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Citizen engagement in climate adaptation surveyed: Identifying challenges in education and capacity building

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Abstract

The accelerating impacts of climate change present significant challenges to sustainable urban development, testing the resilience of current governance frameworks and stakeholder responsibilities. In alignment with the EU's Green Deal, robust adaptation strategies and proactive climate risk anticipation are essential. Traditional discussions emphasize overcoming technological, financial and institutional barriers; however, social and individual factors also significantly hinder adaptation. This study explores the pivotal role of citizen engagement in climate risk management and adaptation, focusing on the Lithuanian context and comparing the results with a survey in Sweden. The research evaluates both external influences, such as experiences with climate-related hazards and adaptation actions, and internal factors, including beliefs, values and individual adaptive capacity. Key findings reveal that adaptation behaviour in Lithuania and in Sweden is deeply influenced by past experiences with extreme weather events and economic considerations, with a significant portion of the population having faced such events recently. Factors such as economic considerations (low costs, financial benefits) are identified as critical motivators for future adaptation actions in Lithuania. On the other hand, in Sweden, respondents first preferred ecological factors (such as contributing to climate change mitigation) when considering future adaptation

actions. The study underscores the need for targeted educational interventions to enhance community resilience, highlighting the importance of socio-cultural contexts in shaping adaptation strategies. It emphasizes the necessity for comprehensive, inclusive educational programmes that address local climate impacts and promote proactive community involvement. The findings advocate for further comparative studies across diverse socio-cultural settings to deepen insights into effective adaptation measures and to support the development of resilient communities worldwide.

KEYWORDS
climate adaptation strategies, climate-related hazards, motivation for climate adaptation, resilient communities, socio-cultural context

1 | INTRODUCTION

The escalating impacts of climate change pose a significant threat to sustainable urban development, challenging existing governance structures and stakeholder responsibilities in addressing climate variability and extremes. Achieving the objectives outlined in the EU's Green Deal necessitates the implementation of robust adaptation strategies, effective capacity building and proactive measures to anticipate climate risks. However, most discussions emphasize technological, financial and institutional barriers (Grothmann & Patt, 2005; O'Brien & Wolf, 2010; Yohe & Tol, 2002). It is presumed that once these external barriers are removed or overcome, society will be able to successfully adapt to a changing climate. (Adger et al., 2009). Adger et al. (2009) argue that social and individual characteristics may likewise act as deep-seated barriers to adaptation. Such perspectives raise important questions about the role that individual and societal values play in adapting to climate change. The imperative for distributed risk governance and citizen engagement is gaining recognition; however, empirical studies systematically evaluating citizen engagement in climate risk management and adaptation remain limited (Böhme et al., 2022; Kiss et al., 2022). Citizens bear legal responsibility for safeguarding their properties, and their actions before, during and after extreme events profoundly influence personal safety and public adaptation efforts. Recognizing this, there is a growing emphasis on citizen involvement to enhance the relevance, fairness and acceptance of public adaptation measures. Research has shown that citizen engagement can foster greater community resilience and responsiveness to climate challenges, ultimately contributing to more effective and equitable adaptation outcomes (Doyle, 2018; Göpfert et al., 2019; Hegger et al., 2022).

In this context, education emerges as a critical component in empowering citizens to actively participate in climate adaptation efforts. By enhancing citizens' understanding of climate change impacts and adaptation strategies, education can promote informed decision-making and proactive behaviour change leading to collective actions. This paper evaluates external aspects, such as climate-related hazard experiences, climate adaptation actions and internal aspects, such as motivational factors, participants' beliefs and values related to climate change and individual adaptive capacity, etc. The researchers provide insights about peculiarities that shape citizen's engagement in climate adaptation process in Lithuania. This research replicates the survey on citizens' engagement in climate adaptation implemented in Sweden (Brink & Wamsler, 2018). Understanding how citizens engage with climate adaptation efforts can provide valuable insights into the knowledge gaps and areas of interest among the general public. Following research questions were raised during the project implementation:

- What are the key factors driving citizen engagement in climate risk management and adaptation?
- How does citizen engagement in climate adaptation efforts vary across different demographic groups, and what implications does this have for designing targeted educational interventions to promote more inclusive and effective adaptation outcomes?
- How does the level of citizen engagement in climate adaptation efforts in Lithuania compare to that observed in Sweden?
- What are the strengths and weaknesses of citizen engagement in climate adaptation efforts in Lithuania, and how can these insights be used to refine and improve existing strategies for enhancing community resilience and responsiveness to climate challenges?

Overall, evaluating citizen engagement in climate adaptation can help ensure that education and training programmes are impactful, relevant and responsive to the needs of communities as they work to address the challenges of climate change. According to Adger et al. (2013), monitoring systems, as tools for supporting place-based adaptation, should be designed based on how communities are already adapting to climate change. Community-led and place-based approaches connected to science are critical for developing locally grounded understandings of how climate change affects human activities and how people choose to respond (Sawatzky et al., 2021).

The paper is structured in the following way: first, comprehensive theoretical review is presented by highlighting external and internal climate adaptation motivation factors. Second, the research methodology and sample size are described following the presentation of survey results. The final part of the paper is dedicated to discussion and conclusions.

