set of demands, organizational sponsors, and action forms.

The dynamics of environmental events

Next, we present the results of our Prais-Winsten regression analysis. In this analysis, we move beyond the individual protest event and examine mobilization in its broader context. The dynamic regressions allow us to focus on the ebb and flow of environmental protests as a function of grievances, opportunities, and resources.[4]

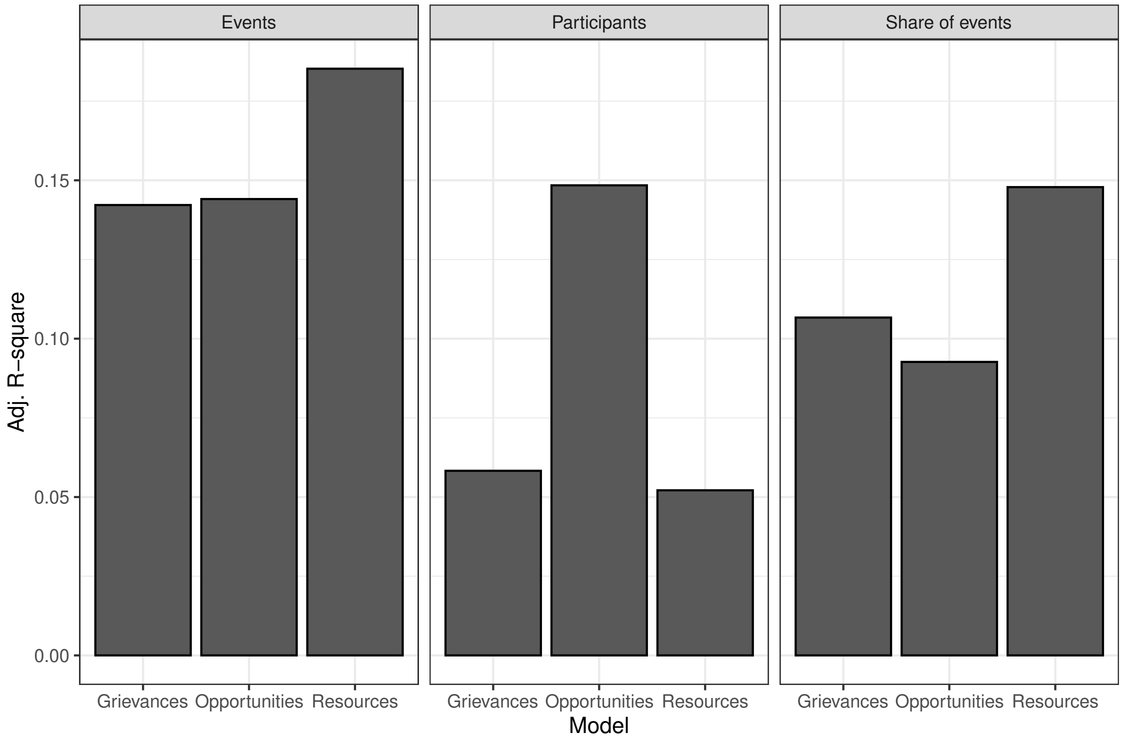
Before we present a joint model of the marginal effect of grievances, opportunities, and resources, we first estimate their explanatory power on the dynamic of environmental protests. Since grievances, opportunities, and resources tend to correlate (see Figure 5, Appendix A), we specify nine different regression models and separately estimate the explanatory power of the three sets of factors on the three dependent variables.[5] We extract the adjusted R-squared value of the individual regression models. Based on the explanatory power of these models, Figure 3 illustrates the relative importance of grievances, opportunities, and

[4]Since we include events that are confrontations, petitions & symbolic actions, strikes, or public demonstrations, we control for the proportion of demonstrations in each country-year context in all models. The inclusion of this control variable is driven by the assumption that environmental events with demonstrative and non-demonstrative forms of action follow different dynamics.

[5]We specify a regression model with grievances, opportunities, and resources as independent variables and the number of events, the number of participants and the share of events as dependent variables. The separate regression models are presented in Appendix B.

resources - as measured with our proxy variables - for all three dependent variables.

Figure 3: Model fit of grievances, opportunities, resources



The figure shows the fit of regression models specified in turn with indicators for grievances, opportunities, and resources. See Appendix B for the respective regression models.

As the figure shows, for the number of environmental events and their share in the protest arena, resources tend to make a difference. Environmental mobilization is both more frequent and more dominant when organizations sponsor these events (as opposed to not being embedded in a network with established organizations), and mobilization takes place in a context where the number of ENGOs is relatively high. In contrast, the number of participants is primarily a function of political opportunities, with resources being less important. Environmental events are better attended in a context where the institutional and discursive opportunity structure strengthens the resonance of the protest. Based on these results, grievances appear relatively unimportant in driving environmental mobilization.

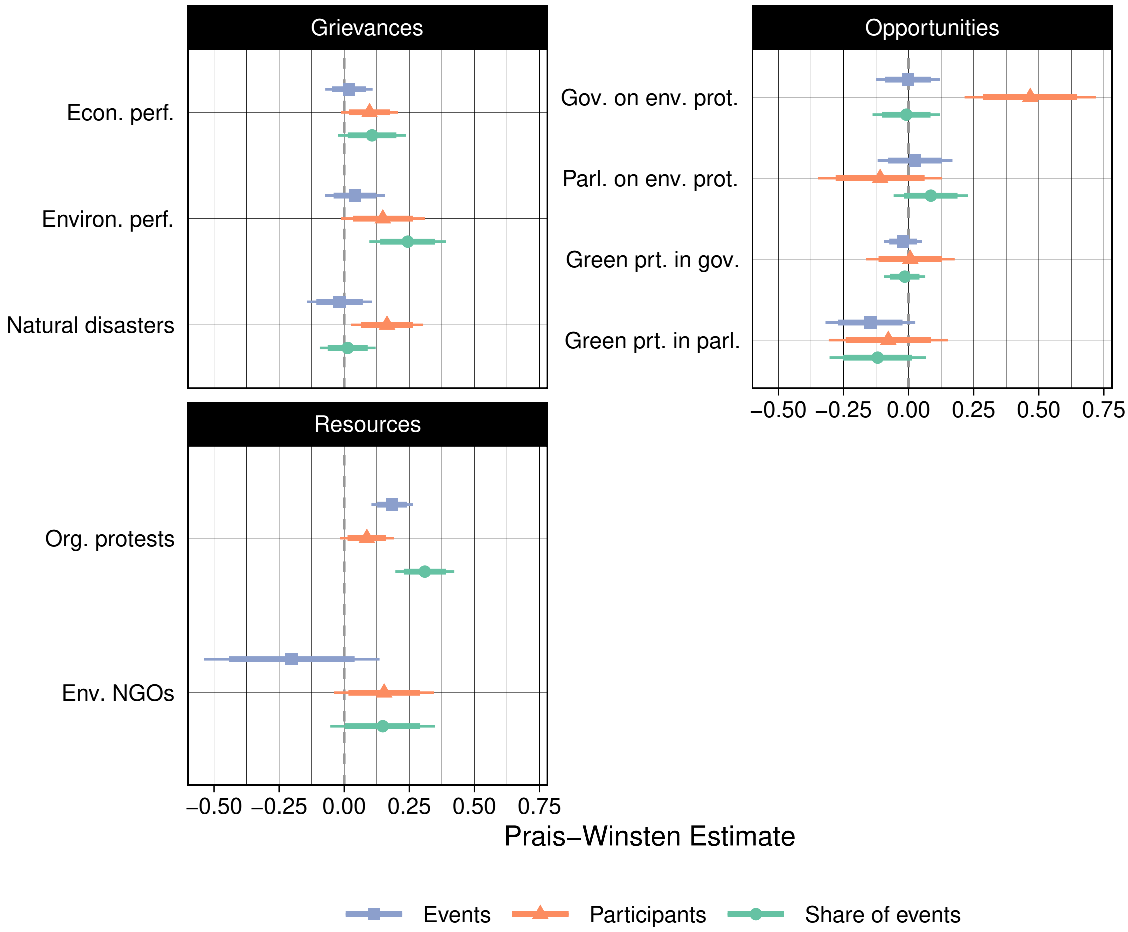
To formally test our hypotheses and disentangle the effects of the factors associated with grievances, opportunities, and resources, we include all predictors in a joint Prais-Winsten regression model with country-fixed effects. Table 1 presents the results. Figure 4 presents the relevant estimates in a coefficient plot to ease their interpretation.

Table 1: Prais-Winsten regression models of environmental mobilization

	Events	Participants	Share of events
Intercept	0.796	0.654	1.278^{*}
	(0.652)	(0.384)	(0.643)
Grievances			
Economic performance	0.018	0.097	0.107
	(0.046)	(0.056)	(0.066)
Environmental performance	0.041	0.148	0.244^{**}
	(0.058)	(0.082)	(0.075)
Number of natural disasters	−0.018	0.164^{*}	0.013
	(0.063)	(0.071)	(0.055)
Opportunities			
Gov. position on env. protection	−0.003	0.467^{***}	−0.009
	(0.062)	(0.128)	(0.066)
Parl. position on env. protection	0.025	−0.109	0.086
	(0.073)	(0.121)	(0.073)
Green party in gov.	−0.021	0.007	−0.015
	(0.037)	(0.087)	(0.040)
Green party in parl.	−0.147	−0.078	−0.119
	(0.088)	(0.116)	(0.094)
Resources			
Share of organized protests	0.184^{***}	0.087	0.310^{***}
	(0.040)	(0.053)	(0.058)
Number of env. NGOs	−0.202	0.153	0.148
	(0.172)	(0.097)	(0.102)
Share of demonstrative action	0.049	0.020	0.130^{*}
	(0.045)	(0.049)	(0.051)
Country fixed effects	Yes	Yes	Yes
Adjusted R sq	0.183	0.172	0.174
Number of obs.	374	374	374

Robust standard errors in parentheses. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 4: Prais-Winsten regression models of environmental mobilization



Calculated based on the regression model presented in Table 1. Thinner lines represent 95% confidence intervals, thicker lines represent 84% confidence intervals. If the 84% confidence intervals do not overlap, the difference is statistically significant at the $p < 0.05$ level (see: Bolsen and Thornton, 2014).

Starting with our hypotheses on the effect of grievances, we find that these factors are significantly related to the number of participants and the share of environmental events, but not to the number of events. Regarding the number of participants, the effect of natural disasters points in the expected direction and is statistically significant (H_{1B}). According to our results, the economic and environmental performance measures are not significantly related with the number of participants - except for the subcomponent of the environmental performance index on fighting climate change, which shows a positive effect (see Appendix D). In terms of the share of events, the effect of environmental performance is statistically significant, but points in the opposite direction than what we expected. In line with the idea of positive feedback loops, environmental performance by the state tends to be positively associated with the share of environmental protest events, mostly driven by the effect of environmental health (see Appendix D). Based on these results, we reject H_{1A} and H_{1C}, while we fail to reject H_{1B}.

