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## EDITED BY

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Kathryn Semmens,  
The Nurture Nature Center, United States

## \*CORRESPONDENCE

Katya Schloesser  
✉ katya.schloesser@colorado.edu

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# Centering and uplifting youth voice in planning for a more resilient climate future in rural Colorado: a case study of a student resilience team asking for change

Katya Schloesser<sup>1\*</sup>, Ravi Davis<sup>2</sup>, Taylor Ruffin<sup>3</sup>, Anne U. Gold<sup>1</sup>,  
Alicia Christensen<sup>1</sup>, Megan K. Littrell<sup>1</sup> and Kathryn J. Boyd<sup>1</sup>

<sup>1</sup>Center for Education, Engagement and Evaluation, Cooperative Institute for Research in Environmental Sciences, University of Colorado Boulder, Boulder, CO, United States, <sup>2</sup>Estes Park Middle School, Estes Park, CO, United States, <sup>3</sup>Earth Force, Denver, CO, United States

Rural communities are increasingly facing challenges from climate-related natural hazards such as drought, wildfire, and flood. These cascading hazards threaten social, emotional, physical, and economic well-being, and pose unique challenges to rural areas which may already struggle to find enough resources. Yet, rural areas are rich in social capital, creativity, and resilience, and future leaders are learning how to build agency and increase their community's resilience in school settings. Students in Estes Park, Colorado, have experienced major climate-fueled hazards in their lifetimes, surviving the floods in 2013 and the East Troublesome and Cameron Peak wildfires in 2020. At Estes Park Middle School, the Environmental Resilience Team (ERT) is an afterschool group of students who are actively participating in promoting public awareness, mitigation, and policy-making to increase resilience to natural hazards. Supported by the Hazard, Education, Awareness, and Resilience Task Force (HEART Force) Program, a comprehensive curriculum that immerses students in the study of their community's resilience to floods and fires, in conjunction with the Earth Force Environmental Civic Action resources, students and educators gained the tools needed to spearhead community discussions on resilience, all while striving to mitigate and minimize future risks. In this paper, we tell the story of the Environmental Resilience Team's campaign to pass statewide legislation to implement Wildland Urban Interface (WUI) Building Codes in high-risk areas. Students visited the Colorado State Capitol, met with their State Senator and Governor to lobby for the passage of the bill. This initiative builds upon years of action projects, including service projects to mitigate fire risk in vulnerable populations within the mountain town of Estes Park and build community education and awareness through the distribution of "go-bags" to community members. By including youth voice in public decision-making and planning for climate resilience, community leaders and policymakers can develop more holistic plans that include multigenerational input. This research is part of a broader study across implementations of HEART Force in several classrooms that showed that the HEART Force program helped students develop a sense of agency and grow in their understanding of community resilience.

## KEYWORDS

resilience to climate change, youth-led, action civics, wildfire mitigation, K-12 education and serious games

# 1 Introduction

Communities across Colorado are grappling with increasing disruptions from environmental hazards, including wildfires, floods, and droughts. With its mountainous, intracontinental location, Colorado is prone to extreme weather events and vulnerable to changes in the climate (Lukas et al., 2014) and has seen the largest increase among all US states in natural disasters over the past 40 years (Johnson, 2020), with drought, wildfire, and floods being the most destructive hazards (Colorado Division of Homeland Security and Emergency Management (DHSEM), 2018). This increased frequency and intensity of environmental disasters underscore the urgency of fostering community resilience through proactive preparation, strategic planning, and civic action. The need to prepare for the impacts of environmental hazards is unique in rural areas, where limited access to resources, inadequate infrastructure, educational disparities and geographical isolation exacerbate the vulnerability of rural residents. Environmental hazards pose significant threats to the well-being and livelihoods of residents, and disproportionately affect vulnerable populations, including those from low socio-economic backgrounds and different ethnic or language backgrounds, due to factors such as inadequate housing and limited access to resources (Teo et al., 2018, 2019). While rural communities face many challenges and experience vulnerability to the impacts of natural hazards, they possess unique assets and opportunities to bolster community resilience such as close-knit social networks, innovative and entrepreneurial thinking, and a strong sense of local community and identity (Colorado Succeeds et al., 2024). Amidst the threat of natural hazards and challenges in rural communities lies an opportunity for students to play a pivotal role in growing their communities' resilience to natural hazards and address climate change through civic action.

Empowering youth to actively participate in climate resilience efforts through civic action is an effective path for fostering sustainable communities from within. Research underscores the pivotal role of youth engagement in enhancing hazard awareness and fostering a sense of civic responsibility (Ronan and Johnston, 2005). Through youth-adult partnerships, resilience action projects, and innovative approaches such as scenario-based role-play games, young people can play a transformative role in driving climate resilience initiatives forward (Hromek and Roffey, 2009; Schloesser et al., 2022). While efforts to increase community resilience do not usually engage K-12 students and educators (Boyd et al., 2021; Ronan and Johnston, 2006), formal education has the potential to significantly increase public awareness of natural hazards and promote proactive youth-led action (Cerulli et al., 2020). In rural Colorado, where access to resources and educational opportunities may be limited, leveraging the potential of youth as change agents holds immense promise. By nurturing partnerships between youth, educators, and community leaders, communities can harness the energy and creativity of young people to navigate the complexities of a changing climate and forge a path toward a more resilient future for all (Ronan and Johnston, 2006; Bey et al., 2020).