2 | THEORETICAL REVIEW

The formulation of survey questions was grounded in established theories of climate change adaptation, risk assessment and environmental behaviour, according to Brink and Wamsler (2018). Hegger et al. (2022) emphasize the pivotal role of citizens in sustainability and climate change governance. Wamsler (2007) explores the complexities of managing urban disaster risk, emphasizing the need for adaptive governance structures and institutional learning processes. Her research underscores the importance of incorporating uncertainty and complexity into urban planning and decision-making to enhance disaster preparedness and response capabilities. Their findings likely stress the significance of inclusive decision-making processes, community involvement and participatory approaches to address climate challenges effectively. Climate adaptation refers to the process of adjusting to the changing climate conditions to minimize the negative impacts of climate change and capitalize on potential opportunities. In this research, climate adaptation is related to countering effects of such hazards and increasing citizens' adaptivity capacity (Botzen et al., 2009; IPCC, 2014; Wamsler, 2014). Previous studies demonstrated that climate-related hazard experiences might result in sustainability initiatives or trigger climate-adaptation actions (Boluda-Verdú et al., 2022; Jain & Jain, 2022; Lutz, Passmore, et al., 2023).

Grothmann and Patt (2005) highlight the importance of individual adaptation to climate change and stress the role of cognitive processes in shaping adaptive capacity. Kollmuss and Agyeman (2002) delve into the underlying motivations and barriers to pro-environmental behaviour. Their work emphasizes the importance of addressing psychological, social and structural factors to foster sustainable actions and overcome obstacles to environmental engagement. A diverse range of activities is emphasized to foster flexible and sustainable adaptation. Motivation for adaptation pertains to willingness or intention to adapt. Aspects that positively or negatively influence adaptation actions and related motivation could be both external/material and inner/subjective (Adger et al., 2009; Baron & Ghelich Khani, 2021; Chen & Yuan, 2019; Navarro et al., 2020). Different external aspects were analysed from demographical and institutional support perspective (Cutter et al., 2003), while inner aspects, covering emotions, values and worldviews are underexplored in the majority of studies (O'Brien & Hochachka, 2011).

TABLE 1 External and internal motivation factors for climate adaptation.

External/material aspects	Theoretical reasoning
Climate-related hazards experiences	Past experiences are linked to adaptation actions (Brink & Wamsler, 2018; Diniz et al., 2018); past experiences impact pro-ecological commitment (Diniz et al., 2018) or nature conservation (Brügger et al., 2011)
Climate adaptation actions	Links between citizen engagement in climate adaptation and attitudes in different geographical context (Sawatzky et al., 2021); adaptation actions are related to climate-related experience (Wamsler & Bristow, 2022; Woroniecki et al., 2019) Adaptation means to prevent or avoid climate hazards, reduce (physical and non-physical) vulnerability to such hazards, and increase capacity or preparedness to respond and recover (IPCC, 2012; Wamsler, 2014)
Adaptive capacity	Increased number and diversity of activities implemented (including economic, social, physical/technical and ecological actions) can create more flexible and sustainable adaptation (Wamsler & Brink, 2014)
Internal aspects	**Theoretical reasoning**
Emotions	The feeling of being unable to control or influence environmental outcomes (Lutz, Zelenski, et al., 2023), environmental anxiety (Ágoston et al., 2022), distress-related worries (Jain & Jain, 2022; Lutz, Passmore, et al., 2023) could trigger climate adaption initiatives
Worldviews	The role of citizens' mindsets and actions is of crucial importance to climate change adaptation (Böhme et al., 2022; Brink & Wamsler, 2018; Hegger et al., 2022; Kiss et al., 2022) Climate-related mindsets are correlated with environmental responsibility (Ivashkiv et al., 2020; Shah et al., 2021) or climate-related behaviour (Baron & Ghelich Khani, 2021; Navarro et al., 2020)
Beliefs and values	Self-interest, rational decision-making and moral norms values shaping attitudes towards environmental issues and participation in related initiatives. • economic (or 'ego-focused'), ecological (or 'eco-focused') and social (or 'other-focused') value orientation (Kollmuss & Agyeman, 2002) • acceptance or denial of climate change, perceptions of the consequences of their actions (Grothmann & Patt, 2005) • altruistic values promote sustainable behaviours (Whitley et al., 2018)

Table 1 provides an overview on different scientific outcomes related to external and internal motivation factors.

In conclusion, these scientific sources collectively underscore the multidimensional nature of climate change adaptation, citizen engagement and disaster risk reduction. Effective responses to climate challenges require interdisciplinary approaches, inclusive governance mechanisms, and sustained efforts to address societal, behavioural and institutional dimensions of environmental sustainability. Based on the presented theoretical framework, the next chapter provides description of methodology and empirical research results. By understanding the strengths and weaknesses of citizen engagement in climate adaptation, education and training programmes can be designed to build the capacity of participants to effectively contribute to these efforts. This might include providing skills training in areas such as communication, advocacy and community organizing.

3 | METHODOLOGY AND SAMPLE OF THE SURVEY

This study used a previously applied instrument developed by Brink and Wamsler (2018) and applied to evaluate citizen engagement in climate adaptation in Sweden. The questionnaire (Brink & Wamsler, 2018) consisted of several subscales and indicators assessing external aspects, such as climate-related hazard experiences, climate

adaptation actions, and evaluation of individual adaptive capacity and internal aspects, such as motivational factors, participants' beliefs and values related to climate change. For the statistical analysis, the statistical software SPSS was employed.