Regarding the factors associated with political opportunities, we find only a statistically significant association with the number of participants. More specifically, the only statistically significant effect is the government's position on environmental protection. Contrary to H_{2C} and contrary to the logic of differential effects between the governmental and parliamentary arena, we find that having a government that takes a more progressive position on environmental protection does not decrease, but it increases the popularity of environmental protests.

Regarding the effect of resources, we find the expected statistically significant association with the share of organizations in the network of environmental mobilization positively affecting the number of events and the relative share of events (H_{3B}). The same measure of the extent to which the network of environmental mobilization is organized is not associated with the number of participants. The number of ENGOs has no statistically significant effect on any of our dependent variables, although in the case of the number of participants and the share of environmental events, it points in the expected direction.

These findings support the previous conclusion and show that resources are important for the strength of mobilization, in absolute and relative terms, while the popularity of environmental protests is mostly a function of political opportunities. They also qualify the previous conclusion to the extent that they show that beyond opportunities, the rate of participants is also a function of grievances, albeit to a smaller extent.

In terms of robustness checks, Appendix E shows that these conclusions apply when we include all 27 countries. With the larger sample size several other effects reach the threshold of statistical significance (e.g., the number of ENGOs and a green party in parliament positively affects the share of events; environmental performance positively affects the number of participants), but the above discussed patterns stay the same (see Figure 1, Appendix E), and our substantive conclusion remain unaffected.

Regarding cross-national differences (Appendix C), the bivariate and multivariate analysis show that the number of environmental events is higher in countries where the mobilization network is more organized and in countries with higher level of environmental performance. The number of participants is higher in countries with a green party in parliament. Finally, the share of environmental events is higher in countries that have a relatively low number of ENGOs.

Conclusion

The article has examined environmental mobilization from a comparative European perspective. We provide the first quantitative account that encompasses protests in 27 European countries over a 21-year period. We make both a descriptive and an explanatory contribution, accounting for the recent wave of environmental mobilization. In this conclusion, we highlight three implications of our findings.

First, we provide crucial cross-national and over-time evidence to support the findings of the emerging literature on the significance of the recent wave of environmental mobilization and its emphasis on the impact and the innovative strategies used by the new wave of climate protests (e.g., Barrie et al., 2023; de Moor et al., 2021; Marquardt, 2020; Schürmann, 2023). According to our results, 2019 does indeed appear to be a pivotal year of increased transnational mobilization on the environment in about half of the countries, especially when it comes to the number of participants. Notably, we do not find strong cross-country differences or Central-Eastern European exceptionalism. However, the increase in 2019 does not seem to have been as long-lasting, since 2020 and 2021 show similar levels of environmental mobilization as in the pre-2019 period. At the same time, maintaining pre-2019 levels of protest during the Covid-19 crisis testifies to the resilience of the environmental movement (Sorce and Dumitrica, 2023).

Second, our findings show that environmental events are a core component of protest mobilization. Environmental events are well-attended, sponsored by a significant network of professional and non-professional organizations, and target demands distinct from other demands in the protest arena. At the same time, we interpret our results as early signs of a bifurcation of the forms of action. On the one hand, part of the movement focuses on less contentious forms, e.g., symbolic actions, petitions and demonstrations, contributing to environmental events being better attended after 2019. On the other hand, part of the movement is involved in confrontational actions. While the former shows the enduring legacy of the environmental movement to influence current mobilization, the latter is a rupture compared to the overall story of the institutionalization of environmental activism. Most likely, after 2021, with the rise of Extinction Rebellion and Last Generation, confrontational actions have become even more dominant. The prospect challenges the teleological understanding of institutionalization processes and underscores the continuing importance of empirically tracking the environmental movement as it evolves.

Third, our analysis demonstrates the importance of distinguishing between different aspects of mobilization strength. In the descriptive analysis, we document a decline in the number of environmental events and a relative stability in the number of participants/ share of environmental events in the protest arena. We take this as an indication of increasing coordination: the mental image of a European environmental protest should be a well-attended demonstration rather than a series of multiple, sparsely attended events. In our explanatory analysis, we aimed to operationalize key drivers of protest (grievances, opportunities, and resources) with available cross-national and longitudinal indicators. Notwithstanding the limitations of our indicators, the results suggest that the number of environmental events and their relative share in the protest arena is primarily a function of resources, while the number of participants in environmental events responds to shifting opportunities. Relatively speaking, grievances play a less important role in explaining the ebb and flow of environmental protests compared to resources and opportunities. This suggests that protests peak when actors invest in organizing the field of environmentalism and seize opportunities that resonate with many potential participants. In contrast, environmental protests do not typically evolve in reaction to the momentary frustrations of environmentally concerned organizations and individuals. We also show that, contrary to some previous literature, environmental mobilization is at least partly driven by positive feedback loops: it peaks under governments that invest in environmental performance and take a progressive stance on the issue. Thus, environmental protests seem entangled in a broader sequence of government-challenger action and reaction rather than peaking in contexts where governments do not take action on environmental questions. This finding should be further explored, including in comparison with more grievance-based mobilizations, such as in the context of the Great Recession (Bojár et al., 2021; Kriesi et al., 2020).

The article contributes to social movement studies by taking a large-N perspective, theorizing and empirically demonstrating how resources, opportunities, and grievances may explain the dynamics of environmental protest. Mapping the frequency, profile, and drivers of mobilization is a critical contribution given the growing body of cited research highlighting the importance of protests in agenda setting, CO_2 emissions, and their spillover into non-contentious repertoires of environmental behavior. At the same time, further research is needed with more fine-grained and extensive protest event data to model the more dynamic ways in which policy-making, protest, and public opinion are related to each other and how also other factors, such as the moral authority of Greta Thunberg, drove the ups and downs of mobilization across countries. We also contribute to the debate on the politics of climate change with our nuanced measure of mobilization strength, highlighting that the power and drivers of protests vary depending on whether we look at events, participation rates, or salience relative to other protest issues.

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Appendix

Environmental Protests in Europe

Contents

Appendix A: Additional figures and tables

Figure 1: Level of environmental mobilization in 30 countries (2000-2020)