The National Oceanic and Atmospheric Administration's Environmental Literacy Program Community Resilience Education Theory of Change provides a framework that describes paths towards youth participation in building community resilience (Bey et al., 2020). By educating and empowering youth to engage in locally oriented, solution-based activities, young people can contribute to tackling

climate impacts and environmental challenges in their home communities. The program described in this paper is an example of one of the pathways outlined in the Theory of Change, which describes that instruction in a classroom setting can build a foundation for youth civic engagement (Pathway 3; "Active Learning Enables Community Engagement in Civic Processes").

In this paper, we describe a case study of the Estes Park Middle School Environmental Resilience Team (ERT) advocating for change, highlighting the importance of centering and uplifting youth voices in planning for a more resilient climate future.

## 1.1 Theoretical framing

The program design for the Estes Park Middle School ERT was framed using the principles of environmental justice (Van Horne et al., 2023) as outlined in the Principles of Environmental Justice (First National People of Color, 1991), and adapted to emphasize participatory youth engagement (Ozer et al., 2020). This initiative builds on the Theory of Change developed for hazard education and community engagement (Bey et al., 2020; Figure 1). Environmental justice focuses on the equitable distribution of environmental benefits and burdens and the meaningful involvement of historically marginalized communities in environmental decision-making (Lee, 2021). In this case study, we applied the theoretical foundations of environmental justice to youth empowerment by telling the story of how we fostered youth engagement in envisioning community resilience and participating in civic decision-making processes. By involving middle school students in resilience projects, the study highlights the importance of participatory approaches that empower marginalized groups—specifically, the youth in rural communities—to engage actively in climate resilience efforts, mobilize community assets, and promote policy-driven changes. This approach aligns with the principles of climate justice, which advocate for the inclusion of diverse voices in climate governance and the equitable distribution of resources and adaptive capacities (Schlosberg and Collins, 2014).

## 2 Overview of instructional programs focused on environmental hazard resilience and youth civic action

Teachers in this case study implemented two complementary materials in their instruction and the activities of the Environmental Resilience Team; materials from the HEART Force and the Earth Force programs. The HEART Force and Earth Force programs have partnered to support teachers for over 5 years, and provide free classroom activities, lessons, and resources to teachers across Colorado and the country. The two programs were developed independently before joining forces. Earth Force was created to give young people the opportunity to initiate change in the local community by responding to environmental problems. The Earth Force curriculum focuses on a set of steps that scaffold youth to take local actions. The HEART Force program was initiated in response to the increasing severity of environmental hazards, including the 2013 Boulder Floods and the 2013 Black Forest wildfire outside of Colorado Springs and focuses on supporting youth engagement with local hazard resilience efforts in rural areas by exploring the scientific data,