A representative survey of the Lithuanian population was carried out between 23 October and 7 November 2023 by the Lithuanian-British market and public opinion research company *Baltijos tyrimai*, based on a questionnaire designed in collaboration with the research team. The survey covered 1013 Lithuanian residents (aged 18 and over) at 109 sampling points (31 cities and 43 villages).

The selection of respondents was carried out in the following stages:

1. The first stage is the determination of the proportion of respondents in the districts. This survey was carried out in all counties. The proportion of people interviewed in each county in the total sample corresponds to the proportion of the population aged 18 and over living in that county among the total population of that age in Lithuania.
2. The second stage was to determine the proportion of respondents in different size areas in each county. The categories of settlements used in this study are Vilnius, large cities (over 50,000 inhabitants), towns (2000–50,000 inhabitants) and rural areas (under 2000 inhabitants). The number of respondents in the different sizes of each county corresponds to the proportion of the population aged 18 years and over living there among the total population of that age in the county.

This sample size allows for an optimum margin of error of no more than ±3.1%. Respondents for the population survey were selected using multi-stage stratified random sampling. The survey was carried out through individual interviews. The age range of this population was chosen in line with the European Union's practice of opinion polls (ESOMAR) and to compare the survey data with previous surveys on this topic. Hence, the findings of this survey are applicable to the Lithuanian population aged 18 years and older.

The survey data have been weighted by gender, age and residence area size according to the latest population composition statistics from the Department of Statistics of Lithuania. These data provide a comparative analysis across key socio-demographic dimensions, including age, gender, income groups, type of settlement, social status and educational levels.

Demographic and social characteristics of the respondents (a total of 1013 respondents aged 18 years and over) are presented in Table 2. More specifically, the *gender* representation among participants was fairly balanced with a slight female predominance, comprising 54% (551) of the respondents as opposed to 46% (462) male respondents. A closer look at the *age* demographics reveals a mature respondent base, with more than half (51%) being 50 years or older, followed by those between the ages of 30–49 years (34%), and a smaller proportion of younger individuals aged 18–29 years (15%). *Ethnic composition* was predominantly Lithuanian, accounting for 91% (926) of the participants, signifying a relatively homogenous national representation within the sample. Minority groups included Russians (3%), Poles (4%), and an assortment of other nationalities (2%), reflecting the multi-ethnic makeup of the country's population. *Residential patterns* depicted a significant urban concentration with 43% residing in major Lithuanian cities. Other cities accounted for 25% of the respondents and rural areas comprised 32%.

In terms of *family income*, the data suggest a spread across different economic strata, with 28% earning up to 1000 euros, 26% between 1001 and 1800 euros, and 24% earning over 1800 euros, while 22% either did not know or did not respond to income inquiries. The *educational levels* of respondents varied, with the majority holding vocational qualifications (27%), followed by those with secondary education (20%), and post-secondary technical education (18%). Higher education levels were less represented, with 13% holding a university Bachelor's degree and a further 5% holding a Master's degree or Doctorate.

The margin of error for this study is less than 3.1% (with a 50%:50% response rate) and the confidence limit is 0.95. The margin of error is calculated for a given sample size at a given response rate with a confidence level of

TABLE 2 Demographic and social characteristics of the respondents.

	Respondents	%
Gender		
Male	462	46
Female	551	54
Age		
18–29	151	15
30–49	341	34
50+	520	51
Ethnicity		
Lithuanian	926	91
Russian	26	3
Polish	45	4
Other	15	2
Family income		
Up to 1000 EUR	287	28
1001–1800 EUR	259	26
More than 1800 EUR	243	24
Don't know, did not answer	224	22
Education		
University higher education (Master's degree/Doctorate)	48	5
University higher (Bachelor's degree)	136	13
Non-university higher education (College)	122	12
Technical education	181	18
Professional education	274	27
Secondary education	202	20
Basic, incomplete secondary, primary education	50	5
Type of residency		
Major cities (Vilnius, Kaunas, Klaipėda, Šiauliai and Panevėžys)	433	43
Other cities	260	25
Villages, towns with up to 2000 habitants	321	32

95%. For example, if the sample size is 1000 and the response rate is 50%, the margin of error is 3.10% and if the response rate is 20%, the margin of error is 2.48% (Table 3).

4 | RESULTS OF THE SURVEY

4.1 | Climate-related hazards experience and climate adaptation actions

At the beginning of the survey, all respondents were provided with a short introduction about the topic of the survey: 'In recent years, the Lithuanian population has been exposed to storms, floods and heat waves, and these extreme events are likely to increase in the future due to climate change. We are interested in people's experiences

TABLE 3 Response error calculation table.

