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Natural Disaster Experience Does Not Affect Environmental Attitudes or Prosociality – Evidence from the 2021 Flood in Germany

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Nils Christian Hoenow, Kiran Karki, and Maximilian N. Burger*

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Abstract

In July 2021, severe floods devastated parts of Germany, causing numerous casualties and extensive damage to property and infrastructure. As climate change is expected to increase the frequency and severity of such extreme weather events, understanding their social implications is crucial. Using data from three nationwide surveys, we examine the impact of the 2021 flood on environmental attitudes, pro-environmental behaviors, and the support for climate-related policies across a wide range of indicators. Results reveal no statistically significant effects, regardless of the estimation methods or measures of flood exposure used. We additionally investigate the flood's effect on prosociality, assessed through measures such as past charitable donations and incentivized decisions in a dictator game. Similarly, we find only limited variation in prosociality, but with impacts differing based on whether respondents in affected areas also sustained damage to their households. These findings challenge the expectation that direct exposure to natural disasters increases environmental awareness and prosocial behavior.

JEL-Codes: D64, D91, Q54, Q58

Keywords: Natural disaster; flood; environmental awareness; environmental attitudes; environmental behavior; climate policy; prosociality

March 2025

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1 Introduction

For years, scholars have warned that human-induced climate change will increase the frequency and intensity of extreme weather events, such as floods, with significant consequences for both, developing and industrialized countries (e.g., Cornwall, 2021; Hirabayashi et al., 2013; IPCC, 2021; Netzel et al., 2021; Reichstein et al., 2021). In July 2021, a catastrophic flood hit Germany, Belgium, Luxembourg and neighboring countries, severely affecting the German states of North Rhine-Westphalia and Rhineland-Palatinate. Despite floods being the most common type of disaster worldwide (CRED, 2020) with Europe being no exception (European Environment Agency, 2024), the scale and impact of the 2021 flood were unparalleled in recent decades (Fekete & Sandholz, 2021). It resulted in the highest flood-related death toll in Germany for the past 60 years (Dietze et al., 2022) with at least 200 fatalities and substantial damage to property and infrastructure (Tradowsky et al., 2023) estimated to amount to 30 billion euro (Apel et al., 2022). Given the increasing frequency of extreme weather events, it is important to understand their broader effects on environmental attitudes, behaviors, and prosociality.

We hypothesize that such extreme events, threatening life, property and livelihood may alter environmental attitudes and pro-environmental behaviors of those affected. While frequent media coverage links extreme events to anthropogenic climate change, many perceive these events as distant and unrelated to their own lives (Spence et al., 2011; Swim et al., 2009). Experiencing a disaster firsthand may reduce this perceived distance, leading to an increased risk perception and awareness of climate change's impacts (Demski et al., 2017; Lorenzoni & Pidgeon, 2006; Marx et al., 2007; McDonald et al., 2015; Rüttenauer, 2024; Weber, 2010). Such shifts in perception could lead to the intention to adopt more environmentally friendly behaviors with the aim of mitigating climate change and limiting future impacts, for example through the reduction of personal greenhouse gas emissions (Haden et al., 2012; Spence et al., 2011; Van Der Linden, 2014; Whitmarsh, 2008). Besides potential changes in individual mitigation efforts, the flood experience may also affect citizens' support for climate-friendly policy measures and lead to according political party preferences or even political involvement (Baccini & Leemann, 2021; Garside & Zhai, 2022; Hilbig & Riaz, 2024; Holub & Schündeln, 2023; Rüttenauer, 2024). Understanding these effects is important for shaping future environmental policy and encouraging behavioral change at both, the individual and societal levels.

In addition to environmental attitudes and behaviors, we hypothesize that experiencing a natural disaster may affect prosociality. The German floods of 2021 led to an extraordinary public response, with donations reaching approximately 655 million euros – the third highest donation amount related to a natural disaster in Germany (Deutsches Zentralinstitut für soziale Fragen, 2022).

Prosocial behavior, however, extends beyond monetary contributions and includes actions such as helping, sharing, and volunteering among fellow citizens (Brief & Motowidlo, 1986). Given that institutional help can often be slow and insufficient, citizens' willingness to engage in prosocial actions is crucial for resilience during crises (Steimanis & Vollan, 2022). In the context of natural disasters, affected individuals and households often receive help from others during the event (e.g., rescue from the floods), in the immediate aftermath (e.g., supply with food and water or removal of debris), as well as in the phase of reconstruction (e.g., donations in kind and money). Understanding how natural disasters influence prosociality is vital for fostering stronger social networks and enhancing collective resilience, particularly in the face of future climate-related crises.

There are several pathways through which we expect that the experience of natural disasters could affect prosociality: First, interactions with others during the event or the recovery phase may create strong social bonds among affected individuals, which can promote prosociality (Cassar et al., 2017). Second, having experienced an extreme event, such as a natural disaster, may enhance one's ability to take the perspective of others in similar situations. Being able to put oneself in the situation of others may increase empathy and the understanding of being in need, thereby enhancing prosociality (Lehmann et al., 2022; Lim & DeSteno, 2016). Even if not personally affected by any damage, being close to others and witnessing their physical and emotional distress can evoke empathy, which may in turn increase prosocial behavior (Decety et al., 2016; Depow et al., 2021; Eisenberg & Miller, 1987; Schroeder et al., 2015). Further, receiving help of any kind during or after a disaster may shift one's view of others, reinforcing the belief that people are generally trustworthy and benevolent, encouraging reciprocal prosocial behavior, possibly lastingly beyond the event itself (Cassar et al., 2017). Finally, the experience of being dependent on the help of others during and after the disaster, coupled with the expectation of experiencing further events in the future, can lead to the strengthening of prosociality to build social networks as safety nets in times of need. Opposingly though, there are also mechanisms that could contribute to a negative association between experiencing natural disasters and prosociality: After a disaster, individuals, whose property or livelihoods have been damaged or whose physical or mental health has been affected, may face constraints in time, dedication and financial resources to engage in prosocial actions and are busy coping with their own damage. Moreover, negative experiences during a crisis – such as a lack of external assistance, conflicts over scarce resources, embezzlement of aid or even looting – can lead to disappointment and negative reciprocity, reducing prosociality (Fleming et al., 2014). While the latter often receives more attention in the media and public perception, the current literature highlights the potential of environmental hazards and natural disasters to strengthen prosociality (Dussaillant & Guzmán, 2014; Rodríguez et al., 2006; Solnit, 2009). However, despite

a surge in analyses published on the matter in the last ten years, the relation between experiencing natural disasters and prosociality remains elusive, with studies finding a negative, positive, or no relation at all. The variance in outcomes suggests that the relationship is contingent upon the specific context. The conditions preceding the event, coupled with the circumstances experienced by those affected during and after the disaster, may affect this relation (Fleming et al., 2014). For a better understanding of the mechanism behind it, it is therefore necessary to examine multiple and diverse conditions, contexts, types of disasters and, not least, populations.

Our study contributes to the literature by investigating the effects of the 2021 flood experience on both environmental attitudes and behaviors, and prosociality in a high income, industrialized country context with strong institutions and high pre-existing levels of awareness for manmade climate change and its link to extreme weather events (Lee et al., 2015; Mewes et al., 2024). Using data from three large-scale nationwide surveys, each conducted within a year of the disaster, we analyze responses from 13,754 participants from both exposed and nonexposed regions. Our findings suggest that the flood experience did not significantly affect environmental attitudes and behaviors. While we furthermore observe no overall effect on prosociality, we identified differences based on whether personal damage was caused by the flood. Specifically, those reporting personal damage donated on average less money to charity, while those living in affected areas without sustaining any damages self-report higher amounts. Further, affected individuals who received any form of aid during or after the flood show higher scores for positive reciprocity compared to those who suffered flood damage but did not receive any aid. These findings suggest that while the flood experience did not substantially alter environmental attitudes and behaviors, it may have had a nuanced impact on prosociality.

The remainder of the paper is organized as follows: Section 2 reviews the literature on the effect of environmental disasters on environmental attitudes and behaviors, as well as on prosociality. The data and methods employed in the analysis are described in section 3. Section 4 presents our results and section 5 discusses them. Finally, section 6 concludes.

2 Discussion of the Literature

2.1 Environmental Attitudes and Behaviors

A growing body of research explores the relationship between natural disaster experience and environmental attitudes and behaviors. Despite the already large number of studies and the diverse contexts investigated, there is no consensus on how natural disaster experiences influence environmental attitudes (for a meta-analysis see Hornsey et al., 2016 and for recent literature reviews see Howe et al., 2019 and Sisco, 2021). Howe et al. (2019) attribute this lack of agreement to methodological variations across studies, such as differing measures for climate and weather trends, as well as survey items and sample selection. Similarly, Sisco (2021) underscores these challenges and expands upon potential mechanisms and contextual factors that may shape the relationship between disaster experience and environmental attitudes. Here, we focus on the most relevant and more recent studies examining the effect of floods on environmental attitudes and behaviors, particularly those in industrialized countries.

In a recent cross-country analysis, Ogunbode et al. (2022) found no link between disaster experience and climate anxiety in a study of 32 countries, suggesting that political orientation and coping capacity may moderate outcomes. Similarly, Spektor et al. (2023) found that while climate event experiences in seven Latin American countries increased the belief in the existence of climate change, they had no effect on anthropogenic attribution or perceived consequences. Peisker (2023) combined survey data from the European Social Survey and national weather data of 206 European regions and reports negligible effects of extreme weather experiences on climate beliefs.

Studies focusing on single countries offer additional nuanced insights. Demski et al. (2017) found greater salience of climate change, elevated intentions for mitigation and more support for climate policies in exposed citizens after a storm with floodings in the United Kingdom. For England and Wales, Lohmann and Kontoleon (2023) found increased risk perception but no impact on environmental attitudes and behaviors due to extreme weather events using a difference-in-differences approach. Rüttenauer (2024) combined panel and flood data from the United Kingdom and found that only close proximity to a flood (2 km or less) significantly affected climate beliefs, with stronger effects among right-leaning individuals and climate skeptics. In Germany, studies on the 2013 flood revealed increased climate risk perceptions, particularly among those living in close proximity (within 1 km radius) to the event (Frondel et al., 2017; Osberghaus & Fugger, 2022). Notably, these effects were most pronounced among individuals who suffered personal damage.

With the link between attitudes and behaviors being well-established (see for example Klöckner, 2013), research increasingly examines whether disaster experiences translate into pro-

environmental actions. Hoffmann et al. (2022) combined weather data for temperature anomalies, heat waves, and dry spells with data from Eurobarometer on environmental concern (34 countries) and Green Parties voter turnout in the European Parliament (28 countries). They found that extreme weather events across Europe were associated with increased environmental concern and higher Green Party votes. However, behavioral responses often seem to depend on event attribution. Ogunbode et al. (2019) showed that flood experiences in the United Kingdom only increased mitigation intentions among those attributing the events to climate change. Attribution in turn was higher among participants with higher pre-existing climate change beliefs and leaning towards the political left. Baccini and Leemann (2021) reported similar findings for Switzerland, making use of the country's unique system of frequent citizen votes on policies. Their study found that recent flood exposure increased support for climate policies. However, this effect diminished significantly within ten months. Similarly, Osberghaus and Demski (2019) explored behavioral responses in Germany following the 2013 flood by combining data on internet searches for green energy options with insurance payouts triggered by the disaster. The authors found that while Germany's 2013 flood spurred searches for green energy, this effect was absent in severely affected regions, possibly due to resource constraints or psychological denial.

The exceptionally severe 2021 flood in Europe has also already been subject to research. Bulut and Samuel (2024) investigated the impact from the perspective of Luxembourg. During the flood, the authors were in the process of collecting data from young people aged 16 - 29, allowing them to compare environmental attitudes before and after the event. Their findings revealed that participants living close to flooded areas exhibited a significant increase in pro-environmental attitudes; however, this shift translated into only limited changes in pro-environmental behavior. In the Netherlands, Duijndam et al. (2023) show that individuals whose homes were flooded were more inclined to adopt in-situ adaptation measures and demonstrated higher intentions to migrate. In contrast, individuals living in affected towns who were not personally harmed, displayed no significant increase in such intentions, highlighting the critical role of direct, personal experience in driving behavioral change.

Studies on German election outcomes suggest mixed effects of flood exposure on Green Party voting during the federal elections held ten weeks after the disaster (Garside and Zhai, 2022; Hilbig and Riaz, 2024; Holub and Schündeln, 2023). Using a binary classification of regions as exposed or non-exposed, Garside and Zhai (2022) as well as Hilbig and Riaz (2024) found that Green Party voting was only slightly elevated in strongly affected regions compared to unaffected ones. Conversely, Holub and Schündeln (2023) used the share of buildings damaged in each municipality as an explanatory variable. Their analysis revealed a significant positive effect of flood damage on

voter turnout for the Green Party, suggesting that the degree of local impact plays a crucial role in influencing electoral outcomes.

Overall, these findings emphasize the variability of outcomes as well as the critical role of the specific contexts, individual factors and their complex interplay, suggesting that further research is needed to disentangle relevant mechanisms and moderating factors (Howe et al., 2019; Sisco, 2021). With our study, we contribute through analyzing three large-scale nationwide data sets that were collected as individual-level surveys. In one data set, we explicitly included questions on the affectedness and damage caused by the 2021 flood. Further, we elicit environmental attitudes as well as behaviors and the support for climate policies across a large range of indicators, not only through self-reported measures but also by an incentivized pro-environmental donation experiment.