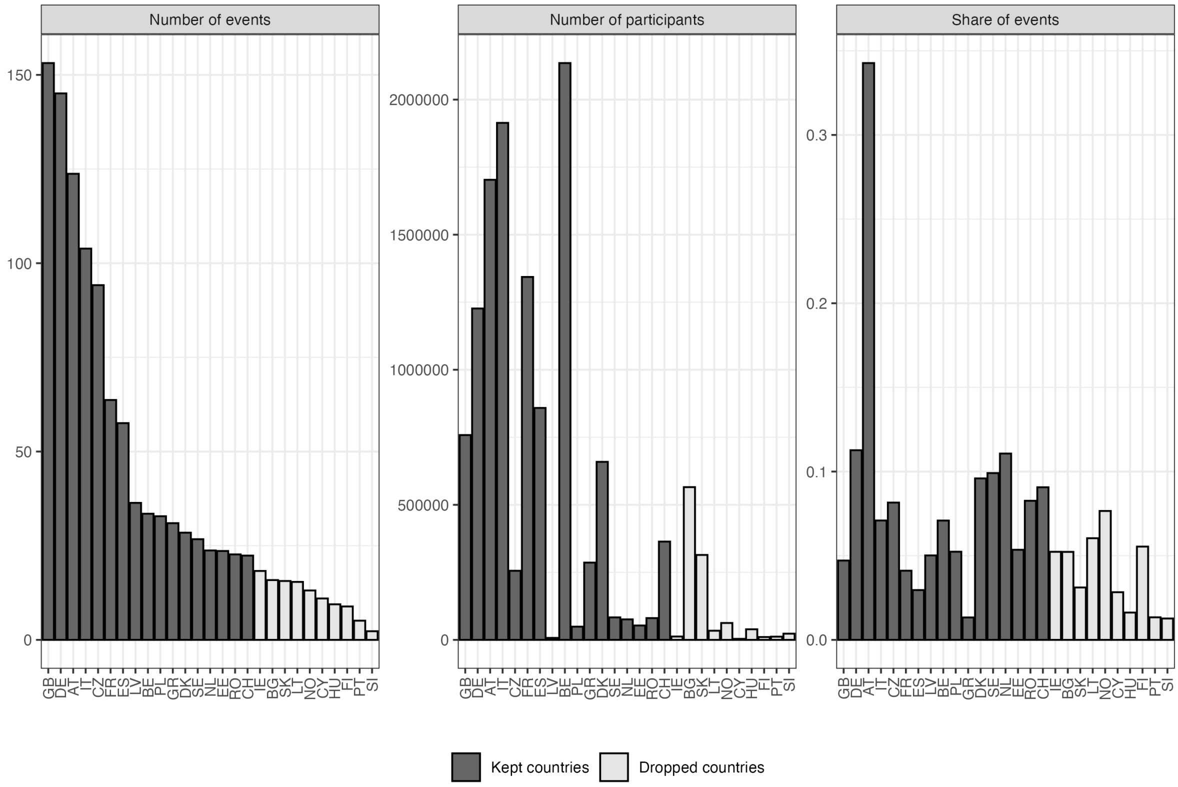
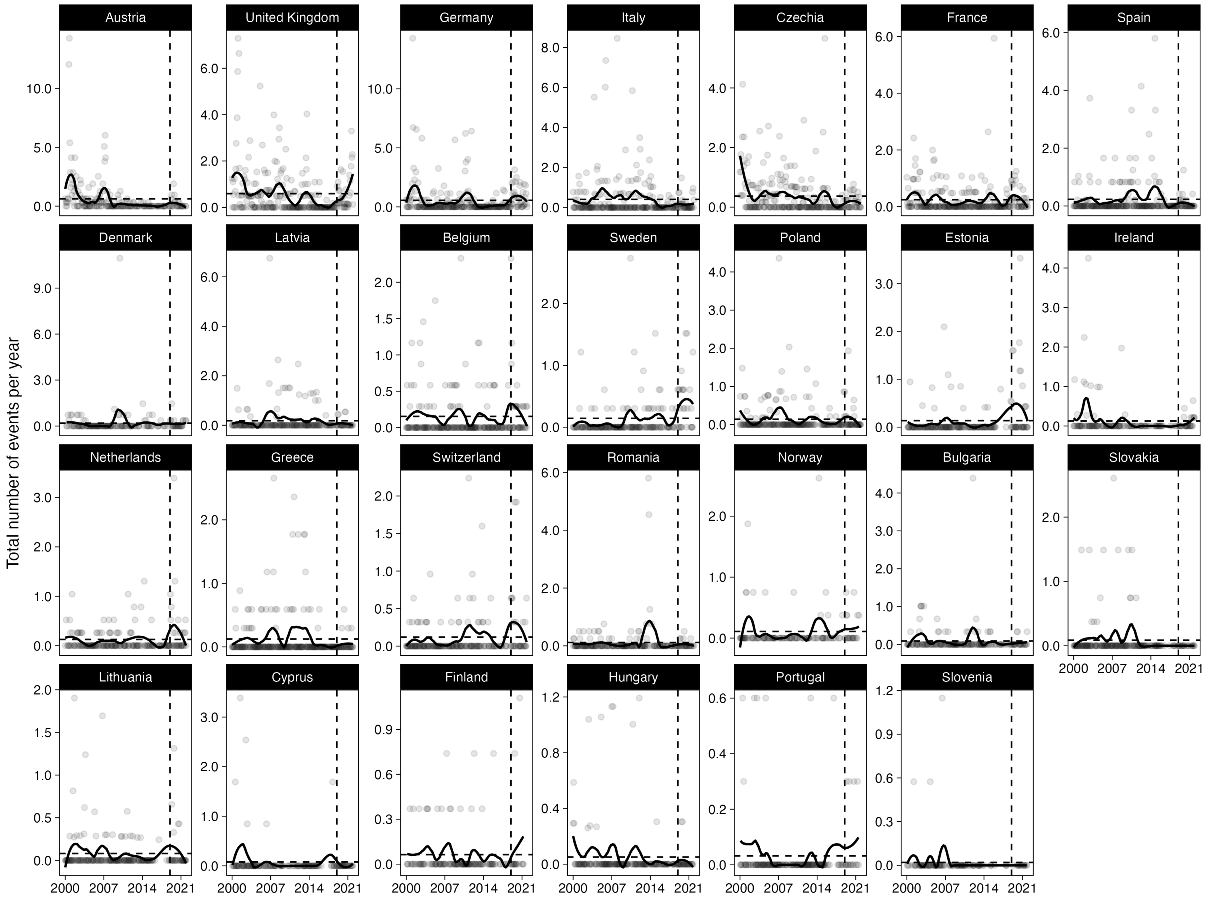
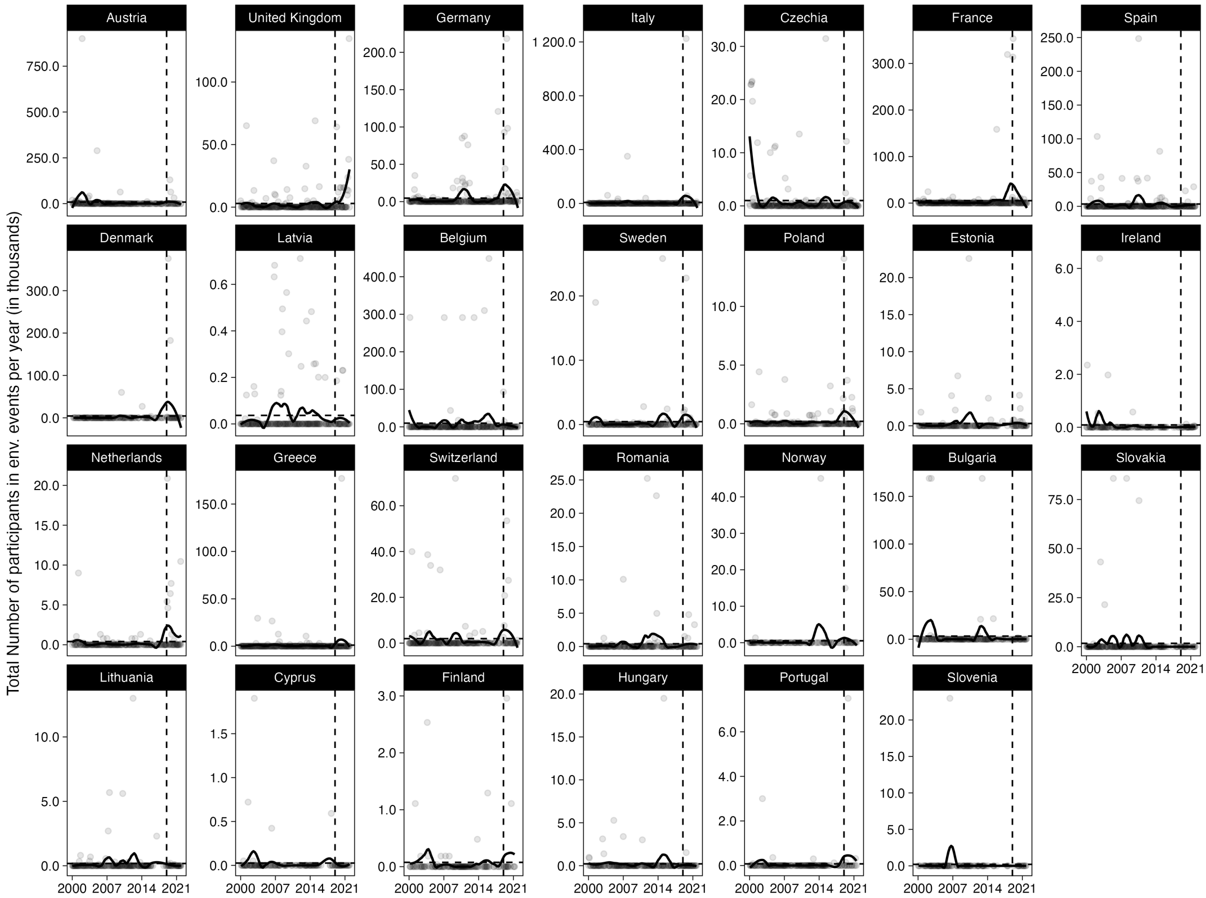


Figure 2: Total number of environmental events by country/ year



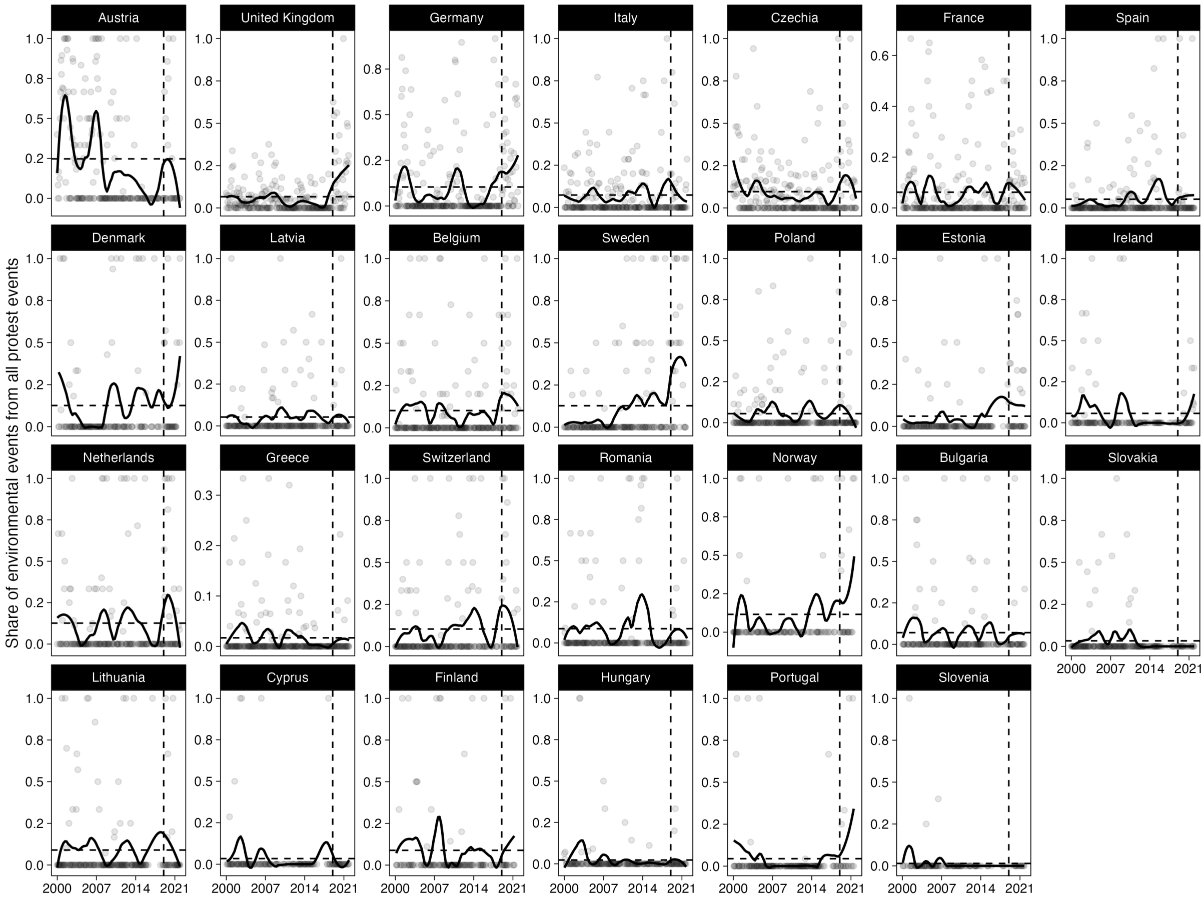
The horizontal reference line shows the country-specific mean. The vertical reference line stands for 2019. Countries are arranged according to the total number of environmental events.

Figure 3: Total number of participants in environmental events by country/ year



The horizontal reference line shows the country-specific mean. The vertical reference line stands for 2019. Countries are arranged according to the total number of environmental events.

Figure 4: Share of environmental events by country/ year



The horizontal reference line shows the country-specific mean. The vertical reference line stands for 2019. Countries are arranged according to the total number of environmental events.