Sample size (*n*)																	
Answers (%)	10 (%)	40 (%)	75 (%)	100 (%)	150 (%)	200 (%)	250 (%)	300 (%)	350 (%)	400 (%)	450 (%)	500 (%)	600 (%)	700 (%)	800 (%)	900 (%)	1000 (%)
0.1	1.96	0.98	0.72	0.62	0.51	0.44	0.39	0.36	0.33	0.31	0.29	0.28	0.25	0.23	0.22	0.21	0.20
0.5	4.37	2.19	1.60	1.38	1.13	0.98	0.87	0.80	0.74	0.69	0.65	0.62	0.56	0.52	0.49	0.46	0.44
1.0	6.17	3.08	2.25	1.95	1.59	1.38	1.23	1.13	1.04	0.98	0.92	0.87	0.80	0.74	0.69	0.65	0.62
2.0	8.68	4.34	3.17	2.74	2.24	1.94	1.74	1.58	1.47	1.37	1.29	1.23	1.12	1.04	0.97	0.91	0.87
3.0	10.57	5.29	3.86	3.34	2.73	2.36	2.11	1.93	1.79	1.67	1.58	1.50	1.36	1.26	1.18	1.11	1.06
4.0	12.15	6.07	4.43	3.84	3.14	2.72	2.43	2.22	2.05	1.92	1.81	1.72	1.57	1.45	1.36	1.28	1.21
5.0	13.51	6.75	4.93	4.27	3.49	3.02	2.70	2.47	2.28	2.14	2.01	1.91	1.74	1.61	1.51	1,42	1.35
6.0	14.72	7.36	5.37	4.65	3.80	3.29	2,94	2.69	2.49	2.33	2.19	2.08	1.90	1.76	1.65	1.55	1.47
7.0	15.81	7.91	5.77	5.00	4.08	3.54	3.16	2.89	2.67	2.50	2.36	2.24	2.04	1.89	1.77	1.67	1.58
8.0	16.81	8.41	6.14	5.32	4.34	3.76	3.36	3.07	2.84	2.66	2.51	2.38	2.17	2.01	1.88	1.77	1.68
9.0	17.74	8/87	6.48	5.61	4.58	3.97	3.55	3.24	3.00	2.80	2.64	2.51	2.29	2.12	1.98	1.87	1.77
10.0	18.59	9.30	6.79	5.88	4.80	4.16	3.72	3.39	3.14	2.94	2.77	2.63	2.40	2.22	2.08	1.96	1.86
15.0	22.13	11.07	8.08	7.00	5.71	4.95	4.43	4.04	3.74	3.50	3.30	3.13	2.26	2.65	2.47	2.33	2.12
20.0	24.79	12.40	9.05	7.84	6.40	5.54	4.96	4.53	4.19	3.92	3.70	3.51	3.20	2.96	2.77	2.61	2.48
25.0	26.84	13.42	9.80	8.49	6.93	6.00	5.37	4.90	4.54	4.24	4.00	3.80	3.46	3.21	3.00	2.83	2.68
30.0	28.40	14.20	10.37	8.98	7.33	6.35	5.68	5,19	4.80	4.49	4.23	4.02	3.67	3.39	3.18	2.99	2.84
35.0	29.56	14.78	10.79	9.35	7.63	6.61	5.91	5.40	5.00	4.67	4.41	4.18	3.82	3.56	3.31	3.12	2.96
40.0	30.36	15.18	11.09	9.60	7.84	6.79	6.07	5.54	5.13	4.80	4.53	4.29	3.92	3.63	3.39	3.20	3.04
45.0	30.83	15.42	11.26	9.75	6.89	6.89	6.17	5.63	5.21	4.88	4.60	4.36	3.98	3.69	3.45	3.25	3.08
50.0	30.99	15.50	11.32	9.80	8.00	6.93	6.20	5.66	5.24	4.90	4.62	4.38	4.00	3.70	3.46	3.27	3.10

of different extreme events and how to strengthen the ability of people and households to cope with changing weather conditions and how to better protect themselves from potential losses'.

The survey showed that a quarter (25%) of the adult population (18 years and older) in Lithuania has experienced any injury, health disruption or damage to property as a result of an extreme weather event at some point in their lifetime, and a fifth (21%) of the households surveyed have experienced such an event in the last 5 years. Figure 1 shows that in the last 5 years, the most common causes of injury, disruption of health or damage to property (one in ten respondents or other household members) were storms, lightning, hail or tornadoes (11% of households in Lithuania), or extreme temperatures, that is, sudden or prolonged heat waves or cold (8%). Another one in twenty (5%) households in Lithuania have suffered from sewage flooding in the last 5 years due to heavy rainfall or torrential rain, a similar proportion (4%) have suffered from mould or excessive moisture from rainfall, and slightly less than one per cent of households in the country have suffered from flooding in a river, lake, or other body of water, or from flooding caused by the sea in the same period. More than three quarters (77%) of respondents/households answered that they had not been affected by any problems related to extreme weather in the last 5 years, while 2% did not answer this question.

Respondents were asked to say what actions they have taken in the last 5 years to protect property or people from extreme weather events. The survey showed that around one in three adults in Lithuania had prepared for a possible power outage at least once in the last 5 years, by buying candles, torches and a battery-powered radio or similar (34%); moved or otherwise secured furniture and other outdoor equipment (33%); warned their neighbours about storms, floods or other extreme weather conditions (31%); and one in four took out insurance or additional insurance for their property against possible extreme weather conditions (26%), and cleared away trees that could fall during a storm and cause damage to their property, such as, (23%).

The results show that past experience of climate-related hazards is a key determinant of citizen action. The proportion of the population affected by extreme weather events in the last 5 years (21%) is the highest. Two thirds (67%) of households in the country were more likely than others to have taken some kind of action—two thirds (67%) had prepared for a possible power outage, six out of ten had moved or otherwise secured their furniture and other outdoor equipment before the storm (63%), and had alerted their neighbours to the situation (61%), and just over half took out insurance or additional insurance to cover their property against possible extreme weather events (56%) and removed trees that could fall and damage their property during a storm (56%) (see Figure 2).