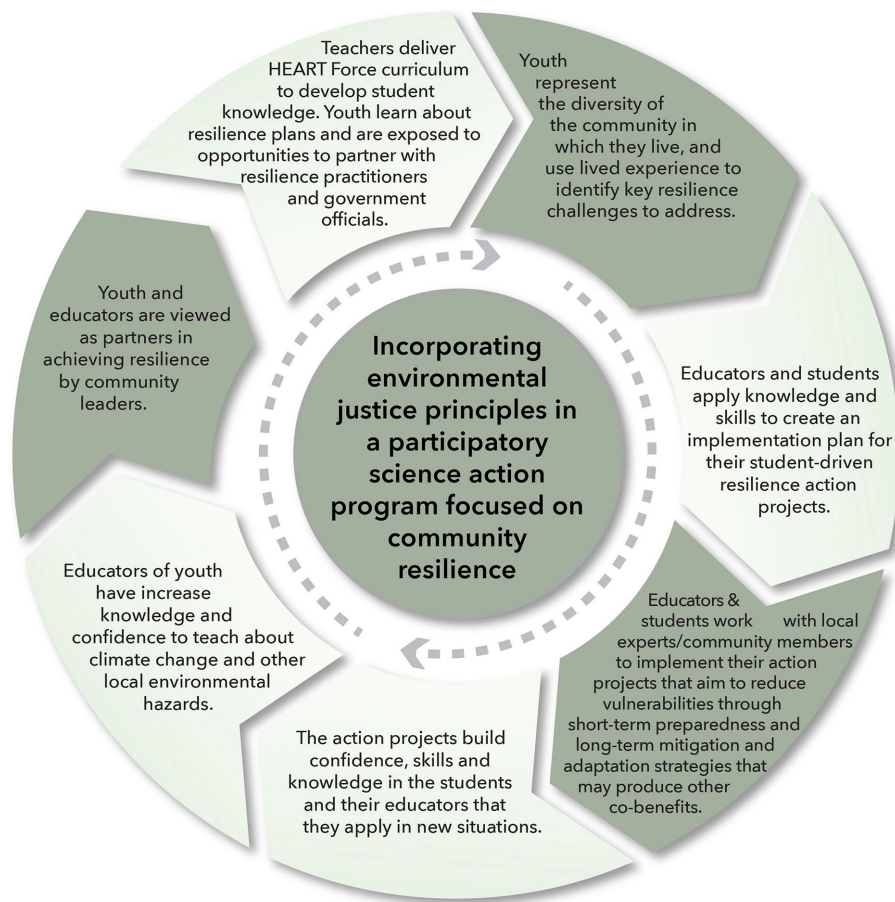


FIGURE 1

Visualization of the iterative process of the ERT program implementation and connections of program steps to the NOAA Theory Of Change (Bey et al., 2020) and the environmental justice framework from Van Horne et al. (2023). Dark green indicates a connection to the environmental justice framework, and the outcomes in the arrows are outcomes from causal pathway 5, student-driven action projects implement resilience measures, and causal pathway 6, youth summits empower agents of change, from the Theory of Change.

local hazard policy documents and envisioning change towards resilience through scenario-based roleplay games and engagement with local hazard experts. The program focuses on the unique vulnerability of these communities, and the opportunity to bridge political divides by focusing on community resilience instead of climate change.

Working in tandem, the HEART Force curricula help students build a robust understanding of the science of the hazard and the historical data, while Earth Force curricula equip students with the understanding of civic processes and levers for creating sustainable and meaningful change.

## 2.1 The HEART Force program—building foundational scientific and systems level knowledge

The main instructional goals of the Hazard Education, Awareness and Resilience Task (HEART) Force program are to increase rural youth's understanding of natural hazards, their community's risks and vulnerabilities and to strengthen youth's agency to increase community resilience, with an emphasis on the

neighborhoods and populations that are most vulnerable to hazards (Schloesser et al., 2021). The place-based middle and high school curriculum includes six units focused on hazards in Colorado. In the HEART Force wildfire curriculum, students familiarize themselves with local datasets that show wildfire risk in Wildland Urban Interface (WUI) areas, historic wildfire locations and frequency of wildfires, while also exploring relevant local policy documents and mitigation plans. The scaffolding to guide students towards envisioning a resilient community begins with students playing a scenario-based role-play game to grow their understanding of how a community responds to a wildfire and what resources the community has available. This vision of a resilient community is the foundation for teachers to support a student-led action project and develop original ideas to increase community resilience to local hazards.

The process of envisioning a student-led action project includes conversations with local community. Leaders from the community that regularly engage in hazard planning and response, such as county emergency managers, local fire chiefs, local multicultural resource officers, local conservation district board members, and/or planning commission board members. These experts can help build a foundation for student-community engagement and collaboration

with community leaders by discussing local challenges regarding the hazard and brainstorming possible action projects with students.

HEART Force program evaluation findings indicate that all HEART Force teachers who took a post-implementation survey during the 2021–2022 school year reported that the program was impactful for their students with respect to community resilience. Teachers emphasized the significance of a place-based curriculum, allowing students to engage with their communities and address real-world issues (Littrell et al., 2023). The program has empowered students to participate in community initiatives, with notable success stories, including student groups winning first place in the 2021, 2022 and 2023 Colorado Resilience Innovation Sustainability Environment (RISE) Challenges.

## 2.2 Earth Force's RISE Challenge program: tools for turning knowledge into action

The Earth Force program is an innovative instructional model that gives teachers the skills to guide youth towards civic action through the Earth Force Environmental Civic Action Process. Students design and implement action projects that increase local resilience and address a local environmental issue to make a positive change in their communities. Earth Force's Environmental Action Civics instructional model incorporates experiential civics into environmental learning to prepare young people for their role as active citizens and provides a pathway to action. The process sets students up to identify key policies and community practices that contribute to their selected local issue, and allows students to gain the skills and experience needed to engage in civic decision-making within their communities. Earth Force's RISE Challenge program engages students in the exploration of their communities to determine their vulnerabilities to natural hazards, tasks students with developing their own ideas for making their community more resilient, and carrying out an action project to increase local hazards resilience. Educators use the program to turn their classrooms into "civic laboratories" where students deepen their understanding of the policies surrounding hazards response and recovery and envision and develop projects to build community resilience. The program builds upon students' understanding of data, existing plans, and civic systems. Throughout the program, students engage with policy and practice research to dig deeper into the root causes of their chosen issue, then use democratic decision-making to select a solution and develop action plans.