2.2 Prosociality

Research on the impact of natural disasters on prosociality has surged over the past decade. Despite improved data availability, significant uncertainties about this relationship persist, suggesting that effects are context specific. While many studies focus on low-income countries, evidence from high-income settings remains sparse.

As detailed in section 1, effects of natural disasters on prosociality can, in theory, be positive or negative. We first present a number of studies that have identified *increases* in prosociality. For instance, Méon and Verwimp (2022) observed elevated donation rates in Belgian municipalities affected by a heavy storm. Similarly, Shupp et al. (2017) found heightened trust in tornado-affected cities, particularly towards police, fire departments, and friends, compared to a control city. In Japan, exposure to the Kobe Earthquake in 1995 was linked to increased community volunteering (Yamamura, 2016). Studies in low-income countries have also reported increased prosociality following disasters, such as elevated trust and cooperation after earthquakes in Indonesia (Bai & Li, 2021) and Chile (Calo-Blanco et al., 2017), or floods in Pakistan (Ahmad & Younas, 2021) and a tsunami in Thailand (Cassar et al., 2017).

A second strand of literature argues that natural disasters lead to *decreases* in prosociality. For example, a study using European Social Survey data and EM-DAT data for 12 cases within European countries found that extreme heat waves correlated with decreased trust, although similar effects were not observed in other high-income contexts. In low-income countries, several studies have documented negative impacts of environmental hazards on prosociality. Field experiments conducted after the 2004 tsunami in Sri Lanka (Becchetti et al., 2017), the 2014 Cambodian flood (Fiala, 2017), and the 2010 earthquake in Chile (Fleming et al., 2014) found reduced contributions

in dictator games and trust games post-disaster. Survey studies in the Philippines and Bangladesh further support these findings, showing decreased reciprocity and trust after the 2013 typhoon (Biener & Landmann, 2023) and 1998 flood (Rahman et al., 2020).

A third body of literature finds no significant effect of natural disasters on procosiality. However, to this point and to the best of our best knowledge, zero effects have only been documented in low-income countries. Studies employing incentivized tasks conducted after events like the 2012 Philippine typhoon (Abatayo & Lynham, 2020), the 2009 Bangladeshi cyclone (Ahsan, 2014), the 2012 Philippine flood (Kuroishi & Sawada, 2019), and the 2011 Cambodia mega flood (Chantarat et al., 2019) showed no effect on prosocial behavior. Similarly, survey studies in Chile and Pakistan found no significant change in trust or prosocial behaviors like donations or volunteering after major earthquakes (Andrabi & Das, 2017; Calo-Blanco et al., 2017; Maki et al., 2019).

Similar to the association with environmental attitudes and behaviors, the variance in outcomes suggests that characteristics of the disaster affecting in-event as well as post-event experience and other contextual factors may be decisive for its impact on prosociality. Few studies explored the mechanisms leading to an alteration of prosociality as a result of such experience. Vardy and Atkinson (2019) observed that suffering personal damage decreases prosocial behavior, while only witnessing others in distress increases it. Another factor that seems to be consistently associated with a positive effect on prosociality is whether affected individuals have received any form of aid (Andrabi & Das, 2017; Becchetti et al., 2017; Cassar et al., 2017; Rahman et al., 2020). Our study provides a new study background in an industrialized country setting and tests through a range of markers of prosociality. We further make use of detailed distinctions in flood experiences, such as whether damage was sustained by the household or any form of aid received, to disentangle the complex pathways through which disasters may influence prosociality.

3 Data and Methods

3.1 Data

For this study, we employ data from three distinct nationwide online surveys conducted within a year after the July 2021 flood event. All three data collections aimed at retrieving samples representative of the German adult population. Table A.1 in the Supplementary Information shows average socioeconomic characteristics of participants from each data set and compares these against the general German population, using official, publicly available data from the German *Mikrozensus*.

The primary survey (data set 1) was conducted eight months after the flood, that is, between March and April 2022, via the survey institute *forsa*. In this survey, 6,285 participants were interviewed towards their perception of climate change, their (self-reported) behavior regarding the environment, their acceptance of climate-related policy measures and their political party preference. It was conducted as wave 3 of the *RWI Climate-Mobility Panel* which is maintained by the RWI – Leibniz Institute for Economic Research within the *Creating the Mobility Transition in Germany together! r*esearch project funded by Stiftung Mercator. While a major part of the survey revolves around mobility behavior and environment-related policy preferences, it also elicits prosociality via hypothetical and incentivized measures. It is the only data set that contains information on prosociality used in this study. Further, only this survey contains direct questions about the flood experience, such as whether participants suffered damage or received aid. The study was preregistered[1] with the intention of focusing the analysis on this first data set. Data sets 2 and 3 were added later to complement with additional information on environmental attitudes and behaviors.

Data set 2 originates from a survey conducted via forsa in July and August 2022, roughly one year after the flood. This survey involved with 6,003 participants and was collected within the *Socio-Ecological Panel* (shortened as *Green SOEP*), also maintained by the RWI and funded by E.ON foundation. It primarily focused on citiziens' perceptions of environmental and energy-related policies, including attitudes and behaviors regarding the environment as well as the support for climate policies.

Data set 3 was drawn from a Europe-wide survey that was conducted within the *NEWCOMERS* research project, funded under the European Union's *Horizon 2020* research and innovation program. For this study, only the German subsample of 1,466 participants is considered. We conducted this survey via *Respondi* and partners (now *Bilendi & Respondi*) four months after the

[1] https://aspredicted.org/jd9pz.pdf

flood in November and December 2021. Its original focus was on citizens' perceptions of energy-related issues. Relevant to this study, it also included questions on environmental attitudes and behaviors, support for selected climate policies, and an incentivized donation experiment with real-life environmental implications. For this data set, participants were selected to fulfill country-representative quotas, regarding age, gender, income and education. Only adults up to the age of 69 were included.

Table 1 illustrates the variables of interest and their availability across data sets. The exact survey questions for relevant variables are attached in the Supplementary Information (Q). The following paragraphs outline the use of our independent (flood exposure) and dependent variables (environmental attitudes, environmental behaviors, support for climate policies and prosociality) for our analysis.

Table 1 Data sets and included variables

	data set 1 (Mar/Apr 2022) N = 6,285	data set 2 (Jul/Aug 2022) N = 6,003	data set 3 (Nov/Dec 2021) N = 1,466
Flood Exposure			
Living in an exposed region (by postal code)	✓	✓	✓
Self-reported exposure	✓		
Damage to persons or property in household	✓		
Aid received during or after flood	✓		
Environmental attitudes			
Impact of climate change	✓		
Existence of climate change		✓	
Climate change manmade		✓	
Dangers of climate change		✓	
Importance of climate policy		✓	
Relative importance		✓	
Seriousness of climate change			✓
Importance of protecting the environment			✓
Environmental behaviors			
Environmentally friendly behavior	✓		
Green Party preference	✓	✓	
Conserving energy at home			✓
Donation to atmosfair			✓
Support for climate policies			
Increase in carbon pricing	✓		
No new vehicles with combustion engines after 2035	✓		
No new vehicles with combustion engines after 2030		✓	
Constant increases in tax on petrol and diesel		✓	
Speed limit of 130km/h on highways		✓	
Coal phase-out			✓
Expansion of electric vehicles			✓
Expansion of public transport			✓
Prosociality			
Positive reciprocity	✓		
Negative reciprocity	✓		
Trust	✓		
Altruism	✓		
Dictator game donation	✓		
Past donations	✓		
Past donations (amount)	✓		
Volunteer work	✓		
Socioeconomics			
Gender	✓	✓	✓
Age	✓	✓	✓
Income	✓	✓	✓
Education	✓	✓	✓
Size of household	✓	✓	✓

Note: Checkmarks indicate that individual-level information is available in the respective data set.

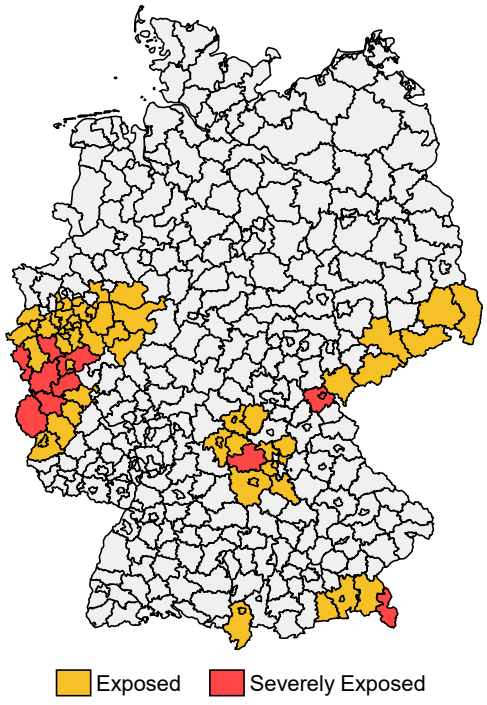
3.2 Measurement Variables

3.2.1 Measuring flood exposure

Flood exposure was measured by assigning participants' postal codes to exposed and nonexposed regions based on the flood mapping from the Federal Office for Civil Protection and Disaster Assistance (BBK) (Federal Ministry of the Interior and Federal Ministry of Finance, 2021). This allows us to compare relevant outcome variables across these two groups.

Figure 1 shows the exposed districts in Germany. The proportion of people living in exposed regions is similar across the three samples. Specifically, there are 18.30% living in regions exposed to the flood in data set 1 (n = 1,150 exposed and 5,135 not exposed), 19.32% in data set 2 (n = 1,160 exposed and 4,843 not exposed) and 19.58% in data set 3 (n = 287 exposed and 1,179 not exposed). Using external data on population size in each postal code area for a comparison, our exposure measure results in 16.198 million people living in exposed regions, which amounts to 19.20% of the general population in Germany (Statistisches Bundesamt [Destatis], 2023).

Figure 1 Exposure to the flood disaster by postal codes



Note: Flood mapping of the July 2021 floods from the Federal Office for Civil Protection and Disaster Assistance (BBK). Orange color indicates exposure; red color indicates severe exposure (state of emergency) to the floods. Map outlines based on data from GeoBasis-DE (BKG, n.d.).

Without doubt, this exposure measure by the postal code liberally includes a relatively large group of people, many of whom have likely not been directly affected by the floods and have not personally suffered any substantial damage. The exposure measure must therefore be understood as either being directly affected or being in the proximity of the disaster, both of which can have an

impact on environmental and prosocial preferences. We go into more detail in the "Robustness Checks and Additional Analyses" subsection (4.5) by looking at respondents from areas that were severely exposed, i.e., participants from districts that were declared a state of emergency by the Federal Office for Civil Protection and Disaster Assistance (BBK) during the flood (see red colored area in Figure 1, Federal Ministry of the Interior and Federal Ministry of Finance 2021). These reduce the proportion of exposed participants in the sample to 3.21% in data set 1 (n = 202 exposed and 6,083 not exposed), 3.13% in data set 2 (n = 188 exposed and 5,815 not exposed) and 3.68% (n = 54 exposed and 1,412 not exposed). This is also close to the expected proportion when comparing to external data on populations in exposed regions, which is 2.94% (Statistisches Bundesamt [Destatis], 2023).

We also make use of additional, detailed self-reported information on flood exposure collected in the survey for data set 1. These are summarized into three relevant variables: First, whether respondents self-report their place of residence was affected by the flood. Second, whether any person from their household actually sustained any injuries or physical damage to their property and, third, whether any external aid, monetarily or in-kind, was provided to the household.

To rule out false attribution of potential effects to the flood exposure that may in fact be due to other, potentially pre-existing, differences across regions or samples, comparisons of socioeconomic characteristics of those exposed and not exposed are presented across all three data sets in the Supplementary Information (Table A.1). It shows that the groups are mostly balanced in their characteristics.

3.2.2 Measuring environmental attitudes

Regarding environmental attitudes, we measure (i) the perceived impact of climate change on one's personal living conditions, (ii) the participants' belief in the existence of climate change, (iii) whether they believe climate change is manmade, (iv) whether climate change is a danger to humankind, (v) whether they consider climate policy to be an important field in politics, (vi) its perceived importance compared to other issues, as well as (vii) the perceived seriousness of climate change as a problem, and (viii) an assessment of the importance of protecting the environment.

3.2.3 Measuring environmental behavior

Distinguished from attitudes, we also measure participants' pro-environmental behavior and include (i) self-assessed environmentally friendly behavior, as well as (ii & iii) the preference for

the German Green Party[2]. Further, data set 3 entails whether respondents indicate to (iv) take actions to conserve energy at home and (v) their decision in an incentivized donation experiment. Within the survey, respondents were asked to allocate 100 Euros between themselves and their donation to *atmosfair*, a non-profit organization which uses donations for climate friendly projects to offset greenhouse gas emissions. An example was shown that describes the construction of micro power-grids and solar panels in villages in developing countries, which allow for clean rural electricity provision. Since not only the environment but also other people directly benefit from these donations, the experimental decision could similarly be interpreted as a measurement of prosocial behavior.[3] Participants were informed that every 100th decision was implemented.