Between one-seventh and one-fifth have done the following in the last 5 years: planted trees or other plants to create more pleasant weather conditions during the summer heat (20%), stocked up on food because of the

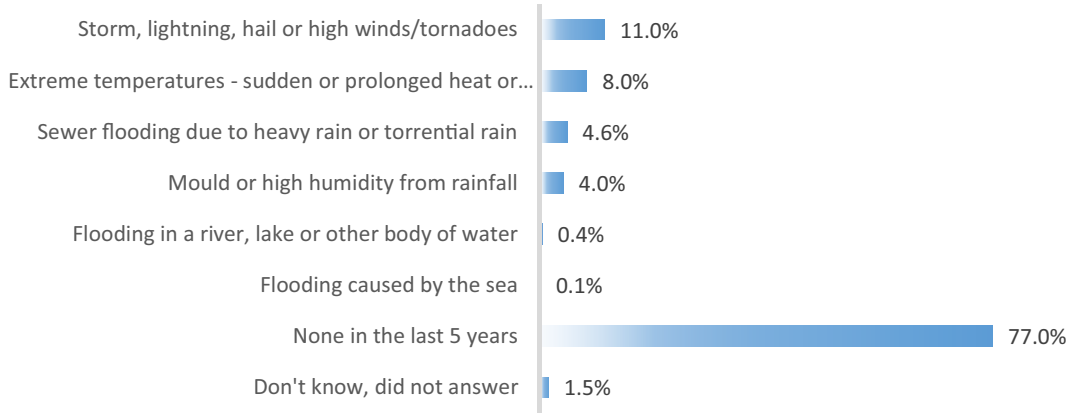

FIGURE 1 In the last 5 years, what proportion of the population in Lithuania has suffered any injury, health disruption or damage to property as a result of extreme weather-related events (all respondents, $N = 1013$).

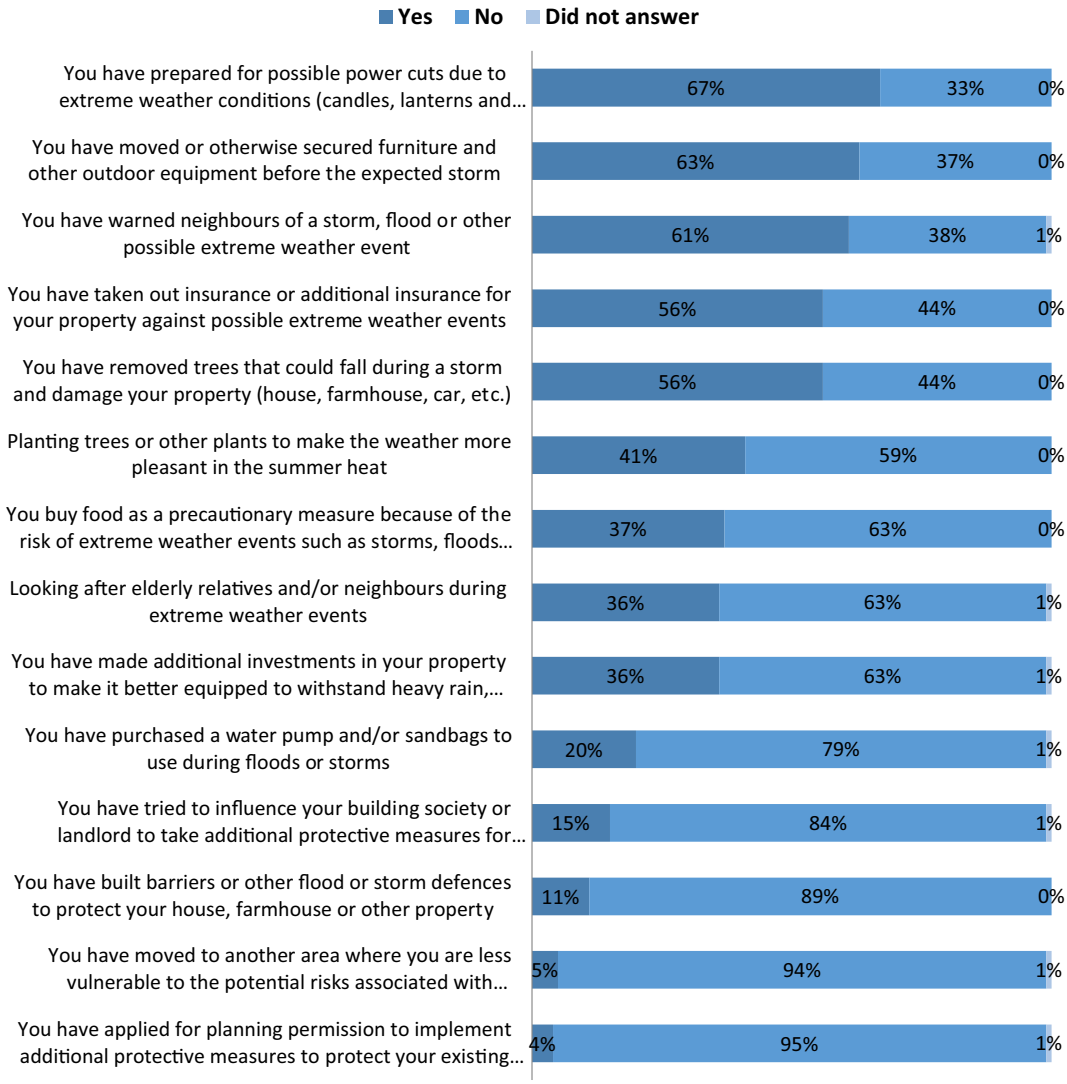

FIGURE 2 What actions have been taken by Lithuanians in the last 5 years to protect property or people from extreme weather events (affected population in 5 years, $N = 215$).

potential risks from extreme weather (18%), looked after elderly relatives and/or neighbours during extreme weather (17%) and invested extra in their property to make it better equipped to withstand heavy rainfall, strong winds or heatwaves (14%).