Figure 5: Correlation structure of the included variables

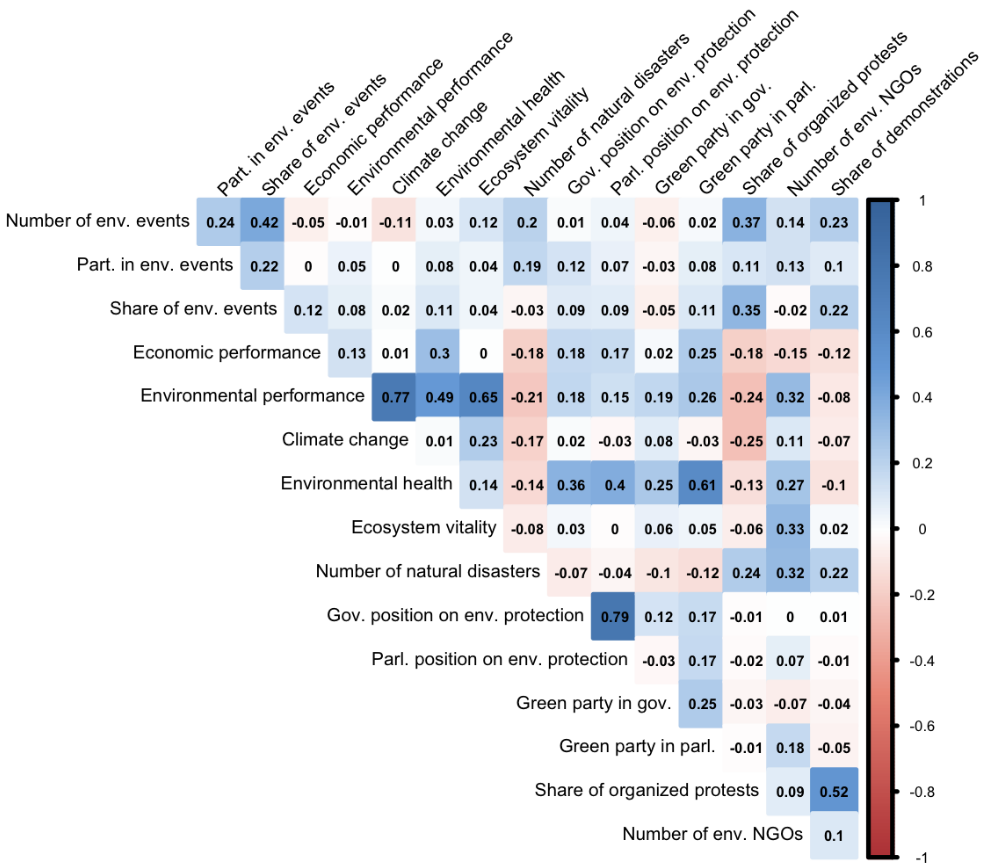
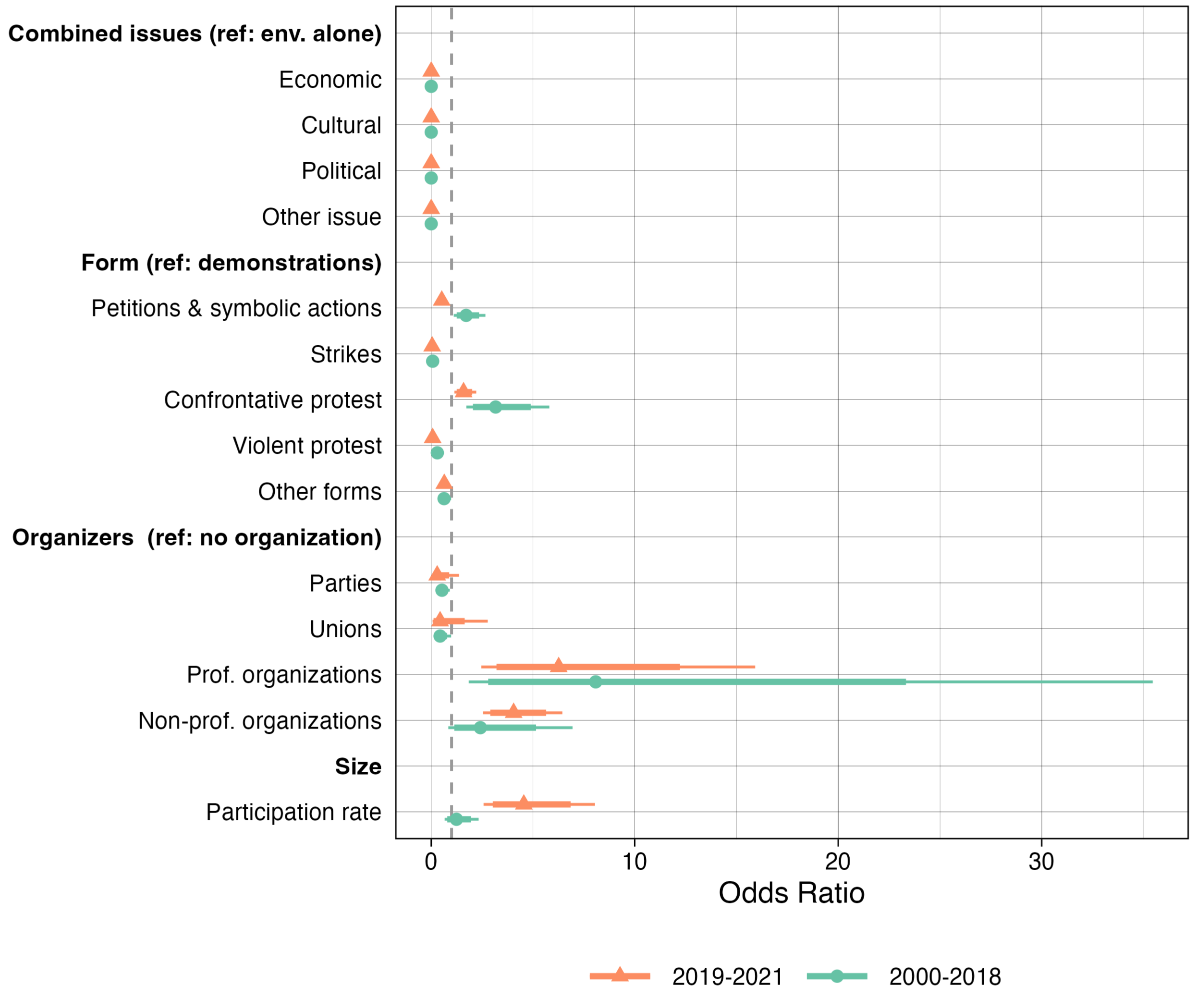


Table 1: Differences between environmental and other events

	Full sample	2000-2018	2019-2021
Combined issues (ref: env. alone)			
Economic	-9.42^{***}	-9.67^{***}	-18.61^{***}
	(0.62)	(0.71)	(0.66)
Cultural	-9.74^{***}	-9.33^{***}	-23.43^{***}
	(0.71)	(0.61)	(1.02)
Political	-8.80^{***}	-8.52^{***}	-21.95^{***}
	(0.59)	(0.52)	(1.12)
Other issue	-8.89^{***}	-8.96^{***}	-20.75^{***}
	(0.48)	(0.49)	(0.72)
Form (ref: demonstrative)			
Petitions & symbolic actions	0.20	0.54^{*}	-0.66^{***}
	(0.21)	(0.22)	(0.19)
Strikes	-2.71^{***}	-2.64^{***}	-3.05^{***}
	(0.31)	(0.35)	(0.42)
Confrontative protest	0.93^{***}	1.15^{***}	0.46^{**}
	(0.25)	(0.31)	(0.17)
Organizers (ref: no organization)			
Violent protest	-1.75^{***}	-1.20^{***}	-2.64^{***}
	(0.33)	(0.26)	(0.21)
Other forms	-0.42^{***}	-0.46^{*}	-0.44
	(0.05)	(0.22)	
Parties	-0.74^{*}	-0.64^{*}	-1.23
	(0.31)	(0.28)	(0.79)
Unions	-0.92^{*}	-0.83^{*}	-0.83
	(0.38)	(0.41)	(0.94)
Size			
Prof. organizations	1.69^{***}	2.09^{**}	1.83^{***}
	(0.47)	(0.75)	(0.48)
Non-prof. organizations	1.25^{***}	0.88	1.40^{***}
	(0.28)	(0.54)	(0.24)
Participation rate	0.44	0.22	1.52^{***}
	(0.23)	(0.32)	(0.29)
Country fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Adjusted R sq	0.79	0.82	0.73
Number of observations	40574	33417	7157

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 6: Coefficient plot: split sample event-level regression (pre & post 2019)



Calculated based on the regression model presented in table 1 above, model 3 and model 4. Thinner lines represent 95% confidence intervals, thicker lines represent 84% confidence intervals. If the 84% confidence intervals do not overlap, the difference is statistically significant at the p ¡ 0.05 level (see: Bolsen and Thornton 2014). The model includes country and year fixed effects, and standard errors clustered by country and year.

Appendix B: Separate regressions (grievances, opportunities, resources)

Table 1: Grievances

	Events	Participants	Share of events
Intercept	0.916	0.354	1.159
	(0.641)	(0.379)	(0.681)
Economic performance	−0.033	0.105	0.001
	(0.047)	(0.054)	(0.055)
Environmental performance	−0.121	0.248*	0.153*
	(0.064)	(0.122)	(0.065)
Number of natural disasters	−0.039	0.152	−0.012
	(0.065)	(0.081)	(0.051)
Share of demonstrative action	0.103*	0.067	0.228***
	(0.042)	(0.046)	(0.047)
Country fixed effects	Yes	Yes	Yes
Adjusted R sq	0.142	0.058	0.107
Number of obs.	374	374	374

Robust standard errors in parentheses. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 2: Opportunities

	Events	Participants	Share of events
Intercept	1.029	0.558	1.271
	(0.657)	(0.369)	(0.648)
Gov. position on env. protection	−0.018	0.467***	−0.011
	(0.070)	(0.131)	(0.068)
Parl. position on env. protection	0.046	−0.112	0.052
	(0.082)	(0.124)	(0.072)
Green party in gov.	−0.012	−0.014	−0.025
	(0.041)	(0.091)	(0.040)
Green party in parl.	−0.155	−0.051	−0.057
	(0.101)	(0.122)	(0.106)
Share of demonstrative action	0.110*	0.056	0.220***
	(0.043)	(0.042)	(0.048)
Country fixed effects	Yes	Yes	Yes
Adjusted R sq	0.144	0.148	0.093
Number of obs.	374	374	374

Robust standard errors in parentheses. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