3.2.4 Measuring support for climate policies

To measure the support for climate policy measures, we ask whether respondents support (i) higher taxes on carbon dioxide emissions, (ii) bans on new vehicles with combustion engines after 2035 or (iii) 2030, (iv) constant increases in tax on petrol and diesel, (v) a general speed limit of 130km/h on highways, (vi) the phase-out of electricity production from burning coal, (vii) the expansion of electric vehicles and (viii) the expansion of public transport.

3.2.5 Measuring prosociality

Regarding prosociality, we only use the data from data set 1, which contains several complementary measures: four self-assessed items measuring general prosociality on 11-point response scales developed by Falk et al. (2018), that are (i) positive reciprocity, (ii) negative reciprocity, (iii) trust, and (iv) altruism. In a (v) dictator game experiment, participants were asked to allocate 10 tokens, each worth 10 Euros, between themselves and another, unknown survey participant[4]. The last block is about self-reported real-world behaviors, that include whether participants (vi) have donated money in the past year, and (vii) the respective amount if applicable. For the donation amount, we winsorize at the top 1% to account for potential outliers. Lastly, we elicit whether respondents (viii) regularly do volunteer work.

[2] Individuals who state to not have any political preference at all are considered to not have a preference for the Green party. Those who state that they do not wish to disclose their preference for a specific party are not considered for the analysis.

[3] Yet, showing the same outcome twice would be redundant, thus, we decide to keep the results from the donation decision in the "environmental behavior" subsection.

[4] In this survey, five participants were randomly selected whose decisions were then implemented. The allocated amounts were paid out via gift vouchers using "wunschgutschein.de" as a provider of vouchers. Participants were informed when playing the dictator game about the randomized selection of actual payouts.

3.3 Method of Analysis

For the main analysis presented in the following "Results" section (4), we show mean responses and corresponding standard deviations for metric and response-scale[5] outcome variables across exposed and unexposed respondents for an intuitive comparison similar to Spence et al. (2011) and Lohmann and Kontoleon (2023). For dichotomous variables, we show proportions. Moreover, differences in means or proportions, respectively, between the two groups are shown and two-sample t-tests are used for metric and response-scale outcome variables and Chi-squared tests are used for dichotomous ones to test for the significance of potential differences.

3.4 Robustness Checks and Detailed Analyses

We test the robustness of our results by applying a number of alternative and additional analyses. First, we run regression analyses in addition to the simple t- and chi2- tests that allow the inclusion of covariates. We rely on simple ordinary-least-squares (OLS) regressions, also in the case of dichotomous outcome variables. The latter are known as linear-probability models (LPM). We control for common socioeconomic characteristics, that are, gender, age, education, household income, and household size. Additionally, we add a dichotomous variable to control for being located in the eastern states of Germany.[6] Second, data set 1 and data set 2 were established as panel data sets and thereby allow us to additionally make use of data available from previous waves conducted before the flood with, partly, the same participants. For a few variables, we can therefore not only measure cross-sectional differences but complement them by comparing changes over time, i.e., conducting a differences-in-differences analysis. The previous waves were collected in June 2019 (data set 1) and June 2021, shortly before the flood (data set 2). Finally, while we select the more general flood exposure, that is, living in the exposed areas, for the main analysis, we also look separately at those who are more severely exposed (declared state of emergency). Further, we go into more detail within data set 1 by using a self-reported affectedness by the floods as the relevant exposure measure as well as additional, detailed questions on damage suffered and aid received.

[5] Most but not all response scales are Likert-scales.

[6] Even 30 years after the reunification, cultural differences may be found in these five re-established states of the former German Democratic Republic that affect attitudes regarding the environment and prosociality.

3.5 Statistical Power for Analysis

Given the unexpected and unpredictable nature of the flood event, the sample sizes of exposed and unexposed respondents were determined by the proportion of affected respondents that each data set provides. With all three data sets being representative on national level and only some areas of Germany being exposed to the floods, the shares of those affected are consequently much smaller than the shares of those unaffected.[7] For the power analysis, we therefore do not calculate a minimum sample size but base our number of observations of those exposed and not exposed on what we have actually observed in our data and report minimal detectable effect (MDE) sizes for each dependent variable. The MDEs are calculated based on the standard deviation (or proportions, in the case of dichotomous variables) for each variable observed in our data. The sizes of the presented MDEs (Supplementary Information Tables B.1 - B.4) give an intuitive interpretation of how large differences (i.e., "effects") would need to be in order to be considered statistically significant.[8] It becomes evident that the MDEs do not appear excessively large for any of the tested variables.

4 Results

Firstly, results for the effect of being exposed to the floods on environmental attitudes (4.1) are presented, followed by its effects on environmental behavior (4.2) and on support for climate policies (4.3). We then look at prosociality (4.4) and add results from various robustness checks as well as additional analyses to the end of this section (4.5).

4.1 Environmental Attitudes

Table 2 compares the mean values of the survey items regarding environmental attitudes, such as the perception of the existence, causes and consequences of climate change, across those unexposed and exposed to the flood in July 2021. The last column of the table presents the differences in means and the p-values of the two-sided t-tests (if metric or response-scale) or chi-squared tests (if dichotomous). Results show no statistically significant difference between those

[7] There may even be some unbalanced attrition in survey participation amongst those affected by the floods through still being, on average, busier with coping and reconstruction than those unaffected. However, in comparison to external data on population proportions exposed, our data does not support this conjecture, at least not on the level of allocation by postal codes.

[8] Since results in section 4 will show no effects of flood exposure in the main analysis, a decision was made post-hoc to not make any multiple hypotheses adjustments to the statistical testing procedures despite the large range of indicators included. Hence, null effects, as found in all tested outcomes of the main analysis, can be considered even more robust.

not exposed and those exposed suggesting that experiencing the flood had no effect on environmental attitudes.

Table 2 Environmental Attitudes

Survey	Question/Statement	Response options	Not exposed means (std. dev.) [n]	Exposed means (std. dev.) [n]	difference (p-value)
data set 1					
Impact of climate change	What do you think the consequences of climate change will be for your personal living conditions in the coming decades?	Five-point scale (very negative – very positive consequences)	3.793 (0.701) [4,966]	3.781 (0.717) [1,110]	-0.012 (0.598)
data set 2					
Existence of climate change	Based on everything you know; do you think the world's climate is changing or not?	Yes/No	0.928 - [4,781]	0.923 - [1,146]	-0.005 (0.538) [C]
Climate change manmade	Do you think climate change is mostly caused by humans (as opposed to mostly caused by natural factors)?	Yes/No	0.884 - [4,764]	0.868 - [1,141]	-0.016 (0.123) [C]
Dangers of climate change	Do you think climate change is dangerous for humanity?	Four-point scale (certainly not – certainly)	3.610 (0.666) [4,427]	3.593 (0.671) [1,056]	-0.017 (0.448)
Importance of climate policy	Do you consider climate policy to be an important field in politics?	Four-point scale (not important – important)	3.667 (0.723) [4,823]	3.628 (0.783) [1,153]	-0.039 (0.101)
Relative importance	In your opinion, are the environment and climate change one of the most important issues Germany is currently facing?	Yes/No	0.446 - [4,843]	0.435 - [1,160]	-0.010 (0.520) [C]
data set 3					
Seriousness of climate change	How serious a problem do you think climate change is at this moment?	Ten-point scale (not at all a serious problem – an extremely serious problem)	7.463 (2.388) [1,179]	7.206 (2.493) [287]	-0.258 (0.105)
Importance of protecting the environment	How important is protecting the environment to you personally?	Four-point scale (not at all important – very important)	3.259 (0.670) [1,179]	3.188 (0.631) [287]	-0.071 (0.106)

For the calculation of means and proportions, "Do not know" and "Prefer not to say" responses were omitted.
Two-sided t-tests for metric and response-scale variables
C = Chi-squared test if variable is dichotomous
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.2 Environmental Behavior

Table 3 presents comparisons of environmental behaviors, including self-assessed environmental action, preferences for the German Green Party and results from an incentivized donation experiment that benefits a pro-environmental organization. Again, we find no statistically significant differences in means across those not exposed and those exposed to the floods.

Table 3 Environmental Behavior

			Not exposed	**Exposed**	
			means (std. dev.) [n]		difference (p-value)
Survey	**Question/Statement**	**Response options**			
data set 1					
Environmentally friendly behavior	I behave in an environmentally conscious manner, even if this is associated with higher costs and/or efforts.	Five-point scale (strongly disagree – strongly agree)	3.333 (0.780) [5,082]	3.325 (0.775) [1,140]	-0.008 (0.757)
Green Party preference	If you lean towards a certain party, do you have a preference for the Green Party?	Yes/No	0.187 - [4,819]	0.172 - [1,080]	-0.015 (0.259) [C]
data set 2					
Green Party preference	If you lean towards a certain party, do you have a preference for the Green Party?	Yes/No	0.238 - [4,639]	0.218 - [1,123]	-0.020 (0.155) [C]
data set 3					
Conserving energy at home	How much do you agree or disagree with the following statements? "I take action to conserve energy at home"	Five-point scale (strongly disagree – strongly agree)	4.002 (0.837) [1,179]	4.042 (0.852) [287]	-0.040 (0.468)
Donation to atmosfair	Donation Experiment: How much of 100 € would you like to donate to atmosfair?	Values between 0 and 100	38.686 (30.694) [1,179]	37.265 (31.444) [287]	-1.421 (0.484)

For the calculation of means and proportions, "Do not know" and "Prefer not to say" responses were omitted.
Two-sided t-tests for metric and response-scale variables
C = Chi-squared test if variable is dichotomous
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3 Support for Climate Policies

Table 4 examines differences in the acceptance of environmental policies, specifically policies that aim to decrease carbon dioxide emissions. Differences for most variables are not significant. For two measures – support for coal phase-out and the expansion of public transport – we observe a small but statistically significant decrease in average support among those who live in regions exposed to the flood. However, these differences are relatively small and do not appear to indicate a broad trend.

Table 4 Support for Climate Policies

			Not exposed	**Exposed**	
			means (std. dev.) [n]		difference (p-value)
Survey	**Question/Statement**	**Response options**			
data set 1					
Increase in carbon pricing	What is your stance on the following measure?	Five-point scale (strongly disagree – strongly agree)	2.845 (1.315) [3,958]	2.810 (1.302) [923]	-0.034 (0.473)
No new vehicles with combustion engines after 2035	What is your stance on the following measure?	Five-point scale (strongly disagree – strongly agree)	2.628 (1.384) [4,990]	2.588 (1.371) [1,129]	-0.040 (0.378)
data set 2					
No new vehicles with combustion engines after 2030[A]	Do you support the following measure?	Five-point scale (No – Yes)	2.599 (1.470) [4,755]	2.577 (1.426) [1,144]	-0.022 (0.651)
Constant increase in tax on petrol and diesel[A]	Do you support the following measure?	Five-point scale (No – Yes)	2.186 (1.296) [4,715]	2.137 (1.235) [1,132]	-0.049 (0.250)
Speed limit of 130km/h on highways [A]	Do you support the following measure?	Five-point scale (No – Yes)	3.772 (1.553) [4,817]	3.773 (1.544) [1,154]	-0.001 (0.983)
data set 3					
Coal phase-out	Please indicate what your opinion is on the following policy measure.	Five-point scale (strongly disagree – strongly agree)	3.696 (1.159) [1,179]	3.568 (1.135) [287]	-0.128* (0.091)
Expansion of electric vehicles	Please indicate what your opinion is on the following policy measure.	Five-point scale (strongly disagree – strongly agree)	3.221 (1.278) [1,179]	3.146 (1.306) [287]	-0.075 (0.375)
Expansion of public transport	Please indicate what your opinion is on the following policy measure.	Five-point scale (strongly disagree – strongly agree)	4.087 (0.913) [1,179]	3.965 (0.978) [287]	-0.121** (0.047)

For the calculation of means and proportions, "Do not know" and "Prefer not to say" responses were omitted.
Two-sided t-tests for metric and response-scale variables
A = The question was preceded by an introductory statement: "For the mobility transition, there are some measures being discussed that aim to reduce car use and thereby emission of pollutants and carbon dioxide."
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.4 Prosociality

Table 5 reports mean values for prosociality measures, including self-assessed altruism, reciprocity, and trust, as well as decisions in an incentivized donation experiment and a set of real-world behaviors. This analysis is based on data set 1 only. Of all four hypothetical, self-assessed measures, only altruism, evaluated by the hypothetical willingness to give to good causes, shows a statistically significant higher mean value for those exposed to the flood (diff. = 0.162, p = 0.049). However, the magnitude of this difference on an eleven-point scale is modest. Other measures, such as positive or negative reciprocity, trust, and decisions in an incentivized donation experiment, show no significant differences. In line with these findings, reported actual behaviors such as volunteer work and the amount of money donated to charity are not affected by flood exposure. Lastly, while a slightly higher proportion of exposed respondents reported donating money in the past year (diff = 2.2 percentage points, p = 0.087), the difference is only marginally significant.