4.2 | Motivation factors for future adaptation

The three most important factors for people to protect themselves against extreme weather events and to avoid potential losses or other negative consequences are good health, available financial resources and municipal support in such situations. The relatively less important factors identified by respondents were the ability to use special equipment or tools, suitable offers from insurance companies and their knowledge of technical or construction issues (Figure 3).

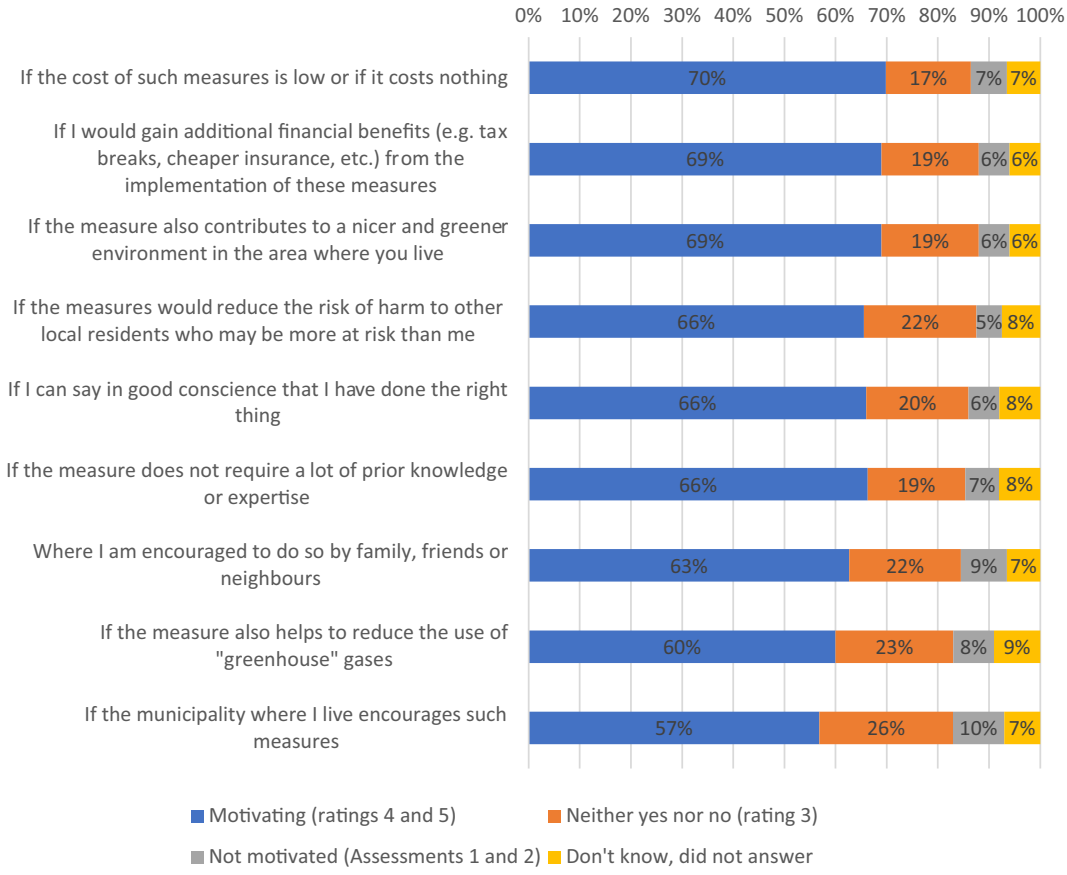

FIGURE 3 Key motivators for people to take various measures to protect themselves from extreme weather events (all respondents, $N = 1013$).

In order to reduce the risk of damage from potential extreme weather events, the following two measures are more likely to motivate the population than others: if the cost of the measure is low or if the measure would not cost anything, and if the measure would bring them additional financial benefits (e.g. tax breaks, cheaper insurance).

4.3 | Adaptivity capacity

The survey showed that one in three (34%) Lithuanian adults rate their ability to manage risks and protect themselves against various problems related to extreme weather conditions as good, four in ten (38%) rate their ability as average (neither good nor bad), and around one in five (18%) rate their ability as poor or very poor. One in ten (10%) respondents had no opinion or did not answer this question.

Men (40%) are more likely than women (29%) to rate their skills in this area as good, as are middle-aged people (30–49) (43%), respondents with more than secondary education and those with a medium (€1001–€1800) or high (over €1800) monthly family income, managers (49%) and workers and farmers (42%), respondents living in Kaunas (39%) and Šiauliai (40%) counties, respondents who are concerned about current climate change and extreme weather conditions (43%).

4.4 | Data analysis from demographical perspective: Gender, income, education and age

More specifically, those affected by *storms, lightning, hail or strong winds/tornadoes* (11%) were more likely to be over 30 years of age, living in rural areas or smaller towns, respondents who had graduated from college/technical school and had a medium (€1001–€1800) monthly family income, managers and unemployed people, and housewives and respondents who live in their own house/part of the house (a sixth of the households living in a house, 17%). Those affected by *extreme temperatures* (8%) were slightly more likely to be over 50 years old, urban dwellers, respondents with higher education and pensioners. Those affected by *sewage flooding* due to heavy rain or heavy rain (5%) or mould and high humidity from rainfall (4%) were more likely to live in a rural area, households living in their own house.