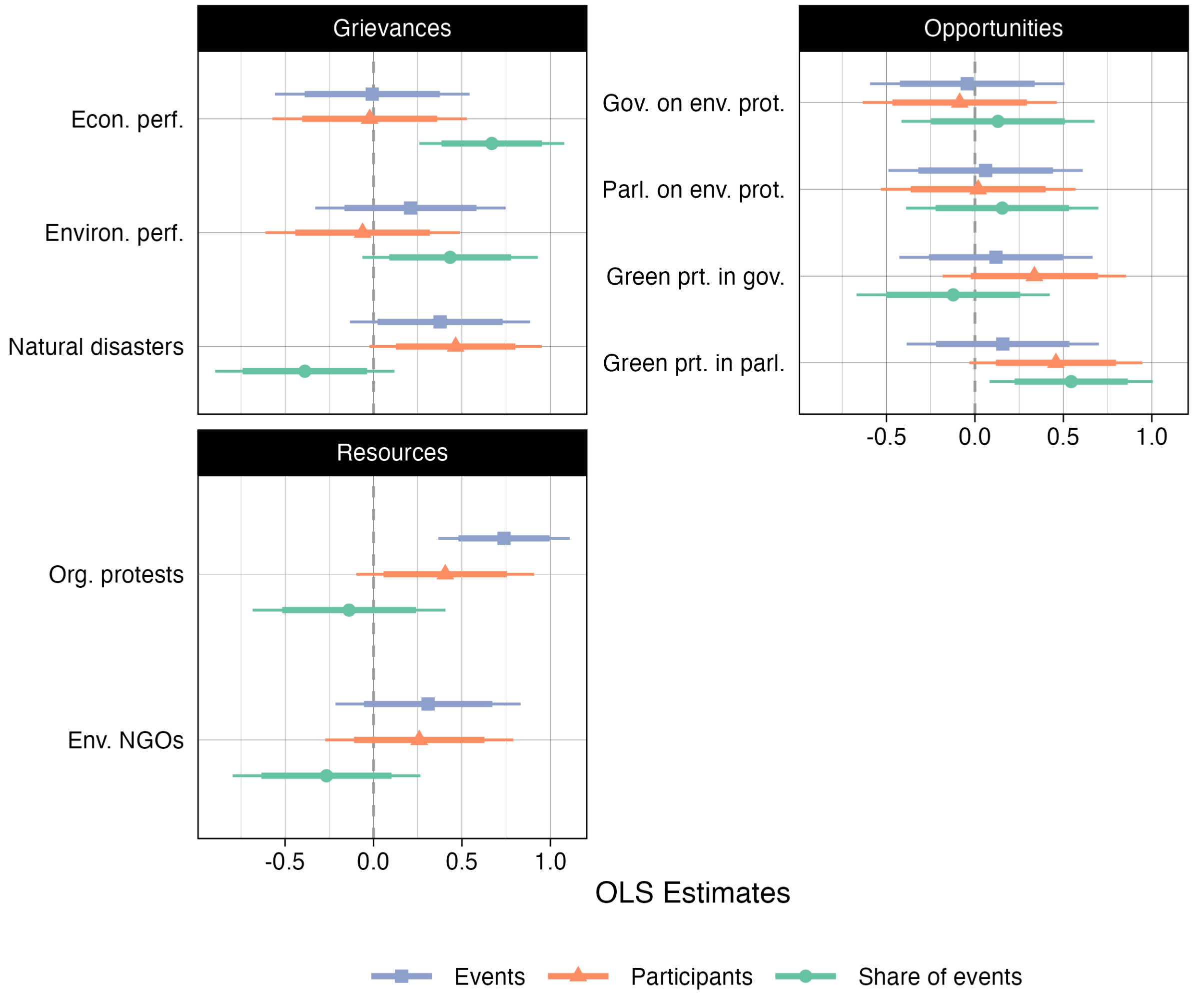
Table 3: Resources

	Events	Participants	Share of events
Intercept	0.703	0.625	1.379^{*}
	(0.643)	(0.374)	(0.611)
Share of organized protests	0.167^{***}	-0.004	0.229^{***}
	(0.037)	(0.056)	(0.054)
Number of env. NGOs	-0.187	0.252^{*}	0.270^{**}
	(0.152)	(0.126)	(0.088)
Share of demonstrative action	0.050	0.079	0.155^{**}
	(0.043)	(0.057)	(0.052)
Country fixed effects	Yes	Yes	Yes
Adjusted R sq	0.144	0.148	0.093
Number of obs.	374	374	374

Robust standard errors in parentheses. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Appendix C: Country level co-variate analysis

Figure 1: Bi-variate coefficients between country-means and co-variates.



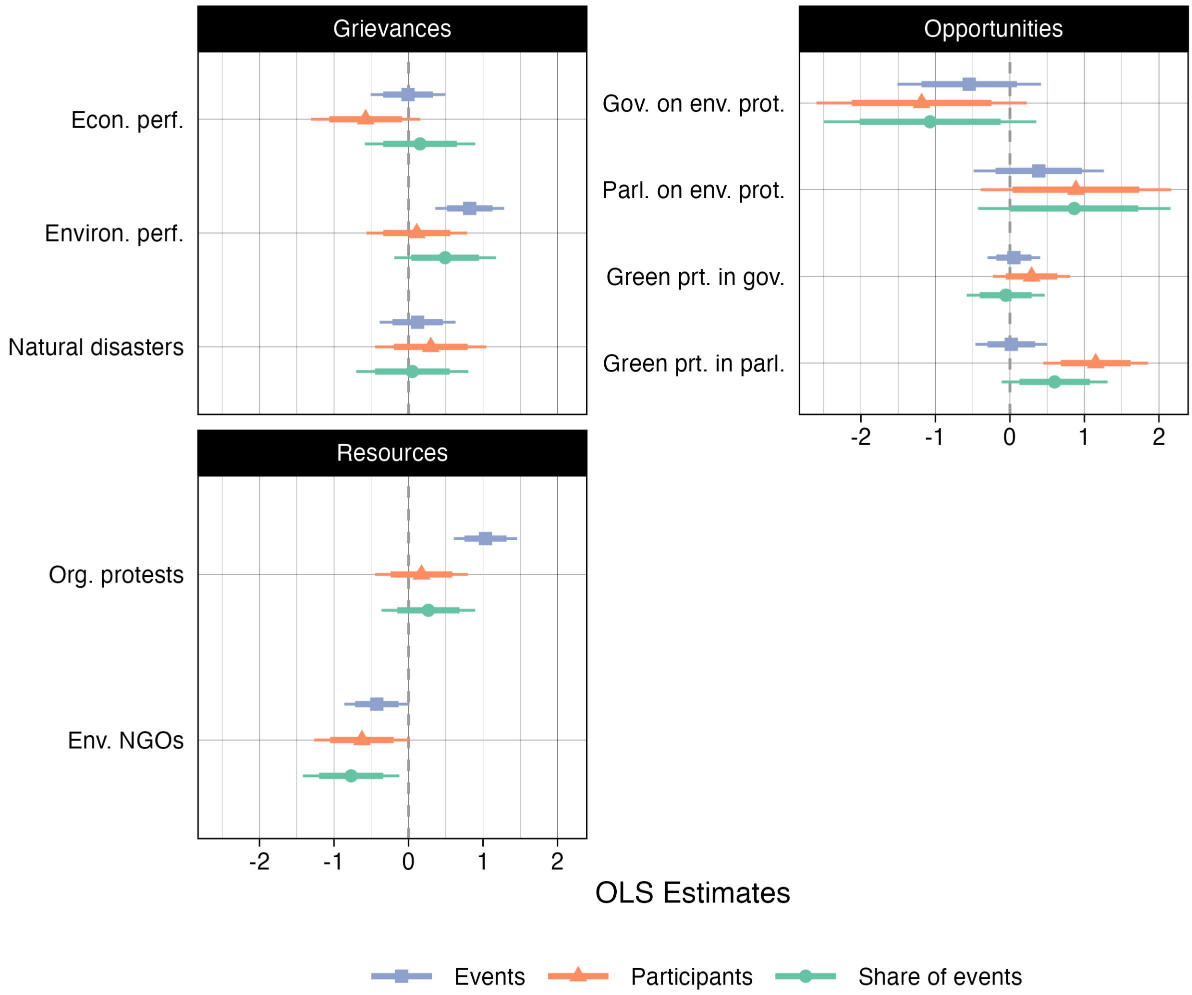
Calculated based on 17 countries. Thinner lines represent 95% confidence intervals, thicker lines represent 84% confidence intervals. If the 84% confidence intervals do not overlap, the difference is statistically significant at the p ¡ 0.05 level (see: Bolsen and Thornton 2014).

Table 1: Country-level OLS multivariate regression model

	Events	Participants	Share of events
Intercept	0.000	0.000	−0.000
	(0.113)	(0.166)	(0.168)
Grievances			
Economic performance	−0.007	−0.576	0.155
	(0.212)	(0.310)	(0.313)
Environmental performance	0.822^{**}	0.111	0.491
	(0.195)	(0.286)	(0.288)
Number of natural disasters	0.122	0.298	0.051
	(0.215)	(0.315)	(0.318)
Opportunities			
Gov. position on env. protection	−0.546	−1.186	−1.071
	(0.407)	(0.596)	(0.602)
Parl. position on env. protection	0.387	0.885	0.863
	(0.370)	(0.541)	(0.546)
Green party in gov.	0.053	0.290	−0.057
	(0.150)	(0.219)	(0.221)
Green party in parl.	0.018	1.151^{**}	0.600
	(0.203)	(0.298)	(0.301)
Resources			
Share of organized protests	1.033^{***}	0.173	0.266
	(0.180)	(0.263)	(0.265)
Number of env. NGOs	−0.425	−0.626	-0.770^{*}
	(0.185)	(0.271)	(0.273)
R^2	0.904	0.795	0.791
Adj. R^2	0.782	0.532	0.523
Num. obs.	17	17	17

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 2: Coefficient plot: country-level OLS multivariate regression model



Calculated based on the regression model presented in table 1 above. Thinner lines represent 95% confidence intervals, thicker lines represent 84% confidence intervals. If the 84% confidence intervals do not overlap, the difference is statistically significant at the p ¡ 0.05 level (see: Bolsen and Thornton 2014).

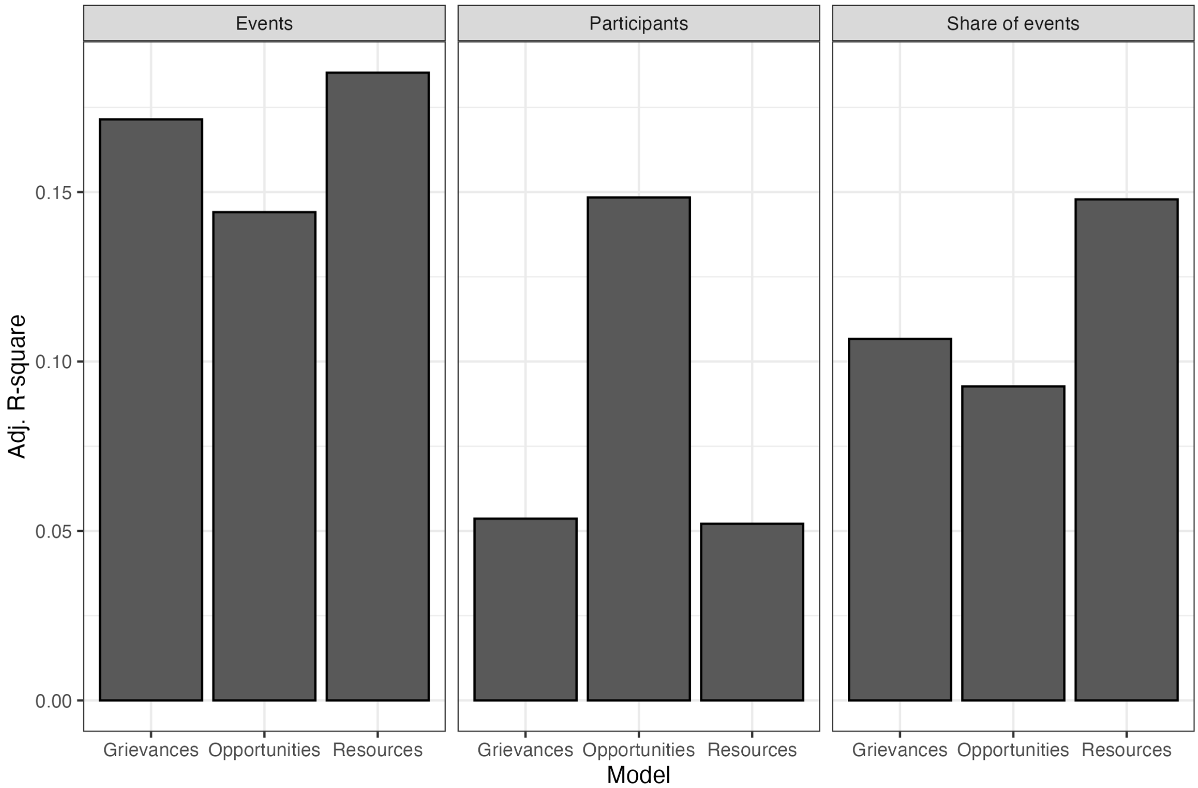
Appendix D: Disaggregated environmental performance index