Table 5 Prosociality

			Not exposed	**Exposed**	
			means (std. dev.) [n]		difference (p-value)
Survey	**Question/Statement**	**Response options**			
data set 1					
Positive reciprocity	Willingness to return a favor	Eleven-point scale	9.364 (1.740) [5,027]	9.395 (1.637) [1,128]	-0.031 (0.586)
Negative reciprocity	Willingness to take revenge	Eleven-point scale	3.563 (2.455) [4,982]	3.590 (2.394) [1,117]	-0.027 (0.739)
Trust	"People have only the best intentions"	Eleven-point scale	6.264 (2.347) [4,967]	6.209 (2.299) [1,118]	-0.054 (0.484)
Altruism	Willingness to give to good causes	Eleven-point scale	7.916 (2.498) [5,008]	8.078 (2.456) [1,123]	-0.162** (0.049)
Dictator game donation	Indicate how many tokens you would like to give to your unknown partner	Tokens between 0 and 10	5.160 (1.464) [3,669]	5.196 (1.504) [869]	-0.036 (0.518)
Past donations	Did you donate money last year, that is, in 2021?	Yes/No	0.800 - [4,961]	0.823 - [1,129]	-0.022* (0.087) C
Past donations (amount)	What was the total amount you donated last year?	Values ≥ 0	311.022 (542.427) [4,411]	328.640 (530.877) [980]	-17.617 (0.356)
Volunteer work	Do you regularly engage in voluntary work?	Yes/No	0.428 - [5,044]	0.415 - [1,130]	-0.013 (0.411) C

For the calculation of means and proportions, "Do not know" and "Prefer not to say" responses were omitted.
Two-sided t-tests for metric and response-scale variables
C = Chi-squared test if variable is dichotomous
Significance levels: * p < 0.10, ** p < 0.05, *** p <0.01

4.5 Robustness Checks and Detailed Analyses

The absence of significant effects of flood exposure on environmental attitudes and behaviors is confirmed by regression analyses that adjust for covariates (Supplementary Information Tables C.1 - C.3) as well as the difference-in-differences estimations, which compare changes over time (Supplementary Information Tables D.1 – D.2). When using the alternative allocation of exposure by focusing on severely exposed respondents, results do not change, either (Supplementary Information Tables E.1 – E.3). Also concerning prosociality, null results are confirmed when including covariates or using the severe exposure measure (Supplementary Information Tables C.4 and E.4).

Within the survey that was conducted for data set 1, participants were asked whether their place of residence had been affected by the flood in July 2021. In case of reported exposure, more detailed information was collected on the flood experiences. Of the whole nationwide sample, 218 (3.48%) respondents reported being affected. Responses to flood-related questions were used to create additional subgroups. We first distinguish whether someone from the respondent's household suffered any injuries to persons from their household and/or physical damage to their property. A total of 70 (1.12%) persons within our data set belong to this group. Next, another distinction is made within those who sustained damage by whether respondents indicated having received any form of aid, either monetarily or in-kind. There are 40 (0.64%) respondents in this group. Given these rather small sample sizes, we focus for the analysis within this subsection on the most striking findings and interpret these with caution.

For environmental attitudes and behaviors, none of these distinctions result in any meaningful differences, indicating that not even suffering physical damage has had any impact on environmental attitudes and behaviors (see Supplementary Information Table F.1 for means and proportions and Table F.2 for test for significance of differences).

For prosociality, however, we observe significant differences in some outcome variables when comparing varying degrees of affectedness (Table 6 for means and proportions, Supplementary Information Table F.3 for test for significance of differences). Specifically, respondents who indicated that their place of residence had been affected by the flood (n = 218) score lower on self-assessed positive reciprocity (two-sided t-test for (1) vs. (2): diff. = -0.359, p-value = 0.003), regardless of whether they also report having sustained any damage. For self-reported negative reciprocity, the same group shows higher average scores, and even higher scores when they have suffered damage (two-sided t-test for (1) vs. (2): diff. = 0.383, p-value = 0.003; for (3) vs. (4): diff. = 0.792, p-value = 0.007). They further show significantly higher scores in self-assessed altruism

(two-sided t-test for (1) vs. (2): diff. = 0.363, p-value = 0.036), while there are no differences in the average scores for self-assessed trust.

Table 6 Degrees of self-reported affectedness on prosociality

	(1) **Not affected**	(2)	(3)	(4) **Affected**	(5)	(6)
Affectedness		All	No damage	Damage	Damage but no aid received	Damage and aid received
Self-reported exposure:	***no***	***yes***	*yes*	*yes*	*yes*	*yes*
Damage:			***no***	***yes***	*yes*	*yes*
Aid:					***no***	***yes***
Prosociality variable						
Positive reciprocity	9.382	9.023	9.048	8.971	8.433	9.375
	(1.712)	*(1.952)*	*(1.852)*	*(2.160)*	*(2.459)*	*(1.835)*
Negative reciprocity	3.556	3.940	3.747	4.348	4.600	4.154
	(2.437)	*(2.594)*	*(2.483)*	*(2.791)*	*(2.872)*	*(2.749)*
Trust	6.257	6.160	6.238	6.000	6.333	5.744
	(2.341)	*(2.278)*	*(2.233)*	*(2.376)*	*(2.644)*	*(2.149)*
Altruism	7.935	8.298	8.466	7.942	7.433	8.333
	(2.489)	*(2.503)*	*(2.506)*	*(2.479)*	*(2.622)*	*(2.321)*
Dictator game donation	5.164	5.232	5.281	5.130	5.190	5.091
	(1.470)	*(1.500)*	*(1.605)*	*(1.260)*	*(1.940)*	*(0.522)*
Past donations (d)	0.805	0.808	0.814	0.794	0.733	0.842
	-	-	-	-	-	-
Past donations (amount)	311.882	384.160	435.674	271.525	324.000	232.941
	(539.177)	*(574.266)*	*(609.281)*	*(474.555)*	*(664.467)*	*(266.623)*
Volunteering (d)	0.424	0.493	0.503	0.471	0.367	0.553
	-	-	-	-	-	-
Observations	6,043	218	148	70	30	40

Means shown for metric and response-scale variables with standard deviations in parentheses, proportions shown for dichotomous variables. When comparing means, note that groups (3) and (4) are subgroups of group (2). and groups (5) and (6) are subgroups of group (4). (d) denotes dichotomous variables.

Although average donations in the incentivized dictator game do not differ across all groups, the average amounts spent on real-world charities among those who donated are higher among respondents whose place of residence was affected but whose household did not sustain any damage (two-sided t-test for (1) vs. (3): diff. = 123.79 Eur, p-value = 0.010), while donations are lower among respondents who experienced damage (two-sided t-test for (1) vs. (4): diff. = -40.36 Eur, p-value = 0.567; for (3) vs. (4): diff. = -164.15 Eur, p-value = 0.069, see Supplementary Information Table F.3).

When comparing individuals who received some form of aid to those who did not, the sample size becomes even smaller, and differences rarely reach statistical significance. However, those who received aid tend to report higher scores in self-assessed positive reciprocity and altruism. Recipients of aid also show higher probabilities of engaging in volunteer work. Regarding involvement in regular volunteer work, there seems to be a general positive association with self-reported exposure to the flood.

5 Discussion

Exploring the relationship between experiencing natural disasters and environmental attitudes and behaviors has produced mixed results in the literature (Howe et al., 2019). Our study contributes to the ongoing debate by investigating the impact of the July 2021 flood disaster in Germany. Using three distinct nationwide and representative survey data sets, we assessed a wide range of individual-level indicators on environmental attitudes, environment-related behaviors, and support for climate policies. Despite the comprehensiveness of our approach, we found no significant effects on any of our selected outcome measures.

When comparing our results to existing studies, some differences emerge. Research on previous disasters has identified links between exposure and risk perceptions (Frondel et al., 2017), increased belief in climate change (Osberghaus & Fugger, 2022) and stronger pro-environmental attitudes (Bulut & Samuel, 2024). However, our findings contrast those and instead align better with recent studies focusing on the same 2021 flood event in Germany. Studies investigating Green Party support in flood-affected regions during the 2021 federal elections observed only marginal increases, which dissipated within weeks (Garside & Zhai, 2022; Hilbig & Riaz, 2024). Our results, reflecting medium- to long-term effects collected months to a year after the event, similarly indicate no lasting impacts.

A critical factor identified in the literature is whether exposure includes proximity to the disaster or personal damage (Frondel et al., 2017; Holub & Schündeln, 2023; Osberghaus & Demski, 2019). In our study, alternative specifications accounting for varying severity of exposure – including proximity to the event and personal damage – yielded no significant effects. It has been argued that the intensive media coverage of the flood may have diluted potential localized effects, influencing attitudes across the entire country rather than solely among those in exposed areas (Hilbig & Riaz, 2024; Sisco, 2021). However, our panel data analyses show no general, nationwide increases in environmental attitudes from pre- to post-flood periods (Supplementary Materials D.1 and D.2)

In the second part of this study, we analyzed the flood's impact on prosociality – an area often studied in the context of emerging economies where informal social networks play a critical role in disaster response. This is, to the best of our knowledge, the first study to explore how the 2021 flood's effects on prosociality in Germany, reflecting an industrialized country setting. Despite analyzing several markers, including an incentivized donation experiment, we only found limited effects of flood exposure on prosocial outcomes.

Importantly, only with self-reported affectedness as the explanatory variable, some notable variation emerged. Affected respondents reported lower scores in positive reciprocity and higher scores in negative reciprocity as well as in altruism. These patterns suggest that affected individuals prioritize punitive responses to perceived negative behavior over affirming positive behavior. This tendency could reflect efforts to regain a sense of control or to address frustrations linked to their experiences. At the same time, increased altruism may reflect heightened empathy and solidarity driven shared sense of suffering.

Consistent with the findings on altruism, affected individuals reported higher levels of past real-world donations than non-exposed respondents, but only so when they have not also sustained personal damage to their household by the flood. Drawing on the potential mechanisms presented in section 1, this suggests that proximity to the disaster – potentially including witnessing spatially and socially close others suffer – can increase empathy, thereby motivating prosocial behaviors (Vardy & Atkinson, 2019). In contrast, we observed lower past real-world donations among respondents who stated to have sustained damage from the flood, even when compared to non-affected respondents. Individuals who experienced personal damage are likely preoccupied with coping, reconstructions efforts and meeting their own financial needs to recover from the flood (Osberghaus & Demski, 2019). It seems intuitive that victims of disasters do not necessarily prioritize donating to their fellow victims, while those living in exposed areas but have not suffered any damage are more likely to have the resources and time to engage in prosocial activities.

A closer differentiation among participants who suffered personal damage revealed differences between those who had received any form of external aid and those who had not. Respondents who received aid exhibited elevated scores for certain markers of prosociality, including positive reciprocity, compared to those who suffered damage but did not receive any aid. These findings align with existing literature and the mechanisms previously identified (Andrabi & Das, 2017; Becchetti et al., 2017; Cassar et al., 2017; Rahman et al., 2020). We further found that self-reported exposure went along with a somewhat higher probability of doing volunteer work, but it did not seem to depend on whether the household had sustained personal damage or received external aid. Overall, many of the discussed differences turned out as statistically significant despite the focus on small subsamples for this part of the analysis.

6 Conclusion

Anticipating progressing climate change and an increase in the prevalence of natural disasters, it seems essential to study how people react to experiencing climate change impacts, such as flood disasters, not only in the direct aftermath but also beyond, that is, months and years after the event. Will increases in frequency, scale as well as intensity of disasters lead people to change their behavior towards more sustainable lifestyles and practices that contribute to mitigating the causes for climate change? Drawing on results from the three nationwide data sets, which were collected between 4 and 12 months after the 2021 flood in Germany, we found no evidence for changes in individual attitudes or behaviors regarding environment or climate change. This suggests that even the first-hand experience of natural disasters does not automatically drive individuals to take greater action against global warming. This apparent lack or deficiency of voluntary mitigation efforts may highlight the need for policy interventions that regulate harmful behaviors or incentivize sustainable ones. However, the feasibility and effectiveness of such policies depends to a large extent also on their public acceptance. We have, therefore, in our analysis additionally examined the support for a set of climate-related policy measures. Similar to environmental attitudes and behaviors, though, we could not find any increases in support for such measures among residents of regions exposed to the flood. Notably, environmental attitudes in our sample were already high, often in the upper quartiles of our scales of measurement. Apparently, though, these attitudes do not translate well into pro-environmental behaviors and support for climate policies, as there is, according to our data and type of measurement, still significant potential for improvement.

These findings suggest that we cannot assume increased proximity to natural disasters to inherently lead to greater awareness and climate action. Future research should explore how different ways of processing and coping with natural disaster shape individual responses, such as in environmental awareness and action. Key areas of exploration include the role of media framings, the attribution of disasters to climate change and the influence of motivated reasoning – a process in which individuals interpret information in ways that align with their existing beliefs. These factors could provide valuable insights into the drivers and barriers to environmental engagement.

Regarding prosociality, we observed no meaningful differences when comparing by disaster exposure on the municipality level. However, more detailed analyses revealed that those reporting to live in affected places without damage tended to donate more, whereas those who suffered damage donated less. This underscores the importance of distinguishing between the mere proximity to a disaster and experiencing personal damage. It seems intuitive that those who are

closer to the disaster, both spatially and socially, are more motivated to help than more distant ones, while those whose households were personally affected are focused on their own recovery.

The flood's impact on prosociality appears most evident in real-world behaviors, such as monetary donations and volunteering. Given our data, we cannot determine whether these effects reflect actions tied to the particular flood event, namely donating money to flood victims and volunteering in clean up and reconstruction, or if it extends to more general prosocial behaviors unrelated to the disaster. In contrast, measures capturing broader and context-independent prosociality, i.e., self-reported hypothetical prosociality and incentivized donations in the dictator game, measured several months after the floods, showed little or less clear influence by the flood. Future research should distinguish between event-related and general prosociality in addition to considering the differing effects of witnessing a disaster due to spatial proximity versus experiencing personal damage.