## 3 Case study context

### 3.1 Setting

Estes Park is a small mountain town located about 70 miles northwest of Denver, Colorado, and is bordered to the west by Rocky Mountain National Park. The town serves as the primary gateway community to the national park, and is a popular tourist destination. The community is situated at an elevation of 7,522 feet above sea level and is located along the Big Thompson River and Fall River. According to a recent Community Livability Survey, approximately four in five residents rate their overall quality of life as excellent or good, with 77%

likely to recommend Estes Park as a place to live (2021 Larimer County HMP Base Plan; [Google Drive, 2021a](#)). Residents also highly rate the town's overall appearance, image, and suitability for retirement (2021 Larimer County HMP, Annex D; [Google Drive, 2021b](#)).

### 3.2 Environmental hazards

Estes Park continues to be threatened by environmental hazards such as wildfire and flooding and the town has encountered significant environmental hazards throughout its history, with some of the most notable events occurring in the last 25 years. In September of 2013, Estes Park was severely impacted by regional flooding; the 2013 floods resulted in 10 deaths and infrastructure damage was estimated at \$2 billion (2021 Larimer County HMP Base Plan; [Google Drive, 2021a](#)). Estes Park itself experienced flooding of its main street and the closure of the primary roads to access the community, and resulted in destruction of and damage to homes and businesses. Situated within the Wildland-Urban Interface (WUI), the Estes Valley also faces heightened vulnerability to wildfire (2021 Larimer County HMP, Annex D; [Google Drive, 2021b](#)). In 2020, Estes Park was threatened from the north and west by two historic wildfires, the Cameron Peak and East Troublesome fires. These wildfires posed immediate risks to residents, businesses, and natural habitats, causing wide-spread evacuation orders within the community, underscoring the ongoing challenges of managing fire hazards in the mountainous, heavily-forested terrain surrounding the town. Despite these hazards, the community has demonstrated resilience and has implemented various mitigation and preparedness measures to enhance its capacity to respond to future natural disasters effectively (2021 Larimer County HMP Base Plan; [Google Drive, 2021a](#)). In particular, the Estes Valley Fire Protection District (EVFPD) recognizes the importance of proactive measures and offers fire risk reduction safety inspections that provide homeowners with actionable recommendations to protect their properties against wildfire risks. These recommendations often include clearing vegetation to create defensible space, removing flammable materials and securing access of firefighters to the property.

### 3.3 Educational setting

Teachers in the Estes Park School District are well aware of the threats and need to support students in learning about natural hazards and building the foundation for community resilience. Teachers across the district had engaged in professional development training around hazard preparedness through the HEART Force and Earth Force programs ([Table 1](#)) and hazard preparedness and youth engagement in resilience efforts was a regular part of instruction in the middle school classrooms that we will be featuring in this case study.

In 2020, school was in session in the Estes Park School District when the town received evacuation notices due to the encroaching wildfires and the threat of the community's access roads being cut off. Middle school science teachers were prepared to support their students in the hazard response and served as stewards for their community. The teachers had worked on hazard preparedness with their students for the two previous years using HEART Force and Earth Force materials. "While the evacuation orders were disruptive and stressful, fortunately, no school buildings were impacted by the



TABLE 1 Steps to development of youth-led civic action through the Environmental Resilience Team (ERT).

Step	Activities
Teacher participation in HEART Force and Earth Force professional development workshops	<ul style="list-style-type: none"> <li>Former Estes Park Middle School (EPMS) teacher attended an Earth Force training in 2017, and shared resources with fellow teachers.</li> <li>EPMS teacher J. Mader attended the pilot HEART Force teacher workshop in April 2019.</li> <li>EPMS teacher R. Davis attended a virtual HEART Force teacher workshop July/June 2021.</li> </ul>
Classroom instruction of HEART Force and Earth Force curricula	<ul style="list-style-type: none"> <li>Estes Park Middle School teachers initiated their class participation in the RISE Challenge in 2020 and used Earth Force curricula to do so.</li> <li>Estes Park teacher J. Mader participated in the original classroom pilot of HEART Force curriculum in 2019, and used the curriculum in her eighth grade classroom up until the 2022–23 school year. Teacher R. Davis began teaching HEART Force in her sixth grade classroom during the 2021–2022 school year.</li> </ul>
Formation of the ERT	<ul style="list-style-type: none"> <li>Following the 2020 fires, in 2021 the ERT began meeting as an after school club to build upon classroom content and have time to develop action projects.</li> <li>The ERT Club was initiated by teachers in their respective middle school classrooms.</li> <li>Mission: Partner youth with community leaders, stakeholders, and legislators to increase resilience in Estes Park and surrounding communities.</li> </ul>
Initiating collaborative relationships	<ul style="list-style-type: none"> <li>During the 2021–22 school year, teacher R. Davis invited EVFPD Fire Chief and a Hotshot wildfire crew member to speak in her classroom.</li> <li>The visit sparked student-led RISE Challenge projects.</li> </ul>
Local community engagement and wildfire preparedness	<ul style="list-style-type: none"> <li>For the 2022 RISE Challenge project, ERT students assembled “go bags” containing personal hygiene items, medications, and evacuation plans.</li> <li>Students distributed the bags at a local wildfire awareness and preparedness fair organized by EVFPD.</li> <li>Students also assisted with fire mitigation efforts, creating defensible space surrounding homes for community members.</li> </ul>
State level policy change	<ul style="list-style-type: none"> <li>For their 2023 RISE Challenge project, ERT students recognized that wildfire resilience extends beyond their community.</li> <li>Met with EVFPD Fire Chief to discuss project idea.</li> <li>The ERT team contacted State Senator about bill on wildfire resilience, arranged a meeting, and traveled to Colorado State Capitol to discuss bill.</li> <li>The Bill was passed in late spring of 2023 and signed into law by the Governor, establishing a new Wildfire Resiliency Code Board under the Colorado Department of Public Safety.</li> </ul>
Impact and reflection	<ul style="list-style-type: none"> <li>Students increased confidence in speaking to community members about resilience.</li> <li>The scaffolding and structure for their achievement was provided by HEART Force and Earth Force programs and curricula.</li> </ul>