Two-thirds (67%) of those who lived in the country were more likely than others to have taken some action to prepare for a possible power outage, six in ten had moved or otherwise reinforced furniture and other outdoor equipment before the storm (67%), and had alerted their neighbours to the storm (61%), and just over half took out insurance or additional insurance to cover their property against possible extreme weather events (56%) and removed trees that could fall and damage their property during a storm (56%).

The comparison of motivational factors showed that male respondents are more focused on receiving economic benefits, while female respondents are more motivated by social values, such as advice from friends, social responsibility, etc.

4.5 | Public support

Just over four in ten (43%) of Lithuanians aged 18 years and over indicated that in the last 5 years they had received any information from their municipality or other public authorities related to extreme weather, half (52%) had not received any such information, and 5% of respondents did not answer this question.

People aged 30–49, metropolitan dwellers, respondents with higher education and the highest monthly family income (over €1800), managers and professionals, civil servants and people who have been affected by extreme weather events in the last 5 years (56% of those affected) were more likely to say that they had received such information in the last 5 years.

One in ten (9%) of the Lithuanian population (aged 18 and over) surveyed said that in the last 5 years they or someone in their household had communication with municipal or other public authorities about any problems related to extreme weather, 87% of the respondents did not have any contact with the authorities, and 4% of the respondents did not answer this question. One in four (23%) people who had been affected by extreme weather in the last 5 years indicated that they had contacted representatives of municipalities or other public authorities about problems caused by extreme weather.

As the survey showed, the Lithuanian population is reluctant to actively participate in public activities related to environmental protection—only 4% of the adult population of the country has been actively involved in the activities of any associations, organizations or other civic initiatives in the last year, which aim to preserve the environment and reduce the negative impact of climate change, or deal with other environmental issues, and 2% of the respondents indicated that they are a member of any of these.

4.6 | Beliefs and values related to climate change

According to the October 2023 survey, almost half (46%) of the Lithuanian population is currently concerned about climate change and extreme weather events, just over a third (36%) are indifferent (neither agreeing nor disagreeing with the statement), and a seventh (16%) say they are not concerned. Those living in rural areas and

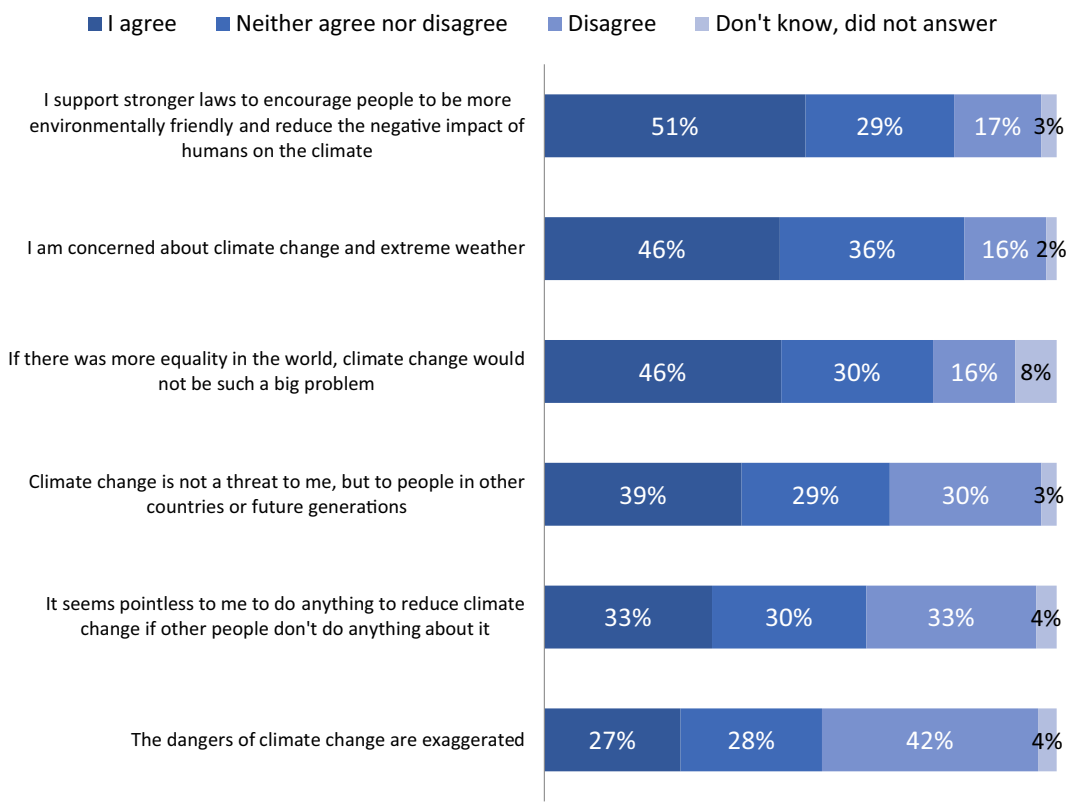

FIGURE 4 Opinion of the Lithuanian population on climate change claims (all respondents, $N = 1013$).

smaller towns, young people in education and those who have been affected by extreme weather in the last 5 years were more likely to say they are concerned about climate change and extreme weather (Figure 4).