❖

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Supplementary Information for

Natural Disaster Experience Does Not Affect Environmental Attitudes or Prosociality – Evidence from the 2021 Flood in Germany

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Supplements

A.1 Respondents' socioeconomic characteristics aacross data sets and flood exposure

	data set 1 (*Climate-Mobility Panel*)		**data set 2 (*Socio-Ecological Panel*)**		**data set 3 (*NEWCOMERS*)**		**German general population**
	Not exposed	Exposed	Not exposed	Exposed	Not exposed	Exposed	taken from *Mikrozensus* values of December 2021
	n = 5,135 (81.70 %)	n = 1,150 (18.30 %)	n = 4,843 (80.68 %)	n = 1,160 (19.32 %)	n = 1,179 (80.42 %)	n = 287 (19.58 %)	
Gender							*C: 12411-0005*
Female	46.10 %	47.13 %	43.80 %	41.21 %	49.02 %	49.13 %	50.66 %
Male	53.90 %	52.87 %	56.08 %	58.53 %	50.98 %	50.87 %	49.34 %
Non-binary	0.00 %	0.00 %	0.12 %	0.26 %	0.00 %	0.00 %	0.00 %
Age Category							*C: 12411-0005*
18-29 Years	5.96 %	5.22 %	3.49 %	2.93 %	18.32 %	11.15 %	15.84 %
30-39 Years	12.13 %	10.70 %	10.57 %	8.97 %	19.25 %	17.42 %	15.70 %
40-49 Years	15.38 %	14.52 %	14.37 %	12.41 %	17.98 %	18.12 %	14.41 %
50-59 Years	22.98 %	22.96 %	22.28 %	23.36 %	24.94 %	33.80 %	18.84 %
60+ Years	43.54 %	46.61 %	49.29 %	52.33 %	19.51 %	19.51 %	35.22 %
Income Category							*C: 12211-0300*
No response	11.35 %	10.87 %	10.26 %	10.69 %	0.00 %	0.00 %	0.63%
Low	4.48 %	3.13 %	5.18 %	5.17 %	13.49 %	13.94 %	15.66%
Medium	26.66 %	31.30 %	26.31 %	28.53 %	36.05 %	36.59 %	32.89%
High	29.19 %	29.30 %	29.96 %	28.10 %	36.56 %	34.84 %	26.03%
Very high	28.32 %	25.39 %	28.29 %	27.50 %	13.91 %	14.63 %	24.79%
High Education							*C: 12211-0101*
No response	2.63 %	2.61 %	2.31 %	2.16 %			0.16%
Yes	27.09 %	23.57 %	38.70 %	35.17 %	24.00 %	17.42 %	19.48%
No	70.28 %	73.83 %	58.99 %	62.67 %	76.00 %	82.58 %	80.36%
Household Size							*C: 12211-0300*
No response	0.47 %	0.26 %	0.47 %	0.43 %	0.00 %	0.00 %	0.00 %
1	25.67 %	25.91 %	26.72 %	27.50 %	22.82 %	21.60 %	41.68%
2	46.56 %	46.26 %	49.33 %	50.09 %	44.78 %	44.25 %	33.47%
3	13.55 %	12.43 %	11.67 %	11.55 %	17.39 %	20.56 %	11.83%
4+	13.75 %	15.13 %	11.81 %	10.43 %	15.01 %	13.59 %	13.02%
East Germany							*C: 12211-1001*
Yes	21.17 %	7.30 %	23.83 %	14.31 %	23.41 %	8.71 %	19.36 %
No	78.83 %	92.70 %	76.17 %	85.69 %	76.59 %	91.29 %	80.64 %

Note: Maximum age in data set 3 was 69, consequently, the last age category is smaller compared to other data sets and thus, the shares of the other age categories are bigger, monthly net household income: low income = less than 1,200 EUR, medium income = less than 2,700 EUR, high income = less than 4,200 EUR, very high income = more than 4,200 EUR, the income categories for data set 3 are slightly higher (50 EUR for each category), monthly net household income for the German population: low income = less than 1,250 EUR, medium income = less than 2,500 EUR, high income = less than 4,000 EUR, very high income = more than 4,000 EUR. C = Code for variable in micro census.

B.1 Power analysis for environmental attitudes

Dependent Variables	Response options	Given sample size	Standard deviation / proportion in given sample	MDE for given std. dev.
data set 1		**5,135 / 1,150**		
Impact of climate change	Five-point scale	4,966 / 1,110	0.704	0.058
data set 2		**4,842 / 1,160**		
Existence of climate change[C]	Yes/No	4,781 / 1,146	0.927	0.021
Climate change manmade[C]	Yes/No	4,764 / 1,141	0.881	0.027
Dangers of climate change	Four-point scale	4,427 / 1,056	0.667	0.057
Importance of climate policy	Four-point scale	4,823 / 1,153	0.735	0.060
Relative importance[C]	Yes/No	4,843 / 1,160	0.444	0.040
data set 3		**1,179 / 287**		
Seriousness of climate change	Ten-point scale	1,179 / 287	2.410	0.393
Importance of protecting the environment	Four-point scale	1,179 / 287	0.663	0.108

MDEs are calculated for significance levels of 10% (alpha = 0.1) and 80% power (1-beta = 0.80).
C = variable is dichotomous

B.2 Power analysis for environmental behavior

Dependent Variables	Response options	Given sample size	Standard deviation / proportion in given sample	MDE for given std. dev.
data set 1		**5,135 / 1,150**		
Environmentally friendly behavior	Five-point scale	5,082 / 1,140	0.779	0.063
Green Party preference[C]	Yes/No	4,819 / 1,080	0.184	0.032
data set 2		**4,842 / 1,160**		
Green Party preference[C]	Yes/No	4,639 / 1,123	0.234	0.035
data set 3		**1,179 / 287**		
Conserving energy at home	Five-point scale	1,179 / 287	0.840	0.137
Donation to atmosfair	Value between 0 and 100	1,179 / 287	30.837	5.047

MDEs are calculated for significance levels of 10% ($\alpha = 0.10$) and 80% power ($1-\beta= 0.80$).
C = variable is dichotomous

B.3 Power analysis for support for climate policies

Dependent Variables	Response options	Given sample size	Standard deviation / proportion in given sample	MDE for given std. dev.
data set 1		**5,135 / 1,150**		
Increase in carbon pricing	Five-point scale	3,958 / 923	1.313	0.119
No new vehicles with combustion engines after 2035	Five-point scale	4,990 / 1,129	1.382	0.113
data set 2		**4,842 / 1,160**		
No new vehicles with combustion engines after 2030	Five-point scale	4,755 / 1,144	1.462	0.120
Constant increase in tax on petrol and diesel	Five-point scale	4,715 / 1,132	1.284	0.106
Speed limit of 130km/h on highways	Five-point scale	4,817 / 1,154	1.551	0.126
data set 3		**1,179 / 287**		
Coal phase-out	Ten-point scale	1,179 / 287	1.155	0.189
Expansion of electric vehicles	Five-point scale	1,179 / 287	1.283	0.210
Expansion of public transport	Five-point scale	1,179 / 287	0.927	0.152

MDEs are calculated for significance levels of 10% ($\alpha = 0.10$) and 80% power ($1-\beta = 0.80$).
C = variable is dichotomous

B.4 Power analysis for prosociality

Dependent Variables	Response options	Given sample size	Standard deviation / proportion in given sample	MDE for given std. dev.
data set 1		**5,135 / 1,150**		
Positive reciprocity	Eleven-point scale	5,027 / 1,128	1.721	0.141
Negative reciprocity	Eleven-point scale	4,982 / 1,117	2.444	0.201
Trust	Eleven-point scale	4,967 / 1,118	2.338	0.192
Altruism	Eleven-point scale	5,008 / 1,123	2.491	0.204
Dictator game donations	Tokens 0 - 10	3,669 / 869	1.472	0.138
Past donation[C]	Yes/No	4,961 / 1,129	0.805	0.033
Past donations (amount)	Values ≥ 0	4,411 / 980	540.339	47.446
Volunteer work[C]	Yes/No	5,044 / 1,130	0.426	0.040

MDEs are calculated for significance levels of 10% ($\alpha = 0.10$) and 80% power ($1-\beta = 0.80$).
C = variable is dichotomous

C.1 Regression analyses for environmental attitudes

	Dependent variables							
	(1) Impact of climate change	(2) Existence of climate change (d)	(3) Climate change manmade (d)	(4) Dangers of climate change	(5) Importance of climate policy	(6) Relative importance (d)	(7) Seriousness of climate change	(8) Importance of protecting the environment
data set	1	2	2	2	2	2	3	3
Exposed to the flood (d)	-0.024	-0.006	-0.018	-0.022	-0.054**	-0.026	-0.281*	-0.070
	(0.341)	(0.525)	(0.123)	(0.361)	(0.037)	(0.131)	(0.085)	(0.100)
Female (d)	0.095***	-0.028***	0.010	0.103***	0.165***	0.037***	0.352***	0.006
	(<0.001)	(0.263)	(<0.001)	(<0.001)	(<0.001)	(0.007)	(0.008)	(0.859)
Age category								
30-39 years	-0.136***	-0.039**	-0.037	-0.094*	-0.067	-0.122***	-0.027	0.053
	(0.006)	(0.031)	(0.110)	(0.055)	(0.257)	(0.004)	(0.890)	(0.364)
40-49 years	-0.219***	-0.015	-0.030	-0.162***	-0.062	-0.195***	-0.149	0.048
	(<0.001)	(0.406)	(0.198)	(0.001)	(0.307)	(<0.001)	(0.485)	(0.425)
50-59 years	-0.205***	-0.038**	-0.056***	-0.193***	-0.069	-0.179***	0.069	0.089
	(<0.001)	(0.022)	(0.009)	(<0.001)	(0.217)	(<0.001)	(0.724)	(0.118)
60+ years	-0.315***	-0.018	-0.032	-0.160***	0.011	-0.145***	0.040	0.078
	(<0.001)	(0.233)	(0.106)	(<0.001)	(0.841)	(<0.001)	(0.854)	(0.205)
Income category								
Medium	-0.032	0.040**	0.049**	-0.038	0.058	0.049	-0.353*	-0.102*
	(0.564)	(0.044)	(0.036)	(0.392)	(0.274)	(0.107)	(0.088)	(0.097)
High	-0.037	0.030	0.045*	0.001	0.094*	0.046	-0.212	-0.08
	(0.524)	(0.155)	(0.066)	(0.976)	(0.089)	(0.150)	(0.329)	(0.200)
Very high	-0.015	0.061***	0.079***	0.027	0.154***	0.073**	-0.181	-0.124
	(0.804)	(0.004)	(0.002)	(0.582)	(0.007)	(0.029)	(0.495)	(0.106)
High education (d)	0.089***	0.052***	0.061***	0.066***	0.164***	0.125***	0.439***	0.146***
	(<0.001)	(<0.001)	(<0.001)	(0.001)	(<0.001)	(<0.001)	(0.005)	(0.001)
Household size								
2	0.001	-0.016*	-0.031***	-0.048*	-0.095***	-0.059***	0.032	0.058
	(0.964)	(0.092)	(0.007)	(0.052)	(<0.001)	(0.001)	(0.861)	(0.243)
3	-0.012	-0.030**	-0.056***	-0.101***	-0.116***	-0.078***	0.040	0.079
	(0.739)	(0.028)	(0.001)	(0.010)	(0.004)	(0.003)	(0.854)	(0.196)
4+	0.042	-0.031**	-0.054***	-0.091**	-0.164***	-0.048*	0.293	0.141**
	(0.261)	(0.031)	(0.003)	(0.021)	(<0.001)	(0.089)	(0.197)	(0.020)
East Germany (d)	-0.070***	<0.001	-0.024**	-0.120***	-0.203***	-0.104***	-0.330**	-0.012
	(0.005)	(0.974)	(0.032)	(<0.001)	(<0.001)	(<0.001)	(0.039)	(0.779)
Constant	4.006***	0.922***	0.878***	3.782***	3.602***	0.560***	7.434***	3.189***
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
R-squared	0.028	0.022	0.019	0.021	0.046	0.034	0.019	0.015
Observations	5,309	5,217	5,198	4,850	5,257	5,272	1,466	1,466

(d) denotes dichotomous variables. p-values in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p <0.01