fire. However, students’ lives were forever changed, as they experienced first-hand the risk of living in the Wildland-Urban Interface, and the fear of losing their homes, pets, or family members in a wildfire,” noted teacher R. Davis (co-author).

Following the imminent wildfire threat to the community, teachers continued to teach about wildfire in their classroom, and used students’ personal experiences to engage them with curricula and resilience efforts. In 2021, R. Davis and J. Mader established the Estes Park Middle School ERT for students in grades 6–8 fostering a culture of environmental awareness and proactive resilience planning. The case study outlines a model of how teachers can engage their students in learning about natural hazards, community resilience and foster youth-led civic action.

### 3.4 Methodology and data collection

The authors approached this research using a mini-ethnographic case study (Yin, 2014; Fusch et al., 2017), including mixed methods data collection and analysis to triangulate findings and to construct an understanding of the case study group’s experience. The data included direct field observations of students, informal interviews, and student pre- and post-unit surveys (University of Colorado IRB Protocol

19-0120). Student surveys included questions on students’ knowledge and understanding of community resilience and how their community responds to natural hazards, changes in their confidence in speaking with community members about resilience efforts, and their overall impressions of the program.

## 4 Case study: Estes Park Environmental Resilience Team project

Building on their learning about the natural hazards, emergency response and community resilience through engagement with scientific data, scenario-based role play games and exploration of the local hazard mitigation plan through the HEART Force curriculum, students in the two Estes Park middle school science classrooms that were included in this case study (teachers: R. Davis and J. Mader), applied what they learned using the Earth Force Environmental Action Civics Process in the Environmental Resilience Team (ERT; Table 1). Field observations of the students’ experiences, along with outcomes from mixed methods data collected before and after the unit are described below.

The ERT’s mission is to partner youth with community leaders, stakeholders and legislators to increase resilience in Estes Park and

surrounding communities. The ERT meets as an after school club, and builds upon classroom content in two middle school science classrooms. Following the fires in 2020, the teachers invited the EVFPD Fire Chief and a Hotshot wildfire crew member who battled the Cameron Peak fire to speak in their classrooms. Their visit initiated an invaluable collaborative relationship that grew to spark ideas for student-led efforts during the 2021–22 and 2022–23 RISE Challenge projects.

Driven by a spirit of service, during the 2021–22 school year, students assembled “go bags,” bags that included personal hygiene items, containers for personal medications, and example evacuation plans, and distributed them at a local community emergency preparedness fair. Inspired by their experiences during the quick evacuation from the 2020 Cameron Peak and East Troublesome Fires, the students created the go bags to emphasize the critical need for preparedness. Additionally, students assisted with fire mitigation efforts, which included removing dense pinecones, needles, and brush to create defensible space surrounding homes for vulnerable community members who faced challenges in carrying out such work due to disability or other limitations. EVFPD facilitated the connections between homeowners in need and the ERT to make homes safer and more resilient against future wildfires.

The following school year, in 2022–2023, students recognized that wildfire resilience needs extend beyond their community, and the ERT aimed to make a statewide impact. The team met with EVFPD Fire Chief David Wolf to discuss their project idea. He inspired the team to contact State Senator Lisa Cutter about her bill SB 23-166, The Establishment of a Wildfire Resiliency Code Board. The team drafted an email to Senator Cutter, received a positive response and arranged a meeting with her to discuss the bill further. As part of a school-sponsored field trip during the school day, the team of eight students traveled from Estes Park to the Colorado State Capitol to meet with Senator Cutter in person. In the meeting with Senator Cutter, Lisa suggested that the team testify to support the bill when it was being discussed in the Colorado House of Representatives. Reflecting on the visit, Senator Cutter said “It was amazing to have the students come down to the capitol, I always love seeing students and young people in the building. It’s their Capitol too, we represent them. And it’s an even greater responsibility as they cannot vote yet. They were so knowledgeable about the bill specifically and the legislative process more generally, while most adult Coloradans have no idea how we function.” (Lisa Cutter, email response via aide to primary author, February 6, 2024). During their visit, students met Governor Jared Polis by chance, and were able to advocate for the bill directly to the governor.