A majority (39%) of people in the country believe that climate change is not a direct threat to them, but to people in other countries or to future generations, while three in ten (30%) disagree. This is confirmed by the fact that people are more likely to see an increase in the losses caused by climate change over the last year globally (59% increase, 25% stay the same and 8% decrease) than in Lithuania over the same period (47% increase, 37% stay the same and 8% decrease).

5 | DISCUSSION AND FURTHER RESEARCH

The results show that citizen engagement in climate adaptation is depending on socio-cultural context. By comparing and discussing results in Lithuania and Sweden (Brink & Wamsler, 2018) some similarities and differences could be detected. For example, in Lithuania, 25% of the adult population has experienced injury, health disruption, or property damage due to extreme weather events in their lifetime, with 21% experiencing such events in the last 5 years. In Sweden, half of the surveyed households reported experiencing personal injury or property damage from weather-related events, including flooding, storms and heatwaves. In Lithuania, 67% of households have taken some form of proactive action, in Sweden, the vast majority (99%) of households have engaged in activities related to adaptation to local hazards. Factors such as past experience and economic considerations (low costs, financial benefits) are identified as key motivators for future adaptation actions in Lithuania. Surprisingly, in Sweden, respondents showed a preference for ecological factors

(such as contributing to climate change mitigation) and economic values (such as low costs and financial benefits) when considering future adaptation actions. Social motivational factors were also important but ranked slightly lower. However, both Lithuania and Sweden highlight past experience with climate-related hazards as a key determinant of citizen action and preparedness. In both countries, economic considerations such as low costs and financial benefits associated with adaptation actions are important motivators for individuals. Overall, while there are differences in the specific experiences and adaptation measures between Lithuania and Sweden, both countries emphasize the importance of past experience, economic considerations and proactive household engagement in addressing climate-related hazards.

This study is limited by the results of two countries and could be defined as exploratory research for deeper data analysis on broader geographical and time scope. However, the findings contributed to the existing body of research in the field, as evidenced by the references to previous studies (Agliardi & Agliardi, 2021; Campiglio et al., 2023; Harris et al., 2022; Jastrzębska, 2023; Lacroix & Gifford, 2018; Prokosch et al., 2022; Schmid-Petri & Bürger, 2022; Schwaab et al., 2022). Specifically, these studies confirmed the existence of positive links between citizens' experiences with climate-related hazards and their adaptation actions. Furthermore, it shed light on the role of citizens' worldviews, concerns about climate change, and types of adaptation motivation.

Conducting similar comparative studies in other countries with diverse socio-cultural contexts could provide a broader understanding how individuals in different environments perceive and respond to climate change. Qualitative surveys on lived experiences and perspectives of communities can also enrich the development of effective adaptation strategies. In addition, longitudinal studies tracking changes in citizen engagement and adaptation practices over time are needed to provide insights into the effectiveness and resilience of adaptation measures.

6 | CONCLUSIONS

The findings indicate the need to find the match between state of the art in citizen engagement and educational initiatives for climate adaptation. A significant percentage of the Lithuanian population has experienced extreme weather events in their lifetime, with a notable proportion having experienced such events in the last 5 years. Past experience with climate-related hazards appears to be a driving factor for citizen action and preparedness. Factors such as good health, available financial resources and municipal support are identified as key motivators for individuals to protect themselves against extreme weather events. Measures with low or no cost and those bringing additional financial benefits are more likely to motivate the population to adopt them. Different demographic groups are affected by different types of extreme weather events. For example, storms, lightning, hail or strong winds/tornadoes predominantly affect older individuals and rural residents. Extreme temperatures tend to affect urban dwellers, and those with higher education working in urban environments.

Based on the conclusions drawn from the data, several challenges for education in Lithuania regarding extreme weather events and climate change can be identified. There may be a lack of awareness and understanding among certain demographic groups, particularly those living in urban areas and with higher education levels, regarding the risks associated with extreme weather events and climate change. Despite the recognition of the importance of managing risks related to extreme weather conditions, a significant portion of the population rates their skills in this area as average or below average. Public support should focus on developing practical skills for risk management and preparedness, targeting groups such as younger individuals, urban dwellers, and those with higher education levels who may perceive themselves as less skilled in this area.

According to the data, a substantial percentage of the population has not received information from public authorities regarding extreme weather events, indicating potential gaps in access to awareness campaigns. Efforts should be made to improve the dissemination of information about climate change consequences through educational channels, ensuring equitable access for all demographic groups. While concern about extreme weather

events is relatively high, there is a tendency in Lithuania to perceive these issues as global rather than local threats. More value- and worldview-sensitive educational programmes should aim to bridge this gap in perception by highlighting the local relevance and impacts of climate change, thereby encouraging greater engagement and participation in environmental protection efforts at the community level. The conclusions call to give more attention to inner aspects of motivation in order to influence behavioural changes.

Socioeconomic factors such as income level and access to financial resources are identified as key motivators for individuals to protect themselves. Educational initiatives could address these socioeconomic disparities by providing practical guidance on cost-effective measures for preparedness and resilience-building, particularly targeting vulnerable populations with limited financial resources.

In summary, addressing educational challenges will require comprehensive and targeted educational interventions that enhance awareness, skill development, access to information and community engagement in climate adaptation. These efforts are crucial for fostering a proactive and resilient response to the growing threats posed by climate-related hazards.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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