C.2 Regression analyses for environmental behavior

	Dependent variables				
	(1)	(2)	(3)	(4)	(5)
	Environmentally friendly behavior	Green Party Preference (d)	Green Party Preference (d)	Conserving energy at home	Donation to atmosfair
data set	1	1	2	3	3
Exposed to the flood (d)	-0.012	-0.012	-0.022	0.024	-1.499
	(0.657)	(0.361)	(0.125)	(0.664)	(0.476)
Female (d)	0.101***	0.091***	0.082***	0.054	2.724
	(<0.001)	(<0.001)	(<0.001)	(0.237)	(0.108)
Age category					
30-39 years	-0.056	-0.062**	-0.076*	0.154**	-1.757
	(0.339)	(0.041)	(0.072)	(0.044)	(0.492)
40-49 years	-0.100*	-0.072**	-0.136***	0.261***	0.324
	(0.078)	(0.016)	(0.001)	(<0.001)	(0.903)
50-59 years	-0.055	-0.065**	-0.158***	0.298***	2.135
	(0.313)	(0.023)	(<0.001)	(<0.001)	(0.400)
60+ years	0.097*	-0.107***	-0.186***	0.271***	5.786**
	(0.061)	(<0.001)	(<0.001)	(0.001)	(0.041)
Income category					
Medium	0.007	-0.028	0.002	0.078	-0.627
	(0.914)	(0.299)	(0.945)	(0.320)	(0.814)
High	0.063	-0.013	0.005	0.145*	4.828*
	(0.340)	(0.653)	(0.870)	(0.076)	(0.088)
Very high	0.102	0.002	0.012	0.124	6.870**
	(0.142)	(0.954)	(0.683)	(0.210)	(0.040)
High education (d)	0.161***	0.149***	0.113***	0.140***	6.662***
	(<0.001)	(<0.001)	(<0.001)	(0.010)	(0.001)
Household size					
2	-0.002	-0.013	-0.017	-0.119*	-2.256
	(0.947)	(0.383)	(0.269)	(0.059)	(0.337)
3	-0.022	-0.022	-0.028	-0.172**	-3.423
	(0.601)	(0.259)	(0.215)	(0.028)	(0.221)
4+	0.038	0.007	-0.012	-0.041	-6.535**
	(0.389)	(0.726)	(0.616)	(0.600)	(0.021)
East Germany (d)	-0.108***	-0.079***	-0.108***	-0.043	-2.253
	(<0.001)	(<0.001)	(<0.001)	(0.460)	(0.272)
Constant	3.205***	0.226***	0.350***	3.739***	34.990***
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
R-squared	0.026	0.058	0.051	0.027	0.029
Observations	5,426	5,245	5,119	1,466	1,466

(d) denotes dichotomous variables. p-values in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p <0.01

C.3 Regression analyses for support for climate policies

	Dependent variables							
	(1) Increase in carbon pricing	(2) Ban on combustion car 2035	(3) Ban on combustion cars 2030	(4) Constant increase in fuel tax	(5) Speed limit of 130km/h	(6) Coal phase-out	(7) Expansion of electric vehicles	(8) Expansion of public transport
data set	1	1	2	2	2	3	3	3
Exposed to the flood (d)	-0.055	-0.061	-0.055	-0.053	-0.056	-0.130*	-0.021	-0.118*
	(0.270)	(0.201)	(0.267)	(0.231)	-0.293	(0.086)	(0.810)	(0.064)
Female (d)	0.207***	0.138***	0.187***	0.027	0.442***	-0.133**	-0.104	-0.011
	(<0.001)	(<0.001)	(<0.001)	(0.453)	(<0.001)	(0.037)	(0.140)	(0.835)
Age category								
30-39 years	-0.340***	-0.249**	-0.238*	-0.338**	0.052	-0.161	-0.022	-0.044
	(0.001)	(0.014)	(0.080)	(0.010)	-0.717	(0.104)	(0.842)	(0.599)
40-49 years	-0.425***	-0.407***	-0.487***	-0.417***	0.086	-0.245**	-0.302***	-0.032
	(<0.001)	(<0.001)	(<0.001)	(0.001)	-0.543	(0.018)	(0.008)	(0.700)
50-59 years	-0.412***	-0.442***	-0.544***	-0.540***	0.191	-0.236**	-0.371***	0.046
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	-0.149	(0.014)	(0.001)	(0.565)
60+ years	-0.286***	-0.211**	-0.373***	-0.431***	0.582***	-0.307***	-0.439***	0.045
	(0.002)	(0.019)	(0.002)	(<0.001)	(<0.001)	(0.004)	(<0.001)	(0.599)
Income category								
Medium	-0.195*	-0.215**	-0.203**	-0.183**	-0.129	-0.179*	-0.105	-0.115
	(0.068)	(0.031)	(0.042)	(0.043)	-0.178	(0.074)	(0.331)	(0.137)
High	-0.151	-0.232**	-0.272***	-0.114	-0.271***	-0.098	-0.062	-0.033
	(0.176)	(0.026)	(0.009)	(0.224)	-0.008	(0.346)	(0.587)	(0.684)
Very high	-0.045	-0.235**	-0.186*	-0.082	-0.373***	-0.083	0.049	0.048
	(0.699)	(0.031)	(0.086)	(0.406)	-0.001	(0.517)	(0.726)	(0.626)
High education (d)	0.563***	0.449***	0.432***	0.394***	0.356***	0.335***	0.342***	0.106*
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.083)
Household size								
2	-0.169***	-0.149***	-0.169***	-0.164***	0.118**	-0.060	-0.066	-0.128*
	(0.002)	(0.004)	(0.002)	(0.001)	-0.035	(0.490)	(0.486)	(0.066)
3	-0.216***	-0.216***	-0.184**	-0.164**	0.076	-0.114	-0.204*	-0.229***
	(0.004)	(0.003)	(0.018)	(0.018)	-0.375	(0.271)	(0.076)	(0.005)
4+	-0.046	-0.162**	-0.184**	-0.104	0.155*	-0.164	-0.228*	-0.286***
	(0.564)	(0.034)	(0.028)	(0.169)	-0.087	(0.138)	(0.056)	(0.001)
East Germany (d)	-0.277***	-0.182***	-0.203***	-0.159***	-0.213***	-0.295***	-0.021	-0.010
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.804)	(0.881)
Constant	3.249***	3.144***	3.183***	2.755***	3.340***	4.127***	3.584***	4.249***
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
R-squared	0.063	0.039	0.041	0.038	0.054	0.038	0.039	0.022
Observations	4,268	5,337	5,197	5,150	5,255	1,466	1,466	1,466

(d) denotes dichotomous variables. p-values in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p <0.01

C.4 Regression analyses for prosociality

	Dependent variables							
	(1) Positive reciprocity	(2) Negative reciprocity	(3) Trust	(4) Altruism	(5) Dictator game donation	(6) Past donations (d)	(7) Past donations (amount)	(8) Volunteer work (d)
data set	1	1	1	1	1	1	1	1
Exposed to the flood (d)	0.087	0.020	-0.015	0.125	0.049	0.006	15.545	-0.013
	(0.125)	(0.816)	(0.853)	(0.140)	(0.425)	(0.636)	(0.416)	(0.464)
Female (d)	0.011	-0.776***	0.436***	0.715***	0.063	0.067***	12.849	-0.051***
	(0.817)	(<0.001)	(<0.001)	(<0.001)	(0.172)	(<0.001)	(0.381)	(<0.001)
Age category								
30-39 years	-0.036	0.028	-0.088	-0.147	0.031	-0.038	25.310	-0.044
	(0.725)	(0.860)	(0.608)	(0.384)	(0.752)	(0.221)	(0.336)	(0.196)
40-49 years	-0.028	0.042	0.101	0.220	0.164*	0.036	129.277***	0.007
	(0.786)	(0.786)	(0.543)	(0.178)	(0.094)	(0.234)	(<0.001)	(0.822)
50-59 years	0.035	-0.124	0.399**	0.365**	0.287***	0.062**	148.136***	0.035
	(0.714)	(0.406)	(0.013)	(0.021)	(0.002)	(0.028)	(<0.001)	(0.267)
60+ years	-0.124	-0.049	0.548***	1.044***	0.442***	0.143***	295.436***	0.128***
	(0.175)	(0.727)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
Income category								
Medium	-0.019	-0.078	0.160	0.655***	0.214*	0.178***	124.789***	0.019
	(0.881)	(0.662)	(0.352)	(<0.001)	(0.089)	(<0.001)	(<0.001)	(0.552)
High	-0.031	-0.144	0.189	0.977***	0.236*	0.244***	245.835***	0.046
	(0.818)	(0.443)	(0.289)	(<0.001)	(0.079)	(<0.001)	(<0.001)	(0.183)
Very high	-0.039	0.091	0.155	1.382***	0.309**	0.274***	364.361***	0.065*
	(0.783)	(0.644)	(0.404)	(<0.001)	(0.028)	(<0.001)	(<0.001)	(0.070)
High education (d)	0.009	-0.164**	0.185**	0.368***	-0.115**	0.083***	158.175***	0.089***
	(0.869)	(0.036)	(0.015)	(<0.001)	(0.036)	(<0.001)	(<0.001)	(<0.001)
Household size								
2	0.028	0.037	0.126	-0.258***	-0.005	-0.023	-59.430***	0.011
	(0.668)	(0.690)	(0.154)	(0.005)	(0.941)	(0.112)	(0.006)	(0.564)
3	0.103	0.189	0.159	-0.451***	-0.055	-0.018	-119.165***	0.061**
	(0.217)	(0.137)	(0.186)	(<0.001)	(0.550)	(0.370)	(<0.001)	(0.015)
4+	0.013	-0.080	0.335***	-0.339***	0.074	-0.003	-75.063**	0.117***
	(0.888)	(0.536)	(0.009)	(0.010)	(0.427)	(0.884)	(0.013)	(<0.001)
East Germany (d)	0.041	0.037	-0.091	-0.318***	-0.006	-0.074***	-97.359***	-0.075***
	(0.486)	(0.672)	(0.280)	(<0.001)	(0.927)	(<0.001)	(<0.001)	(<0.001)
Constant	9.418***	4.002***	5.423***	6.289***	4.635***	0.484***	-85.494***	0.314***
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(0.002)	(<0.001)
R-squared	0.002	0.029	0.019	0.073	0.016	0.063	0.088	0.029
Observations	5,396	5,366	5,355	5,381	4,025	5,335	4,851	5,412

(d) denotes dichotomous variables. p-values in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p <0.01

D.1 Differences-in-differences for data set 1 (RWI Climate-Mobility Panel): June 2019 and March/April 2022

data set 1	2019		2022		Time Trend		DiD
	Not exposed	Exposed	Not exposed	Exposed	Not exposed	Exposed	Estimate
Perceived impact of climate change	3.831 (0.678) [2,293]	3.780 (0.693) [514]	3.785 (0.674) [2,293]	3.753 (0.678) [514]	-0.046*** (0.004) [2,293]	-0.027 (0.441) [514]	0.018 (0.620)
Green Party preference (d)	0.163 - [2,304]	0.150 - [525]	0.173 - [2,304]	0.156 - [525]	0.010* (0.087) [2,304]	0.006 (0.622) [525]	-0.005 (0.735)
Donation (d)	0.761 - [2,320]	0.762 - [534]	0.812 - [2,320]	0.830 - [534]	0.050*** (<0.001) [2,320]	0.067*** (<0.001) [534]	0.017 (0.361)

Standard deviation in round brackets for means, p-values in round brackets for time trend (within-subject differences) and DiD.
Number of observations in square brackets. Time trend tests for significance by paired t-tests or McNemar if variable is dichotomous. (d) denotes dichotomous variables. Significance levels: * p < 0.10, ** p < 0.05, *** p <0.01. DiD-estimate based on Fixed-effects estimation: the respective variable is regressed on the survey wave (dummy for 2022), on the treatment (dummy for being affected), as well as on the interaction of wave and treatment. The results equal a t-test across the time trends for each group.

D.2 Differences-in-differences for data set 2 (Socio-Ecological Panel): June 2021 and July/August 2022

data set 2	2021		2022		Time Trend		DiD
	Not exposed	Exposed	Not exposed	Exposed	Not exposed	Exposed	Estimate
Existence of climate change (d)	0.900 - [4,703]	0.904 - [1,129]	0.930 - [4,703]	0.923 - [1,129]	0.030*** (<0.001) [4,703]	0.019* (0.058) [1,129]	-0.012 (0.282)
Climate change manmade (d)	0.860 - [4,670]	0.849 - [1,119]	0.885 - [4,760]	0.867 - [1,119]	0.025*** (<0.001) [4,670]	0.018* (0.079) [1,119]	-0.007 (0.546)
Relative importance (d)	0.574 - [4,823]	0.566 - [1,153]	0.446 - [4,823]	0.435 - [1,153]	-0.128*** (<0.001) [4,823]	-0.131*** (<0.001) [1,153]	-0.003 (0.865)
Green Party preference (d)	0.212 - [4,527]	0.191 - [1,092]	0.240 - [4,527]	0.219 - [1,092]	0.028*** (<0.001) [4,527]	0.027*** (<0.001) [1,092]	<0.001 (0.989)

Standard deviation in round brackets for means, p-values in round brackets for time trend (within-subject differences) and DiD.
Number of observations in square brackets. Time trend tests for significance by paired t-tests or McNemar if variable is dichotomous. (d) denotes dichotomous variables. Significance levels: * p < 0.10, ** p < 0.05, *** p <0.01. DiD-estimate based on Fixed-effects estimation: the respective variable is regressed on the survey wave (dummy for 2022), on the treatment (dummy for being affected), as well as on the interaction of wave and treatment. The results equal a t-test across the time trends for each group.