Unfortunately, students were unable to testify due to late scheduling, as the bill went to the floor near midnight. The next day, students were thrilled to learn that the bill passed the House and was later signed into law by Governor Polis. The new Wildfire Resiliency Code Board operates under the Colorado Department of Public Safety, Division of Fire Prevention and Control within the Colorado Fire Commission. For students, one of the main highlights of this project was the experience talking with Senator Cutter about why her bill was important to them, as well as the opportunistic timing of meeting Governor Polis.

With the foundational support of the HEART Force and Earth Force programs, which had driven their passion for mitigation work in prior years, the students came to realize the broader significance of

community resilience beyond their hometown and were determined to advocate for it at the capitol. Following the meeting where Chief Wolf provided valuable insights into legislative initiatives, the students felt empowered to take action. They delved into thorough research and discovered that Senator Cutter had initiated the relevant bill, sparking their desire to meet her. Upon meeting the senator and engaging in meaningful conversations, they experienced a surge of optimism and fulfillment, particularly when receiving praise from Senator Cutter herself, which further reinforced their belief in the impact of their advocacy efforts. This sense of accomplishment deeply resonated with them, as they understood the far-reaching implications of their actions, benefiting not only their local community but also citizens statewide. One student shared, “I think being able to share our personal experiences within our community to people around the state like Senator Cutter allowed us to reflect on all the different safety issues and things that we can make more resilient in our community.”

In addition, the ability to share personal experiences and feel valued by decision makers, undoubtedly increased students’ self-confidence due to their experience with the ERT. These observations were further supported by responses from students on the pre- and post-unit surveys. Pre- and Post-unit surveys were facilitated to capture a broader assessment of the experiences of students in the full case study class. Twenty-one students participated in these pre- and post-surveys. The students rated their understanding of community resilience and their confidence in speaking to community members about resilience efforts. These ratings were significantly higher on the post-survey compared to the pre-survey (Understanding:  $Z = 2.74$ ,  $p < 0.01$ ; Confidence:  $Z = 2.18$ ,  $p < 0.05$ ). The students were also asked open-ended questions about their impressions of the course and how it impacted their confidence in engaging with community members on the topic of resilience to local natural hazards. Students reported that the program improved their awareness of specific actions to take (e.g., “It showed me that you need [need] to evacuate and make a safety quit [kit],” “knowing what I can do to help, and how to help others prepare along with myself”), and it increased students’ awareness and knowledge about resilience and natural hazards (e.g., “It made me more aware,” “taught me more about the concept”). Some students also noted that knowing more about natural hazards and community resilience helped them talk to community members (e.g., “It gave me more information on the subject I was talking about,” “I can say more about what it [resilience] means than the first time I saw that word”). When asked what advice they would give other middle schoolers who want to make change in the community, student responses encouraged confidence, courage, and teamwork. One student said, “I think really just making sure to not be scared to speak up and tell people, Hey, look what’s happening. We need to fix this” (RISE Challenge 2023 Q&A video; [Google Docs](#), n.d.). Students valued hearing from community leaders and scientists, and in turn, these experts showed that they valued youth voice. Case study class teacher and co-author (R. Davis) observed that in the class overall students were very engaged and enjoyed learning about wildfires and hearing from guest speakers. She also noted that this was the first exposure to the term “resilience” for most students. When asked about their experience working with community leaders, one ERT student said, “I personally felt like they were really happy that young people were concerned, and [they] were really trying to help us succeed” (RISE Challenge 2023 Q&A video; [Google Docs](#), n.d.). Students’ open-ended responses also indicated that one of the best parts of the unit was getting to learn from guest

speakers, including scientists and community leaders in emergency management. For example, one student shared that the best part was “The guest speaker. It was cool to hear his story’s [stories] and pictures and firsthand experience.” Another student indicated the best part was learning about how “... scientists study fire to see how they could make a difference.” Together, these findings show how engaging students in place-based learning about natural hazards resilience efforts in collaboration with community members and incorporating avenues for civic engagement can support youth empowerment and inspire environmental action.

## 5 Discussion: inclusion of youth voice in climate change related decision-making

In order to engage with climate change related decision-making and engage in civic action, students need a foundational understanding of the science and civic processes, collaborative and reciprocal relationships with community leaders that value youth voice, and the ability to express their own voice supported by a youth-adult partnership (Y-AP).