Table 1: Grievances

	Events	Participants	Share of events
Intercept	1.140	0.417	1.038
	(0.589)	(0.404)	(0.704)
Economic performance	-0.002	0.113^{*}	-0.017
	(0.044)	(0.054)	(0.055)
Climate change	0.019	0.221^{**}	0.021
	(0.053)	(0.067)	(0.075)
Environmental health	-1.129^{***}	0.139	0.293
	(0.239)	(0.393)	(0.309)
Ecosystem vitality	0.259^{***}	0.025	0.060
	(0.076)	(0.135)	(0.119)
Number of natural disasters	-0.030	0.149	-0.012
	(0.062)	(0.080)	(0.052)
Share of demonstrative action	0.112^{**}	0.062	0.231^{***}
	(0.042)	(0.046)	(0.047)
Country fixed effects	Yes	Yes	Yes
Adjusted R sq	0.171	0.054	0.107
Number of obs.	374	374	374

Robust standard errors in parentheses. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 1: Model fit of grievances, opportunities, resources



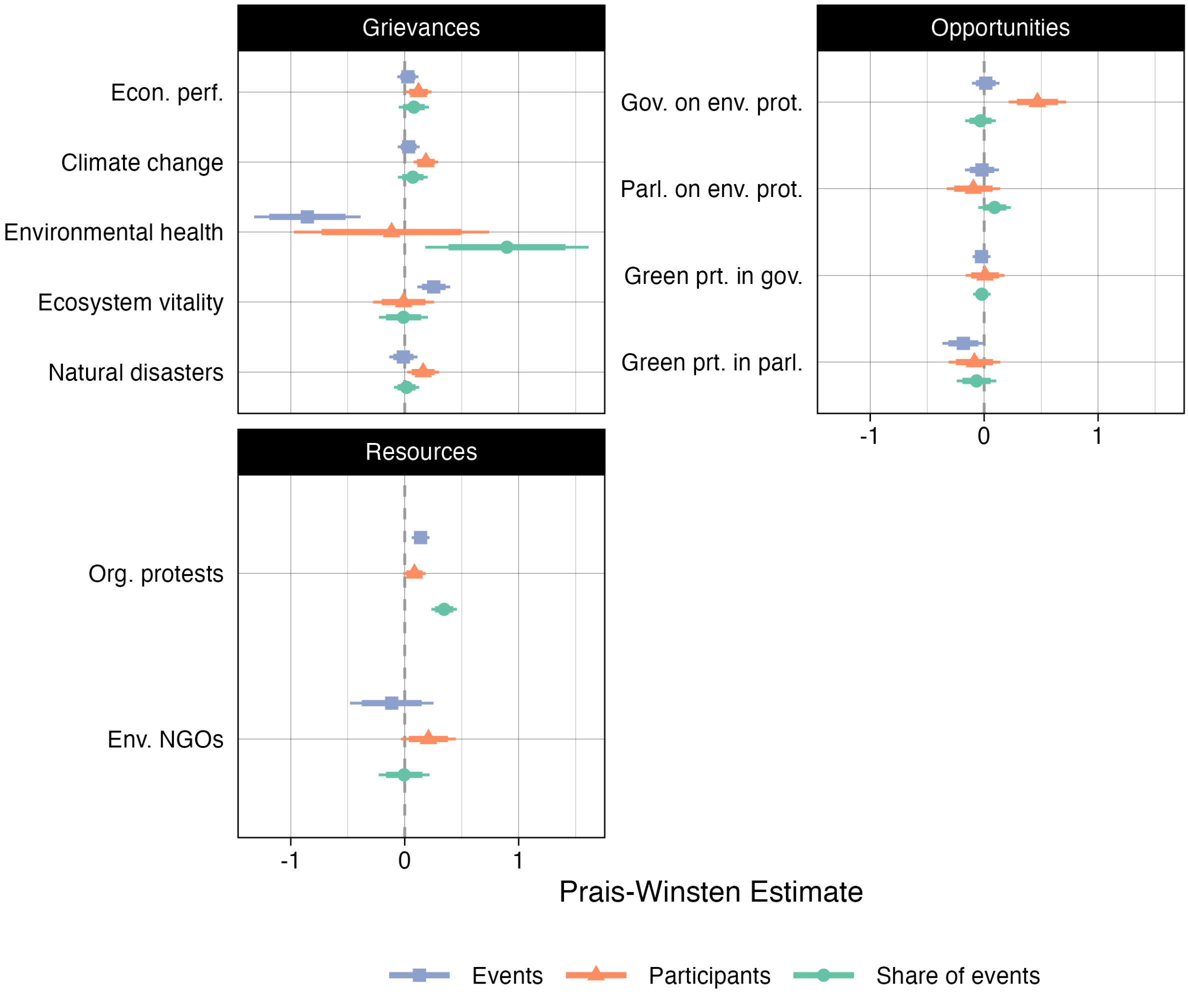
The figure shows the fit of regression models specified in turn with indicators for grievances, opportunities, and resources. The environmental performance index is disaggregated - see appendix D, table 1 above. The values for opportunities, and resources are the same as calculated in the regressions included in appendix B.

Table 2: Prais-Winsten regression models of environmental mobilization

	Events	Participants	Share of events
Intercept	1.065	0.871*	0.822
	(0.631)	(0.425)	(0.727)
Grievances			
Economic performance	0.028	0.121*	0.081
	(0.047)	(0.059)	(0.067)
Climate change	0.035	0.186***	0.071
	(0.049)	(0.055)	(0.067)
Environmental health	−0.854***	−0.115	0.898*
	(0.238)	(0.435)	(0.365)
Ecosystem vitality	0.255***	−0.010	−0.011
	(0.073)	(0.136)	(0.109)
Number of natural disasters	−0.012	0.162*	0.016
	(0.063)	(0.071)	(0.056)
Opportunities			
Gov. position on env. protection	0.014	0.467***	−0.032
	(0.062)	(0.128)	(0.068)
Parl. position on env. protection	−0.019	−0.094	0.091
	(0.076)	(0.119)	(0.073)
Green party in gov.	−0.023	0.009	−0.020
	(0.040)	(0.087)	(0.039)
Green party in parl.	−0.183	−0.085	−0.067
	(0.094)	(0.116)	(0.088)
Resources			
Share of organized protests	0.139***	0.085	0.346***
	(0.040)	(0.050)	(0.057)
Number of env. NGOs	−0.114	0.208	−0.005
	(0.187)	(0.122)	(0.113)
Share of demonstrative action	0.069	0.014	0.115*
	(0.046)	(0.048)	(0.049)
Country fixed effects	Yes	Yes	Yes
Adjusted R sq	0.195	0.169	0.195
Number of obs.	374	374	374

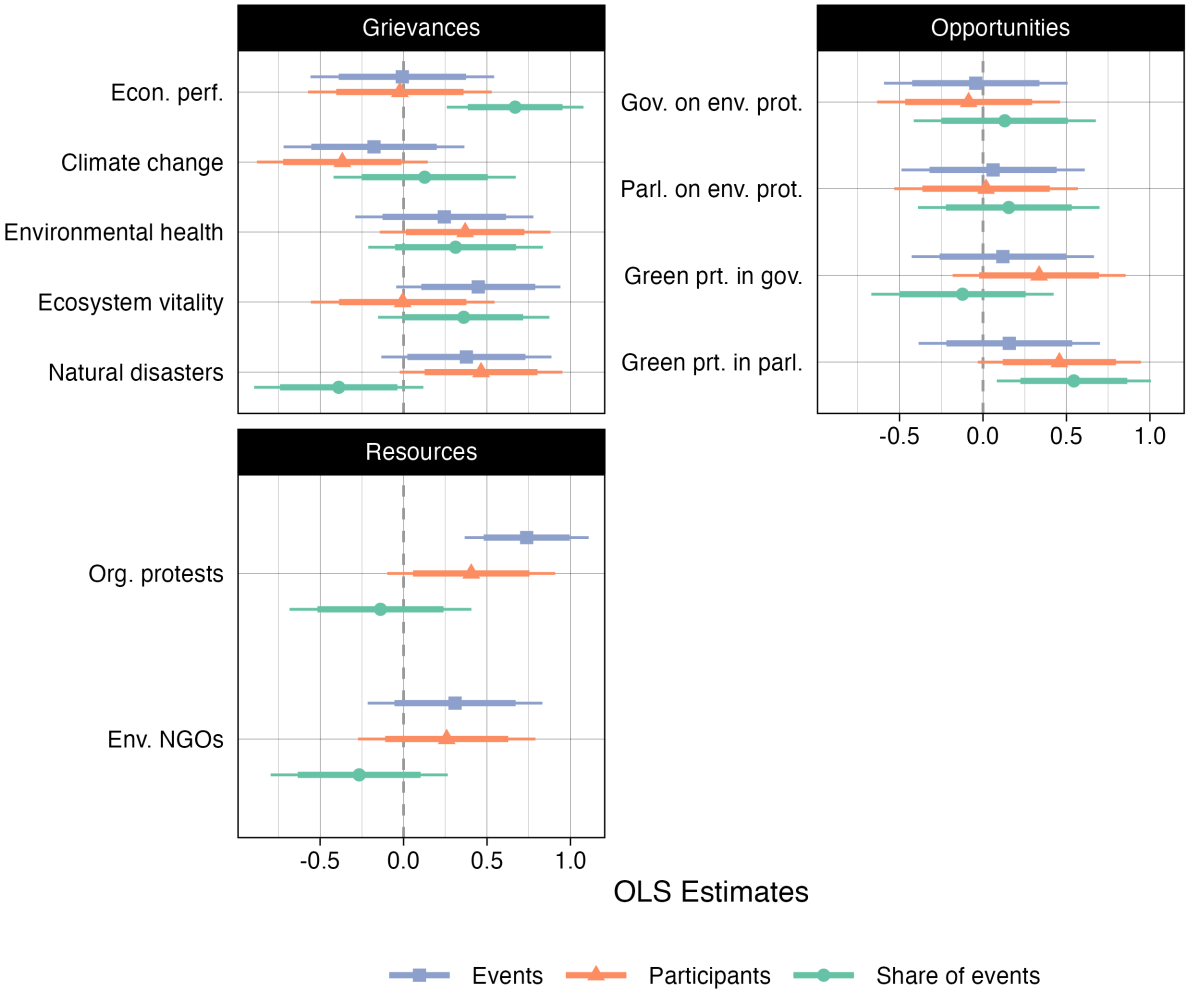
Robust standard errors in parentheses. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 2: Prais-Winsten regression models of environmental mobilization



Calculated based on the regression model presented in appendix C, table 2 above. Thinner lines represent 95% confidence intervals, thicker lines represent 84% confidence intervals. If the 84% confidence intervals do not overlap, the difference is statistically significant at the $p < 0.05$ level (see: Bolsen and Thornton 2014)

Figure 3: Bi-variate coefficients between country-means and co-variates.