E.1 Severe exposure and environmental attitudes

Survey	Question/Statement	Response option	Not exposed means (std. dev.) [n]	Severely exposed means (std. dev.) [n]	difference (p-value)
data set 1					
Impact of climate change	What do you think the consequences of climate change will be for your personal living conditions in the coming decades?	Five-point scale (very negative - very positive consequences)	3.791 (0.702) [5,881]	3.790 (0.754) [195]	-0.001 (0.977)
data set 2					
Existence of climate change	Based on everything you know; do you think the world's climate is changing or not?	Yes/No	0.928 - [5,742]	0.914 - [185]	-0.014 (0.458) C
Climate change manmade	Do you think climate change is mostly caused by humans (as opposed to mostly caused by natural factors)?	Yes/No	0.881 - [5,721]	0.8750 - [184]	-0.006 (0.800) C
Dangers of climate change	Do you think climate change is dangerous for humanity?	Four-point scale (certainly not - certainly)	3.605 (0.669) [5,314]	3.663 (0.596) [169]	-0.058 (0.268)
Importance of climate policy	Do you consider climate policy to be an important field in politics?	Four-point scale (not important - important)	3.660 (0.734) [5,789]	3.652 (0.756) [1,153]	-0.008 (0.889)
Relative importance	In your opinion, are the environment and climate change one of the most important issues Germany is currently facing?	Yes/No	0.444 - [5,815]	0.436 - [188]	-0.008 (0.831) C
data set 3					
Seriousness of climate change	How serious a problem do you think climate change is at this moment?	Ten-point scale (not at all a serious problem - an extremely serious problem)	7.414 (2.410) [1,412]	7.370 (2.436) [54]	-0.044 (0.895)
Importance of protecting the environment	How important is protecting the environment to you personally?	Four-point scale (not at all important - very important)	3.250 (0.665) [1,412]	3.111 (0.572) [54]	-0.139 (0.131)

For the calculation of means and proportions, “Do not know” and “Prefer not to say” responses were omitted.
Two-sided t-tests for metric and response-scale variables
C = Chi-squared test if variable is dichotomous
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

E.2 Severe exposure and environmental behavior

Survey	Question/Statement	Response options	Not exposed means (std. dev.) [n]	Severely exposed means (std. dev.) [n]	difference (p-value)
data set 1					
Environmentally friendly behavior	I behave in an environmentally conscious manner, even if this is associated with higher costs and/or efforts.	Five-point scale (strongly disagree - strongly agree)	3.329 (0.780) [6,022]	3.410 (0.731) [200]	-0.081 (0.149)
Green Party preference	If you lean towards a certain party, do you have a preference for the Green Party?	Yes/No	0.184 - [5,704]	0.179 - [195]	-0.005 (0.861) [C]
data set 2					
Green Party preference	If you lean towards a certain party, do you have a preference for the Green Party?	Yes/No	0.236 - [5,580]	0.192 - [182]	-0.043 (0.174) [C]
data set 3					
Conserving energy at home	How much do you agree or disagree with the following statements? “I take action to conserve energy at home”	Five-point scale (strongly disagree - strongly agree	4.008 (0.841) [1,412]	4.056 (0.811) [54]	-0.048 (0.682)
Donation to atmosfair	Donation Experiment: How much of 100 € would you like to donate to atmosfair?	Values between 0 and 100	38.620 (30.756) [1,412]	32.852 (32.686) [54]	-5.769 (0.177)

For the calculation of means and proportions, “Do not know” and “Prefer not to say” responses were omitted.
Two-sided t-tests for metric and response-scale variables
C = Chi-squared test if variable is dichotomous
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

E.3 Severe exposure and support of climate policies

Survey	Question/Statement	Response options	Not exposed	Severely exposed	difference (p-value)
			means (std. dev.) [n]		
data set 1					
Increase in carbon pricing	What is your stance on the following measure?	Five-point scale (strongly disagree – strongly agree)	2.837 (1.311) [4,714]	2.886 (1.364) [167]	-0.050 (0.632)
No new vehicles with combustion engines after 2035	What is your stance on the following measure?	Five-point scale (strongly disagree – strongly agree)	2.620 (1.382) [5,920]	2.653 (1.373) [199]	-0.034 (0.737)
data set 2					
No new vehicles with combustion engines after 2030[A]	Do you support the following measure?	Five-point scale (No – Yes)	2.592 (1.460) [5,713]	2.683 (1.507) [186]	-0.091 (0.418)
Constant increase in tax on petrol and diesel [A]	Do you support the following measure?	Five-point scale (No – Yes)	2.175 (1.283) [5,662]	2.216 (1.322) [185]	-0.041 (0.677)
Speed limit of 130km/h on highways [A]	Do you support the following measure?	Five-point scale (No – Yes)	3.771 (1.549) [5,783]	3.814 (1.610) [188]	-0.043 (0.718)
data set 3					
Coal phase-out	Please indicate what your opinion is on the following policy measure.	Ten-point scale (not at all a serious problem - an extremely serious problem)	3.682 (1.157) [1,412]	3.389 (1.071) [54]	-0.293* (0.067)
Expansion of electric vehicles	Please indicate what your opinion is on the following policy measure.	Five-point scale (strongly disagree – strongly agree)	3.212 (1.281) [1,412]	3.074 (1.344) [54]	-0.138 (0.439)
Expansion of public transport	Please indicate what your opinion is on the following policy measure.	Five-point scale (strongly disagree – strongly agree)	4.067 (0.925) [1,412]	3.944 (0.979) [54]	-0.12 (0.339)

For the calculation of means and proportions, "Do not know" and "Prefer not to say" responses were omitted.
Two-sided t-tests for metric and response-scale variables
A = The question was preceded by an introductory statement: "For the mobility transition there are some measures being discussed that aim to reduce car use and thereby emission of pollutants and carbon dioxide."
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

E.4 Severe exposure and prosociality

Survey	Question/Statement	Response options	Not exposed	Severely exposed	difference (p-value)
			means (std. dev.) [n]		
data set 1					
Positive reciprocity	Willingness to return a favor	Eleven-point scale	9.371 (1.722) [5,957]	9.303 (1.701) [198]	-0.068 (0.582)
Negative reciprocity	Willingness to take revenge	Eleven-point scale	3.576 (2.448) [5,902]	3.315 (2.293) [197]	-0.262 (0.139)
Trust	"People have only the best intentions"	Eleven-point scale	6.257 (2.344) [5,888]	6.137 (2.166) [1,118]	-0.120 (0.477)
Altruism	Willingness to give to good causes	Eleven-point scale	7.937 (2.491) [5,933]	8.202 (2.491) [198]	-0.265 (0.141)
Dictator game donation	Indicate how many tokens you would like to give to your unknown partner	Tokens between 0 and 10	5.165 (1.474) [4,382]	5.218 (1.420) [156]	-0.053 (0.657)
Past donations	Donation last year	Yes/No	0.804 - [5,890]	0.820 - [200]	-0.016 (0.577) C
Past donations (amount)	Donation amount	Values ≥ 0	313.747 (543.703) [5,218]	328.630 (427.616) [173]	-14.883 (0.722)
Volunteer work	Volunteering	Yes/No	0.424 - [5,975]	0.477 - [199]	-0.053 (0.136) C

For the calculation of means and proportions, "Do not know" and "Prefer not to say" responses were omitted.
Two-sided t-tests for metric and response-scale variables
C = Chi-squared test if variable is dichotomous
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

F.1 Self-reported degrees of affectedness on environmental variables

Affectedness	(1) **Not affected**	(2)	(3) **Affected**	(4)
		All	W/o damage	W/ damage
Self-reported exposure:	***no***	***yes***	*yes*	*yes*
Damage:			***no***	***yes***
ENV variable:				
Impact of Climate Change	3.791	3.824	3.860	3.746
	(0.702)	*(0.740)*	*(0.698)*	*(0.823)*
Env. friendly behavior	3.331	3.390	3.446	3.271
	(0.778)	*(0.820)*	*(0.740)*	*(0.962)*
Green Party preference (d)	0.185	0.180	0.171	0.197
	-	-	-	-
Increase in carbon pricing	2.838	2.881	2.931	2.783
	(1.314)	*(1.306)*	*(1.214)*	*(1.474)*
No new vehicles with combustion	2.622	2.634	2.667	2.565
engines after 2035	*(1.384)*	*(1.323)*	*(1.305)*	*(1.366)*
Observations	6,043	218	148	70

Means shown for metric and response-scale variables with standard deviations in parentheses, proportions shown for dichotomous variables denoted by (d). For comparisons, note that groups (3) and (4) are subgroups of group (2).

F.2 Tests for differences between self-reported degrees of affectedness on environmental variables

Testing for differences	(1) and (2) Not affected vs. Affected	(1) and (3) Not affected vs. Affected w/o damage	(1) and (4) Not affected vs. Affected w/ damage	(3) and (4) Affected w/o damage vs. Affected w/ damage
ENV variable:				
Impact of Climate Change	0.033	0.069	-0.044	-0.114
	(0.503)	*(0.243)*	*(0.607)*	*(0.300)*
Env. friendly behavior	0.059	0.115*	-0.059	-0.175
	(0.270)	*(0.075)*	*(0.528)*	*(0.143)*
Green Party preference	-0.005	-0.013	0.012	0.026
	(0.855)	*(0.691)*	*(0.797)*	*(0.656)*
Increase in carbon pricing	0.042	0.093	-0.055	-0.148
	(0.674)	*(0.451)*	*(0.748)*	*(0.479)*
No new vehicles with combustion	0.012	0.045	-0.057	-0.101
engines after 2035	*(0.898)*	*(0.699)*	*(0.735)*	*(0.600)*
Observations	*6,043 / 218*	*6,043 / 148*	*6,043 / 70*	*148 / 70*

Differences in means or proportions and p-values for test results in parentheses shown. Two-sided t-tests for metric and response-scale variables, Chi2-tests for dichotomous variables. p-values in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p <0.01

F.3 Tests for differences between self-reported degrees of affectedness on prosociality

Testing for differences	(1) and (2) Not affected vs. Affected	(1) and (3) Not affected vs. affected w/o damage	(1) and (4) Not affected vs. affected w/ damage	(3) and (4) Affected: W/o damage vs. W/ damage	(5) and (6) Damaged: No aid received vs. aid received
Prosociality variable:					
Positive reciprocity	-0.359***	-0.334**	-0.410**	-0.076	0.942*
	(0.003)	*(0.020)*	*(0.047)*	*(0.789)*	*(0.071)*
Negative reciprocity	0.383**	0.601	0.190	0.792***	-0.446
	(0.024)	*(0.113)*	*(0.351)*	*(0.007)*	*(0.514)*
Trust	-0.096	-0.019	-0.257	-0.238	-0.590
	(0.556)	*(0.924)*	*(0.365)*	*(0.478)*	*(0.310)*
Altruism	0.363**	0.531**	0.007	-0.524	0.900
	(0.036)	*(0.011)*	*(0.981)*	*(0.153)*	*(0.136)*
Dictator game	0.068	0.117	-0.034	-0.151	-0.100
	(0.556)	*(0.404)*	*(0.864)*	*(0.544)*	*(0.780)*
Past donations (d)	0.003	0.009	-0.011	-0.020	0.109
	(0.918)	*(0.784)*	*(0.827)*	*(0.734)*	*(0.271)*
Past donations (amount)	72.277*	123.792**	-40.357	-164.149*	-91.059
	(0.072)	*(0.010)*	*(0.567)*	*(0.069)*	*(0.471)*
Volunteer work (d)	0.069	0.080*	0.047	-0.033	0.186
	(0.044)	*(0.054)*	*(0.438)*	*(0.654)*	*(0.127)*
Observations	*6,043 / 218*	*6,043 / 148*	*6,043 / 70*	*148 / 70*	*30 / 40*

Differences in means or proportions and p-values for test results in parentheses shown. Two-sided t-tests for metric and response-scale variables, Chi2-tests for dichotomous variables. (d) denotes dichotomous variables. p-values in parentheses.
Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Q. Survey questions

Below, relevant survey questions on the dependent variables (environmental attitudes, environmental behaviors, support for climate policies) are shown. For data set 1, we also show questions on prosociality and the flood experience. Additional questions, such as for measuring individual socioeconomics characteristics as well as all questions in German language, are available upon request from the corresponding author.

Q.1 Survey questions from the interviews that were used to collect data set 1 (RWI Climate-Mobility Panel)

Q.1.1 Environmental attitudes

Impact of Climate Change (V2): *What do you think the consequences of climate change will be for your personal living conditions in the coming decades?* [Single choice]
( ) Very negative consequences
( ) Rather negative consequences
( ) Roughly equal positive and negative consequences
( ) Rather positive consequences
( ) Very positive consequences
( ) Do not know

Q.1.2 Environmental behavior

Environmentally friendly behavior (V3): *Please indicate to what degree you agree with the following statement. [1 - Strongly disagree, 2 - Disagree, 3 - Neither agree nor disagree, 4 - Agree, 5 - Strongly agree, Do not know / no response]*

(1) I behave in an environmentally conscious manner, even if this is associated with higher costs and/or efforts.