### 5.1 Students need an initial understanding of the scientific concepts, local history, and civic processes to engage with civic action, which in turn helps them master their understanding

The HEART Force and Earth Force curricula complement one another to provide science teachers with a variety of lessons and activities that empower students to engage with higher level thinking and environmental action civics. Students who have learned about the hazard and mitigation practices were able to use democratic decision making practices to imagine community-based actions to address the threat of natural disasters and strengthen their community resilience. The case study showed how students flexed their muscles in civic engagement by modeling deliberative practices that community leaders and decision makers use. The case study illustrates that careful instructional preparation scaffolds students’ ability to engage with policy makers and leaders and meaningfully contribute to community wide decision making.

### 5.2 Strong relationships and youth-adult partnerships are critical to foster youth engagement in the civic process

Just like in the professional world, collaborative and responsive relationships between students and community leaders are essential to young people’s ability to successfully engage in decision making. As shown in this story of the Estes Park ERT, relationships with local professionals increased students’ feeling of agency and sense that they were contributing meaningfully to the community’s preparedness. However, it was critical for the success of the project that the teachers were local champions who had well established relationships within

the community and were able to bring in professionals who took the students’ ideas seriously. Civic decision making timelines are often quite different from the rigidly scheduled classroom timelines dictated by school calendars, standardized testing schedules, and classroom time limitations. In this case, the creation of the ERT provided additional time for students to engage with their action projects, which built upon knowledge gained in classroom instructional time. The ERTs allowed for students to dedicate time needed for research and successful project planning and implementation outside of the classroom. The relationship between the EVFPD fire chief and the students created the opportunity for students to engage with a timely topic of a relevant wildfire focused bill and engage authentically in the civic process of providing input into legislation. Had the bill gone to the floor during summer break, or the fire chief not given students the inspiration to reach out to the representative, the opportunity of tangible civic engagement may not have been available for the ERT students. Creating new relationships with local hazard professionals may take years to develop, and the efficacy increases with the depth of the relationship. Educators planning to support their students in identifying and pursuing civic actions may therefore partner with well-connected local experts.

A mid-term outcome of the ELP Theory of Change is for youth to be viewed as partners in achieving resilience by community leaders (Bey et al., 2020). The case study showed that the local fire chief and the senator considered the ERT students’ voices valuable, relevant and worthy of attention. This direct civic engagement allowed the students and the Estes Park community to benefit from a multigenerational holistic approach to resilience planning. The HEART Force and Earth Force programs emphasize the importance of student voice and choice through supporting genuine youth-adult partnerships (Y-AP). In Y-AP, both adult and student assets are upheld, contributions are valued, and learning is reciprocal (Youth-Adult Partnerships–Earth Force Resources, n.d.). An essential component of Y-AP is valuing student voice, which reframes students’ roles in classrooms from “passive beneficiaries to active stakeholders in education” (Conner, 2020). Research has shown that when students engage with decision making through supportive adult relationships that foster a sense of safety, their emotional and cognitive engagement increases along with their confidence and sense of empowerment, critical consciousness and community connections (Krauss et al., 2013; Zeldin et al., 2018). In the Estes Park ERT, students built upon their lived experience to develop solutions that would be meaningful to them personally, as well as their community and home state. These students shared that the experience of sharing their personal stories with community leaders helped them to reflect on the ways they could help to make their community more resilient and it empowered them to use their voices to encourage environmental and civic action.

### 5.3 Exposure to a variety of community leaders and experts supports student visioning of solutions

The feedback process for the ERT project prioritized student learning and community impact, fostering enduring collaborations among youth, elected officials, and non-profit organizations. Beginning with the identification of relevant stakeholders, including

local authorities and organizations like the local fire chief and the Estes Valley Watershed Coalition, the teacher facilitated regular interactions between students and experts throughout the project timeline. In addition to these expert engagements, weekly meetings were held with the team and teacher, providing dedicated time for students to discuss progress, solicit feedback, and brainstorm solutions. These feedback sessions, occurring at consistent intervals, provided opportunities for students to present their ideas and receive constructive input, fostering continuous improvement. The collaborative nature of these meetings nurtured youth-adult partnerships, enriching students' educational experience and preparing them for active citizenship. The project also cultivated lasting collaborations beyond its duration, crucial for addressing broader state-level concerns and ensuring the sustainability of students' solutions. Through consistent engagement and collaboration, students developed meaningful solutions and built relationships that continue to benefit the community.

Over the past 2 years, the team has grown from 7 to 13 members, with students eagerly rejoining each year and often recruiting new members, driven by a desire to build upon their previous work. As students engage in these projects, they build essential leadership skills, which empowers them to initiate further collaborative efforts to make a greater impact. During the 2023–24 school year, they continued to partner with the Estes Valley Watershed Coalition on current data collection and water monitoring efforts along Fish Creek. Additionally, they have partnered with town experts to develop a plan for the stormwater drainage system. After inspecting detention basins around town, the team is gathering data and preparing a proposal for town officials, highlighting the need to maintain these basins to ensure efficient water flow and minimize flooding.