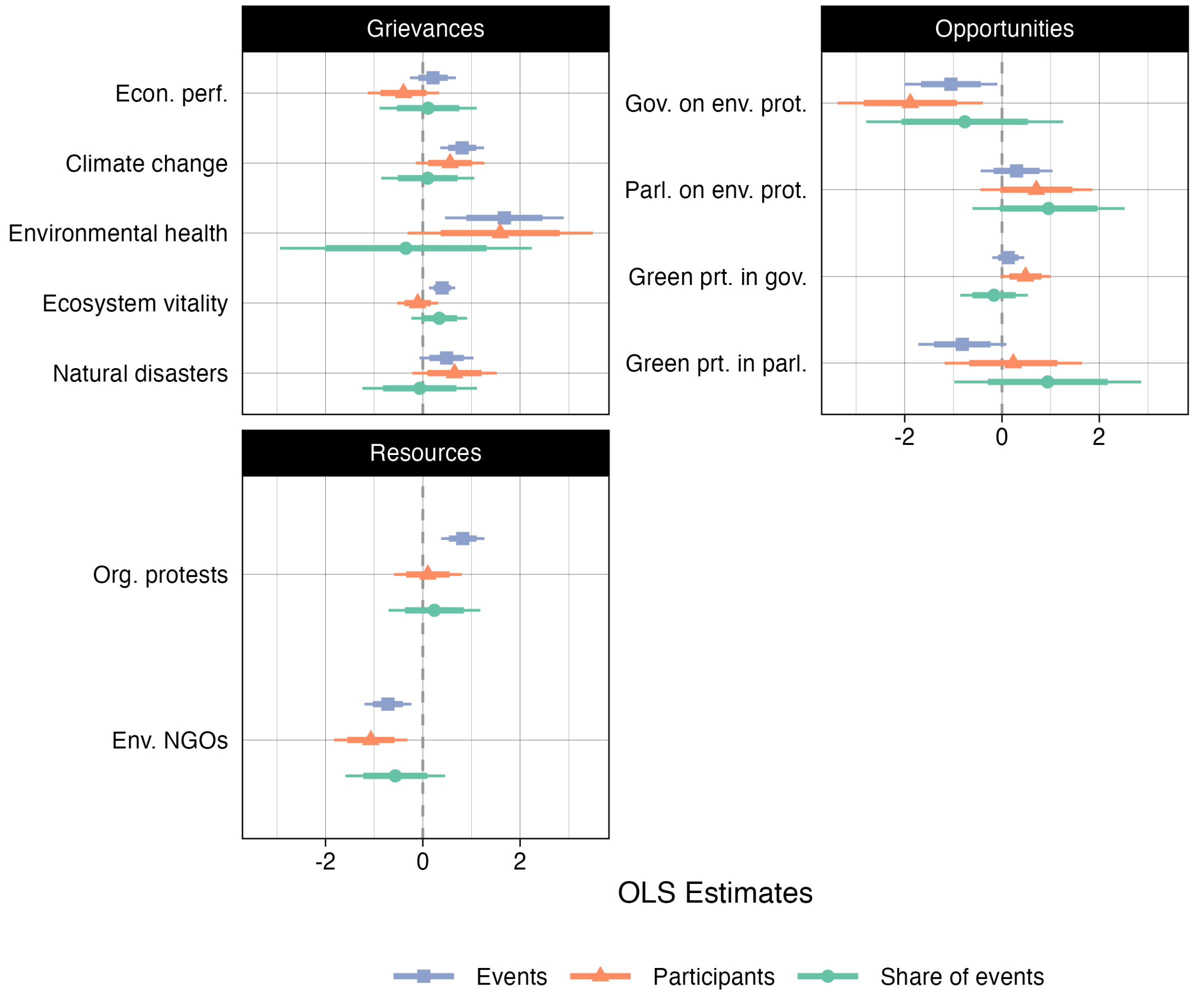
Calculated based on 17 countries. Thinner lines represent 95% confidence intervals, thicker lines represent 84% confidence intervals. If the 84% confidence intervals do not overlap, the difference is statistically significant at the p ¡ 0.05 level (see: Bolsen and Thornton 2014).

Table 3: Country-level OLS multivariate regression model

	Events	Participants	Share of events
Intercept	−0.000	−0.000	−0.000
	(0.087)	(0.135)	(0.184)
Grievances			
Economic performance	0.209	−0.398	0.109
	(0.183)	(0.286)	(0.388)
Climate change	0.809**	0.561	0.101
	(0.176)	(0.274)	(0.372)
Environmental health	1.676*	1.591	−0.349
	(0.475)	(0.742)	(1.007)
Ecosystem vitality	0.396*	−0.105	0.338
	(0.105)	(0.164)	(0.223)
Number of natural disasters	0.488	0.652	−0.064
	(0.216)	(0.337)	(0.458)
Opportunities			
Gov. position on env. protection	−1.051*	−1.885*	−0.765
	(0.372)	(0.581)	(0.788)
Parl. position on env. protection	0.300	0.705	0.957
	(0.287)	(0.448)	(0.608)
Green party in gov.	0.128	0.483	−0.164
	(0.128)	(0.199)	(0.270)
Green party in parl.	−0.816	0.232	0.940
	(0.352)	(0.550)	(0.747)
Resources			
Share of organized protests	0.821**	0.104	0.238
	(0.173)	(0.270)	(0.367)
Number of env. NGOs	−0.718*	−1.069*	−0.566
	(0.188)	(0.294)	(0.399)
R^2	0.960	0.903	0.821
Adj. R^2	0.872	0.688	0.426
Num. obs.	17	17	17

$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 4: Coefficient plot: country-level OLS multivariate regression model



Calculated based on the regression model presented in table 1 above. Thinner lines represent 95% confidence intervals, thicker lines represent 84% confidence intervals. If the 84% confidence intervals do not overlap, the difference is statistically significant at the p ¡ 0.05 level (see: Bolsen and Thornton 2014).

Appendix E: Replicated analysis with the full-sample of countries

Table 1: Grievances

	Events	Participants	Share of events
Intercept	1.329	0.511	1.182
	(0.780)	(0.447)	(0.638)
Economic performance	-0.022	0.065	0.006
	(0.033)	(0.044)	(0.050)
Environmental performance	-0.114^{*}	0.206^{*}	0.076
	(0.053)	(0.097)	(0.047)
Number of natural disasters	-0.028	0.141	-0.016
	(0.056)	(0.074)	(0.040)
Share of demonstrative action	0.119^{***}	0.069	0.261^{***}
	(0.031)	(0.036)	(0.037)
Country fixed effects	Yes	Yes	Yes
Adjusted R sq	0.200	0.063	0.116
Number of obs.	616	616	616

Robust standard errors in parentheses. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 2: Opportunities

	Events	Participants	Share of events
Intercept	1.340	0.694	1.059
	(0.792)	(0.437)	(0.621)
Gov. position on env. protection	−0.005	0.407**	0.046
	(0.058)	(0.131)	(0.061)
Parl. position on env. protection	0.028	−0.119	−0.008
	(0.066)	(0.118)	(0.068)
Green party in gov.	−0.009	−0.053	−0.059
	(0.029)	(0.081)	(0.045)
Green party in parl.	−0.061	−0.028	0.178**
	(0.044)	(0.110)	(0.066)
Share of demonstrative action	0.124***	0.062	0.246***
	(0.032)	(0.032)	(0.036)
Country fixed effects	Yes	Yes	Yes
Adjusted R sq	0.204	0.114	0.122
Number of obs.	616	616	616

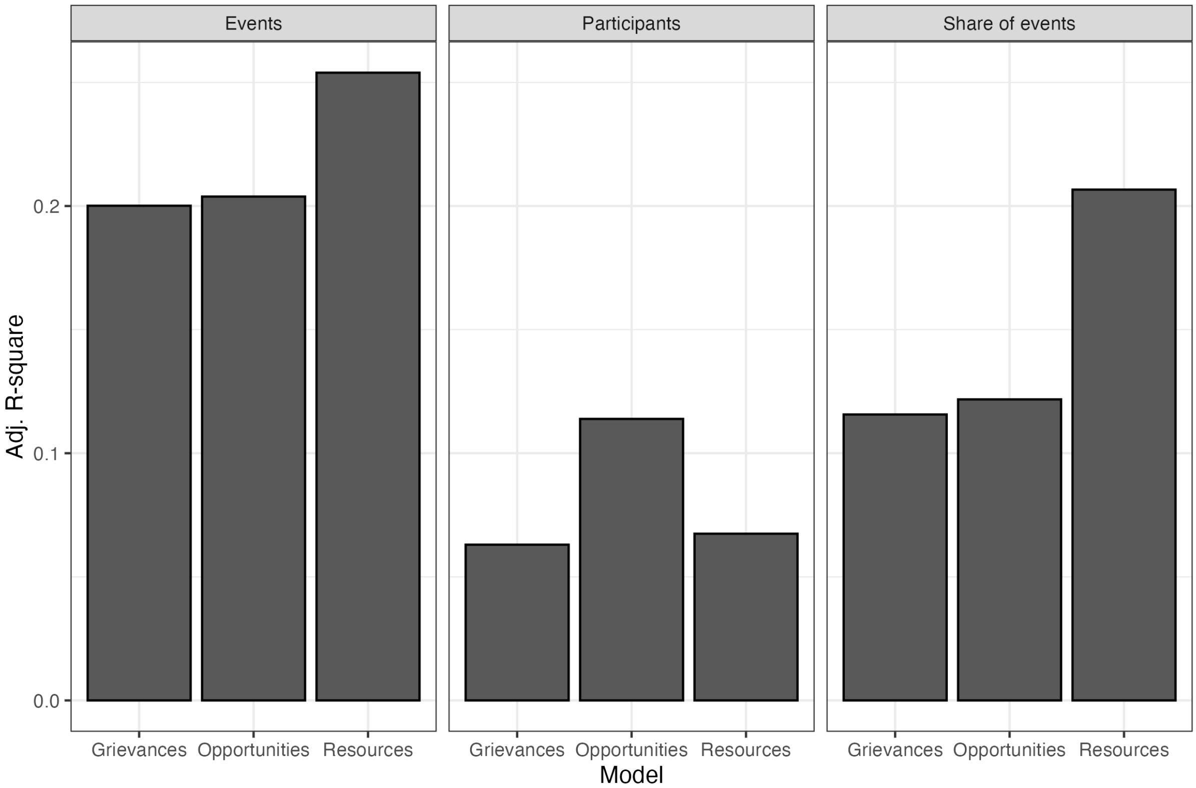
Robust standard errors in parentheses. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Table 3: Resources