Green Party preference (S15): *Many people lean towards a particular political party for a long time, although they also vote for another party from time to time. What is it like for you? Do you - generally speaking - lean towards a particular party?* [Single choice]
( ) Yes
( ) No, I am not interested in politics
( ) No, because there is no party that appeals to me
( ) Do not know / no response

Green Party preference (S16): [Only asked if S15 = Yes] *And which party is it?* [Single choice]
( ) CDU / CSU
( ) SPD
( ) FDP
( ) Bündnis 90 / The Greens
( ) The Left Party
( ) AfD
( ) Pirate Party
( ) NPD
( ) Another party
( ) No response

Q.1.3 Support for climate policies

Increase in carbon pricing (G1): *What is your stance on the following measure? [1 - Strongly disagree, 2 - Tend to disagree, 3 - Neither agree nor disagree, 4 - Tend to agree, 5 - Strongly agree, Do not know / no response]*

(1) Increase in carbon pricing

No new vehicles with combustion engines after 2035 (C.3): *Various measures are currently being discussed in Germany. What is your stance on the following measure? [Random order of responses; 1 - Strongly disagree, 2 - Tend to disagree, 3 - Neither agree nor disagree, 4 - Tend to agree, 5 - Strongly agree, Do not know / no response]*

(1) Ban on new registrations of vehicles with combustion engines after 2035

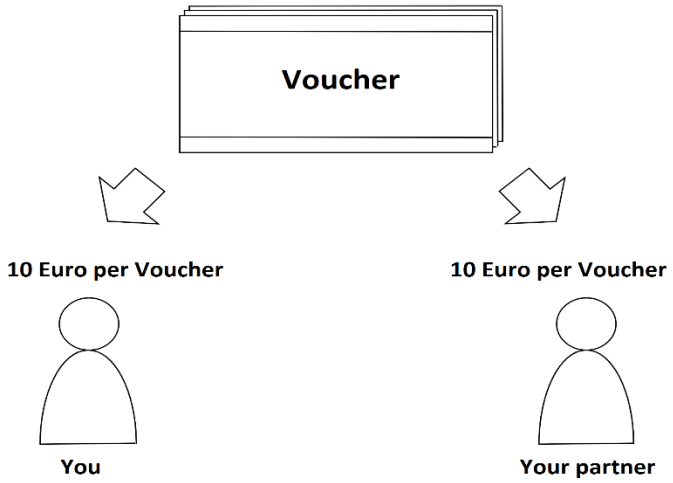
Q.1.4 Prosociality

Positive reciprocity / Negative reciprocity / Trust / Altruism: [Random order of responses] (The Quarterly Journal of Economics, Volume 133, Issue 4, November 2018, Pages 1645–1692, https://doi.org/10.1093/qje/qjy013) *How well does each of the following statements describe you as a person? Please use a scale from 0 to 10, with 0 meaning "does not describe me at all" and 10 "describes me perfectly". [Do not know / no response also possible].*

(1) When someone does me a favor, I am willing to return it.
(2) If I am treated very unjustly, I will take revenge at the first occasion, even if there is a cost to do so.
(3) I assume that people have only the best intentions.
(4) I am very willing to give to good causes without expecting anything in return.

Dictator Game donation (G.4 Fairness Experiment):
(Game loosely based on Andreoni and Vesterlund 2001):
The following section is about a game where you and other participants in this survey have the chance to win a Wunschgutschein (Info button: A Wunschgutschein can be redeemed at over 500 stores, including supermarkets, (online) clothing stores, (online) electronics retailers, and much more. More information can be found here: https://www.wunschgutschein.de/).
The voucher amount that you and other participants can receive depends on your decisions and those of the other participants.
You will make a total of six decisions. These decisions do not build on each other and are independent, so you do not need to think about what will come next when making your initial choices.
Specifically, we will provide you with virtual "tokens", each of which corresponds to a certain voucher amount. You will be randomly paired with another study participant, whom we will refer to as your "partner". You will be asked to divide the tokens between yourself and your partner. You and your partner will remain completely anonymous.
For five randomly selected participants, one of the following decisions will be randomly chosen and actually implemented. This means that you will receive a Wunschgutschein worth the tokens you kept for yourself, while your randomly assigned partner will receive a Wunschgutschein worth the tokens you allocated to them.
These vouchers will be sent via email by forsa after the survey is completed.

Game 1: Me – Other
Decision 1:
Prog: DO NOT RANDOMIZE
You have 10 tokens that you can divide between yourself and your assigned partner. Each token is worth 10 euros for both you and your partner. You can choose any distribution (in whole tokens).



Please indicate how many tokens you would like to give to your assigned partner:
Decision: _____ tokens (Limit: 0 to 10; no decimals allowed)
– Don't know / No response

Past donations (PS1): *We would now like to ask about donations. By donations, we mean giving money for social, religious, cultural, charitable, and nonprofit purposes without receiving direct compensation in return. This can include larger amounts as well as smaller ones, such as money put in a donation box. Church collections are also included. Did you donate money last year, that is, in 2021?* [Single choice]
( ) Yes
( ) No
( ) Don't know
( ) No response

Past donations (amount) (PS2): [If PS1 = Yes] *What was the total amount you donated last year? If you are unsure, please estimate.*
( ) _____ Euros [Open answer from 0 to 999,999,999]
( ) Don't know
( ) No response

Volunteer work (PS9): *Do you regularly engage in voluntary work (e.g., in a club, foundation, religious community, initiative, etc.)?* [Single choice]
( ) Yes
( ) No
( ) Don't know / No response

Q.1.5 Flood experience

Self-reported exposure (F1): *Was your place of residence affected by the flood disaster in July of 2021?* [Single choice]
( ) Yes
( ) No
( ) Do not know / no response

Damage to persons or property in household (F2): [Only asked if F1 = Yes] *Were you or your household directly affected by the flood?* [Multiple choice, except for No]
[ ] Yes, with personal injury (physical)
[ ] Yes, with personal injury (emotional/psychological)
[ ] Yes, with considerable material damage (e.g., to property, house, car, ...)
[ ] Yes, with minor material damage (e.g., to property, house, car, ...)
( ) No, none of the above
( ) Do not know / no response

Aid received during or after flood (F3): [Only asked if F2 = Yes (personal injury and/or material damage)] *Did you receive aid, e.g. with cleaning up, renovations, food, accommodation and/or financial assistance?*
[Multiple choice, random order of responses; only No and Do not know / no response always as last options]
[ ] Yes, from public authorities (fire department, German Red Cross, police, city, state, etc.)
[ ] Yes, from private entities (private companies, neighbors, friends and relatives, etc.)
[ ] Yes, from an insurance company
[ ] Yes, via other sources (donations, church, etc.)
( ) No, I did not need or accept any aid, although it was offered to me
( ) No, I was not offered any aid
( ) Do not know / no response

Q.2 Survey questions from the interviews that were used to collect data set 2 (Socio-Ecological Panel)

Q.2.1 Environmental attitudes

Existence of climate change (Klima1): *Based on everything you know; do you think the world's climate is changing or not?* [Single choice]
( ) Yes, I believe that the global climate is changing.
( ) No, I do not think that the global climate is changing.
( ) Do not know / no response

Climate change manmade (Klima2): [Only asked if Klima1 = Yes*] Do you think climate change is mostly caused by human activity (as opposed to mostly caused by natural factors)?* [Single choice]
( ) Mostly by humans
( ) Mostly by natural factors
( ) Both to the same extent
( ) Do not know / no response

Dangers of climate change (ExpB6): [Only asked if Klima1 = Yes] *Do you think climate change is dangerous for humanity?* [Single choice]
( ) No, certainly not
( ) I am unsure, but rather no
( ) I am unsure, but rather yes
( ) Yes, certainly
( ) Do not know / no response

Importance of climate policy (ExpB7): *Do you consider climate policy to be an important field in politics?* [Single choice]
( ) No, it is not important
( ) I am unsure, but rather no
( ) I am unsure, but rather yes
( ) Yes, it is important
( ) Do not know / no response

Relative importance (Klima3): *In your opinion, what are the two most important problems currently facing Germany?* [Multiple choice, random order of responses; up to two responses possible]
[ ] Economic situation
[ ] Immigration
[ ] Health
[ ] Environment and climate change
[ ] Unemployment
[ ] Rising prices/inflation/cost of living
[ ] Terrorism
[ ] Crime
[ ] Pensions
[ ] Taxes
[ ] Energy supply
[ ] International security situation
[ ] Other [Always as last option]
( ) Do not know / no response

Q.2.2 Environmental behavior

Green Party preference (SO7): *In Germany, many people tend to vote for a particular political party for a long time, although they also vote for another party from time to time. What is it like for you? Do you - generally speaking - lean towards a particular party? And if so, which one?* [Single choice]
( ) CDU / CSU
( ) SPD
( ) AfD
( ) FDP
( ) The Left Party
( ) Bündnis 90 / The Greens
( ) Another party
( ) No party
( ) Do not know / no response

Q.2.3 Support for climate policies

No new vehicles with combustion engines after 2030 / Constant increases in tax on petrol and diesel / Speed limit of 130km/h on highways (U12_1): *For the mobility transition, there are some measures being discussed that aim to reduce car use and thereby emission of pollutants and carbon dioxide. Do you support the following measures?*
[Random order of responses; 1 - No, 2 - More likely no, 3 - Neither, 4 - More likely yes, 5 - Yes, Do not know / no response]

(1) No new vehicles with combustion engines after 2030
(2) Constant increase in tax on petrol and diesel fuels, e.g., by 5 Cent per liter
(3) Speed limit of 130km/h on highways

Q.3 Survey questions from the interviews that were used to collect data set 3 (NEWCOMERS)

Q.3.1 Environmental attitudes

Seriousness of climate change (AB2): (European Commission – Eurobarometer 2020) *How serious a problem do you think climate change is at this moment? Please use a scale from 1 to 10, with 1 meaning it is "not at all a serious problem" and 10 meaning it is "an extremely serious problem".*

(1) Seriousness of climate change

Importance of protecting the environment (AB1): (European Commission – Eurobarometer 2020) *How important is protecting the environment to you personally?*
( ) Very important
( ) Fairly important
( ) Not very important
( ) Not at all important

Q.3.2 Environmental behavior

Conserving energy at home (AB4): *How much do you agree or disagree with the following statements? [1 - Strongly disagree, 2 - Disagree, 3 - Neither agree nor disagree, 4 - Agree, 5 - Strongly agree]*

(1) When home, I take actions to conserve energy.

Donation to atmosfair (DON. Experiment 3: Donation Experiment)

In the following, we give you the possibility to win 100 €. In addition, you have the option to donate part of this potential win.
Many people in developing countries have no access to electricity because their countries cannot afford to expand the expensive power grid. As a result, electricity is often supplied only to densely populated areas, while rural regions have no access.
Instead of electricity, people use for example firewood from the rainforests for cooking. The resulting decline in the forest has a negative impact on the global climate.
So-called Micro-Grids are intended to change this: Instead of waiting for rural regions to be connected to the central power grid, communities can use decentralized power grids. These consist, for example, of a solar panel for electricity generation, a battery for electricity storage and a system of transmission cables that gives all the inhabitants of a village access to the electricity generated. By establishing its own energy supply, the village thus becomes an autonomous "energy community".

Since financial resources are needed to build such Micro-Grids, organisations like the non-profit Atmosfair collect donations to support such projects (here you can find information about an example project in Madagascar: https://www.atmosfair.de/en/climate-protection-projects/solar-energy/madagascar-solar-powered-rural-electrification-program).
On the next screen you have a chance to support such projects by donating to Atmosfair., Every 100th respondent will win 100€, paid out in form of X mingle points. You can decide how much of this possible win should be donated to Atmosfair.
If you win, we will donate your chosen amount to Atmosfair and transfer mingle points worth the remaining amount to you.

Control (Shown randomly to 1/4 of the respondents): *Before you decide, please reflect on the scenario you read above and consider the role of Micro-Grids for electrification in developing countries.*

TREATMENT I (Shown randomly to 1/4 of the respondents): *Before you decide, please imagine a village without power supply. How will the availability of power supply through such a Micro-Grid change the lives of the people living there?*

TREATMENT II (Shown randomly to 1/4 of respondents): *Before you decide, please imagine living in a village without power supply. How will the availability of power supply through such a Micro-Grid change the lives of the people living there?*

TREATMENT III (Shown randomly to 1/4 of the respondents): *Before you decide, please imagine living in a village without power supply. How will the availability of power supply through such a Micro-Grid change your own life?*

Please, spend a few moments reflecting on this question. When you are ready to proceed, click "next". (measure time spent on this page)

How much of 100 € would you like to donate to Atmosfair? (Info: For every 100th person, we will donate the selected amount to Atmosfair— an NGO that carries out projects to electrify villages. If you are selected, the rest of the amount will be paid to you in form of mingle points. We guarantee you that your decision does not influence your chances to win.)
[_____] € [allow all numbers from 0 to 100]

The remaining amount is then [100 - donation*] €, which will be paid out to you in form of [Insert the mingle points equivalent of* [100 – donation] € here] *mingle points if you have been among the selected respondents.*

Note on treatment conditions for study analyzing the 2021 floods: Since all treatment conditions are roughly equally distributed across the sample as well as across the exposed and nonexposed subsamples (that is, about 25% each), we do not further consider in our study the treatment conditions implemented in the survey as they were part of another research.

Q.3.3 Support for climate policies

Coal phase-out / Expansion of electric vehicles / Expansion of public transport (AB6): *The energy transition might comprise a wide range of different policies. Please indicate what your opinion is on the following policy measures.*
[1 - Strongly disagree, 2 - Disagree, 3 - Neither agree nor disagree, 4 - Agree, 5 - Strongly agree]

- Coal phase-out
- Expansion of electric vehicles
- Expansion of public transport

I. Information on availability of analysis code and data

Analysis codes are available from the corresponding author. The data are not yet publicly available but will be made accessible by the FDZ Ruhr in the future.