#### 5.4 Engaging K-12 students in civic action requires strong teacher engagement and leadership

Working within the constraints of formal K-12 education can be challenging, and most classroom teachers are not able to engage with ambitious student-led projects such as the ERTs. The here featured teachers showed exceptional engagement and fostered relationships with community leaders in addition to their own teaching responsibilities. While the Estes Park teachers required relatively little support, program managers at HEART Force and Earth Force often provide additional support for teachers to connect with community leaders. Program managers make initial contact with leaders, coordinate logistics for meeting times of these experts with teachers and classroom visits, and are able to discuss possible opportunities for student civic engagement. Teachers are often stretched thin, and having a program manager to maintain momentum and be a backstop for relationships has proved invaluable for students and teachers to achieve their project goals. While co-author Ravi Davis has been able to facilitate the action project, the program managers at Earth Force and HEART Force found that many teachers require significantly more support to facilitate student action projects. The reality of classroom teachers busy schedules' today often does not allow additional time to coordinate guest speakers and engage with local resilience efforts and may create a barrier in implementation if additional program support is not available.

#### 5.5 Engagement of K-12 students in civic process builds a foundation for lifelong civic action

As the literature shows, perhaps one of the most important outcomes of these programs is the transformative experiences these students had during their middle school years increases the probability of their civic engagement in the future (Rosenstone and Hansen, 1993; Verba et al., 1995). Through this work, ERT students gained invaluable exposure to the democratic process, increasing the likelihood of their participation in political processes as they get older. As the sophistication of students' understanding of the wildfire problem increased over a few years in the ERT, students moved from a short term ameliorative project, giving out a few hundred go-kits to local families, to focusing on long term institutional policy reform, by advocating for the Wildfire Resiliency Building Code Board establishment. This shift exemplified a deeper approach to action civics (Levinson, 2014), in which the teachers challenged students to critically reflect on their own lived experiences, and the systems and policies in place that are root causes for increased wildfire risk. Over time, students engaged in what Levinson (2014) calls a virtuous cycle, where "effective learning and practice improve outcomes in a way that motivates further learning and engagement." Arguably, in the extra-curricular setting of the ERT, students have a unique opportunity to dedicate time and energy to develop their ideas and engage with a virtuous cycle to identify levers of power to address their problem, and in the meantime gain empowered and public-spirited attitudes (Levinson, 2014).

#### 5.6 Environmental justice provides useful theoretical framing

This paper highlights the transformative potential of youth engagement in hazard resilience programs that are grounded in the principles of environmental justice. By integrating scientific education with civic action, the ERT project empowered students to become active participants in resilience planning and policy advocacy. The success of this program underscores the importance of youth-adult partnerships to foster meaningful youth engagement in environmental decision-making.

### 6 Conclusions and recommendations

This case study is a story of success, that describes an initiative led by a small group of students in a rural Colorado community to take meaningful action against the impacts of climate change. The students became acutely aware of the impacts of climate-fueled hazards when they had to quickly evacuate their home to escape impending danger from the fast moving, record-size East Troublesome and Cameron Peak fires of 2020. In their science classroom and through an afterschool club, students were guided by their educators to explore what action they could take to avoid having to repeat the stressful experience of evacuation. Initially, students created "go-bags" to help other families be more prepared. In the following year, the students' agency and reach expanded by advocating for statewide policy change around wildfire resilience. The



HEART Force and Earth Force education and engagement programs work across the state of Colorado with similar classes and student groups to guide them towards resilience action projects. This case study illustrates the ingredients for a successful implementation of student action projects: most importantly, the commitment of the lead teacher is critical for the success of the projects. The structure that the teacher provided for regular meetings between students and the teacher to discuss progress, address challenges, and give each other feedback, fostered the students' skills to maintain momentum and effectively complete their project. The after-school club and the development of the ERT provided additional time and support for students to pursue action outside the classroom and gave students more capacity to pursue change, as compared to student engagement projects that occur during classroom time only. The commitment of local emergency personnel such as the fire chief to work with the afterschool ERT over several years allowed students to iterate on their strategies to address wildfire resilience with the chief's support and guidance. The case study shows that the key ingredients of success to this project are commitment, structure, community and programmatic support, and thus provide a framework that is transferrable to other contexts, communities and student action projects.

## Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## Ethics statement

Written informed consent was obtained from the individual(s), and minor(s)' legal guardian/next of kin, for the publication of any potentially identifiable images or data included in this article.

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## Author contributions

KS: Conceptualization, Project administration, Writing – original draft, Writing – review & editing. RD: Writing – original draft, Writing – review & editing. TR: Writing – original draft, Writing – review & editing. AG: Funding acquisition, Project administration, Writing – original draft, Writing – review & editing. AC: Writing – original draft, Writing – review & editing. ML: Methodology, Writing – original draft, Writing – review & editing. KB: Writing – original draft, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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