	Events	Participants	Share of events
Intercept	1.090	0.736	1.216*
	(0.776)	(0.438)	(0.573)
Share of organized protests	0.181***	0.047	0.373***
	(0.031)	(0.051)	(0.049)
Number of env. NGOs	−0.208	0.274*	0.282***
	(0.155)	(0.132)	(0.075)
Share of demonstrative action	0.043	0.067	0.106*
	(0.036)	(0.049)	(0.045)
Country fixed effects	Yes	Yes	Yes
Adjusted R sq	0.204	0.114	0.122
Number of obs.	616	616	616

Robust standard errors in parentheses. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 1: Model fit of grievances, opportunities, resources



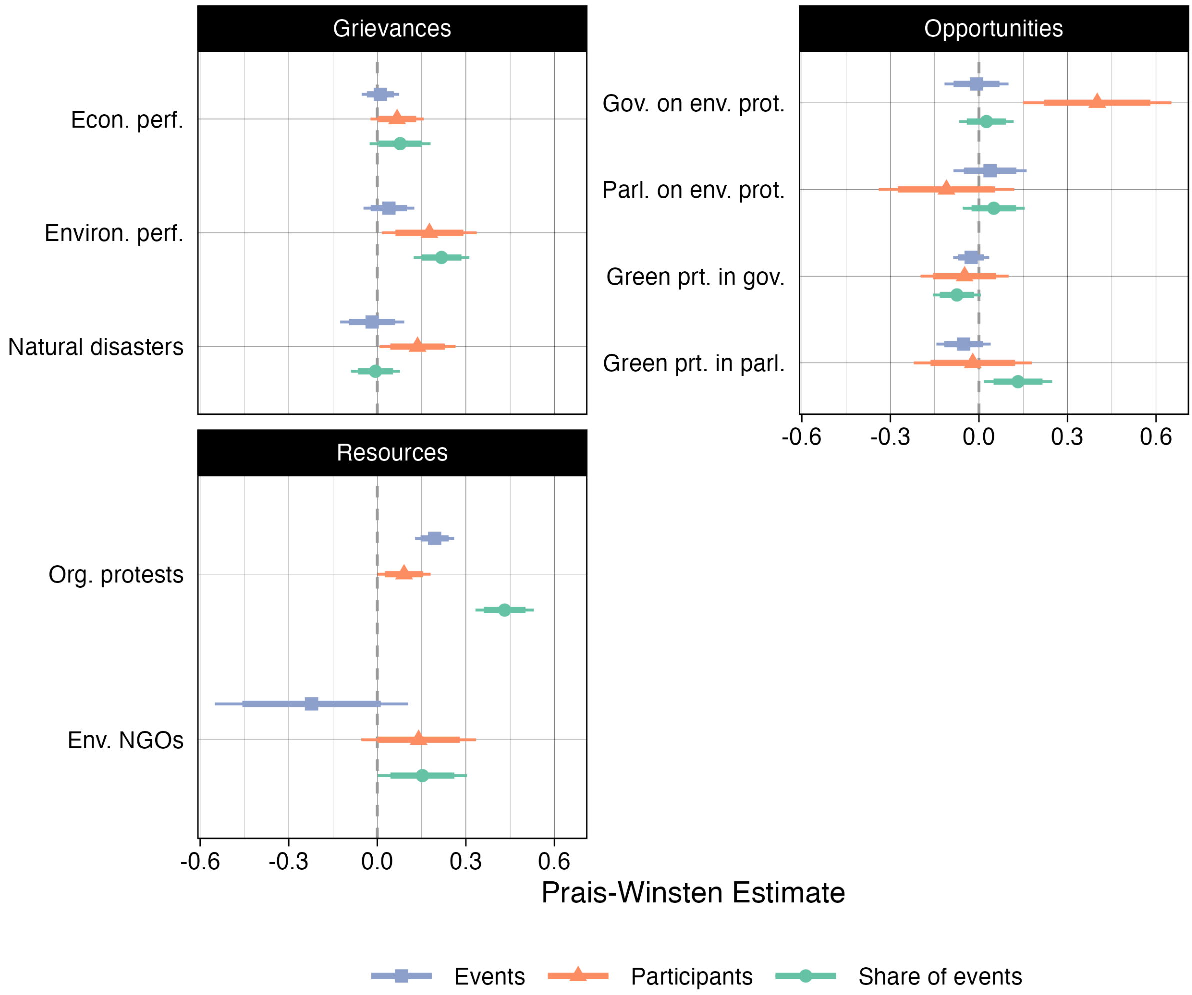
See the respective regression models above.

Table 4: Prais-Winsten regression models of environmental mobilization

	Events	Participants	Share of events
Intercept	1.101	0.646	0.894
	(0.779)	(0.447)	(0.600)
Grievances			
Economic performance	0.011	0.067	0.077
	(0.032)	(0.046)	(0.053)
Environmental performance	0.039	0.176*	0.218***
	(0.044)	(0.082)	(0.048)
Number of natural disasters	−0.017	0.136*	−0.006
	(0.055)	(0.066)	(0.042)
Opportunities			
Gov. position on env. protection	−0.008	0.401**	0.025
	(0.055)	(0.128)	(0.047)
Parl. position on env. protection	0.038	−0.110	0.050
	(0.063)	(0.117)	(0.053)
Green party in gov.	−0.026	−0.049	−0.075
	(0.031)	(0.076)	(0.041)
Green party in parl.	−0.052	−0.021	0.132*
	(0.047)	(0.102)	(0.059)
Resources			
Share of organized protests	0.194***	0.091*	0.431***
	(0.034)	(0.046)	(0.050)
Number of env. NGOs	−0.223	0.140	0.153*
	(0.167)	(0.099)	(0.077)
Share of demonstrative action	0.043	0.019	0.083
	(0.037)	(0.042)	(0.043)
Country fixed effects	Yes	Yes	Yes
Adjusted R sq	0.243	0.137	0.228
Number of obs.	616	616	616

Robust standard errors in parentheses. $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 2: Prais-Winsten regression models of environmental mobilization (full sample)



Calculated based on the regression model presented in table 4 above. Thinner lines represent 95% confidence intervals, thicker lines represent 84% confidence intervals. If the 84% confidence intervals do not overlap, the difference is statistically significant at the p ¡ 0.05 level (see: Bolsen and Thornton 2014).

Appendix F: Generation and evaluation of the protest event database

The protest event database was jointly created by political scientists and computational linguists at the ERC project 'Political Conflict in Europe in the Shadow of the Great Recession (POLCON)' at the European University Institute, and the SNF project 'Years of Turmoil' at the University of Zurich. The database includes more than 40,000 protest events and covers 30 European countries over a twenty-one period. The countries covered by the dataset are Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom. The protest events were retrieved from ten European news agencies that public English-speaking newswires and coded using semi-automated content analysis.

The data relies on a combination of automated text analysis and manual coding. The articles that include protest events are identified using techniques of automated text analysis, which is followed by manual coding of key variables of interest. We got access to the relevant newswires from the Lexis Nexis data service by using a list of more than 40 keywords that describe different protest actions in the search query. Still, we were left with an extremely large corpus of 5.2 million documents and, hence, we developed natural language processing (NLP) tools to identify newswires that report about protest evens in the countries and during the time period that we are interested in. First, we removed documents that were exact or near duplicates and used a meta-data filter that discarded documents not reporting about any of our countries of interest. Afterward, we developed tools to attribute a probability score to each document, indicating whether this document actually reports about protest events. For this purpose, we combined two different classifiers (i.e. algorithms that identify documents or words as probable indicators of a protest event): a supervised document classifier that uses a bag-of-words approach and a supervised anchor classifier that uses event-mention detection tools.

A detailed evaluation of these classifiers by Lorenzini et al. (2022) and by Wüest and Lorenzini (2020) shows that the classifiers are reliable and, thus, we used them to calculate a single probability score for each document. This score indicates the likelihood that both classifiers indicate that a document is relevant. Afterward, we manually coded a sample of documents to establish the optimal threshold for the probability score above which we are relatively confident that a document reports about protest without excluding too many relevant documents. In other words, we attempted to find the optimal level of the probability score, which would reduce the number of documents that are false positives and false negatives. In the end, we classified slightly more than 100,000 documents as relevant, thereby substantially reducing the number of documents that are relevant for our analysis.

Afterward, we employed manual coding to retrieve information on all protest events in our selected countries and time period. For this purpose, we used a simplified version of the protest event analysis (PEA) approach that was first established by Kriesi et al. (1995). An important advantage of the semi-automated process was that it significantly reduced the amount of time and resources required for coding protest events. By using the classifiers, we were able to provide coders with documents that were more likely to report about a protest event. In total only 22% of the documents that we submitted to coders were irrelevant (compared to 95% of documents from our entire corpus that are irrelevant). Tests to evaluate the content of the documents that we excluded from the analysis show that most of the documents that we excluded do not contain any protest events. Moreover, when documents report protest events, these events have the same attributes as the events included in the sample. Thus, we are confident that the articles, which we coded manually, are a good representation of all articles published by the ten newswires.

However, to implement PEA we still relied on an additional sampling strategy because the corpus of relevant documents remained too large to be coded manually. Therefore, we categorized countries into three group: for countries with a large sample of documents, we coded 25% of the relevant documents; for countries with an average number of documents, we coded 50%; and for small countries with only a few hundred news reports, we coded all the documents identified as relevant by our classifiers. Afterward, coders were asked to identify all mentions of protest events in the documents. To this end, coders did not rely on a theoretical definition of relevant protest actions, which might be conceptually precise but practically very difficult to implement. Instead, coders identified relevant events based on a detailed list of unconventional or non-institutionalized action forms. In addition to demonstrative, confrontational, and violent actions, coders were asked to also identify strikes and other forms of industrial action as a protest.

A document may contain references to one or to more than one protest event and coders recorded the following variables for each event: date, location, action form, issue of the protest, the actors participating or organizing the protest, and the number of participants. To measure the level of inter-coder agreement, we presented fourteen coders with the same 65 documents at different times during their coding. For the identification of the events – assessing whether two coders agree on the data, country, and action form of all the events that they identify in the same document – the averaged F1-score was 0.60 with a standard deviation of 0.06. For the identification of event attributes, the average Cohen's Kappa varies by event attribute. It was 0.57 (with a standard deviation of 0.13) for actors, 0.53 (with a standard deviation of 0.45) for issues and 0.45 (with a standard deviation of 0.06) for the number of participants. These values show that our coders have a relatively high level of agreement given that values from 0.40 to 0.60 are commonly defined as fair to good.

Given we sampled the events in some countries and not in others (see above), and starting from the assumption that events in bigger countries are more likely to be covered, we constructed weights for event features and participant numbers based on the press agency and the log population number of the country where the event took place (for details see: Kriesi et al., 2020). All the empirical analysis included in the paper and in the appendix is weighted by this weight.

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