

Report on the NOAA Office of Education Environmental Literacy Program Community Resilience Education Theory of Change



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EXECUTIVE SUMMARY

NOAA's Environmental Literacy Program (ELP) supports projects that both inspire and educate people to use Earth system science to increase ecosystem stewardship and resilience to extreme weather, climate change, and other environmental hazards (NOAA Education Strategic Plan, 2015–2035). In 2015, ELP grants shifted from focusing on climate change education to community resilience education.

This shift occurred in response to a need identified by ELP grantees to use approaches that are more solutions-oriented for educating, engaging, and empowering children, youth, and adults to tackle climate impacts and other environmental challenges. Resilience offered a framework that is locally focused, solutions oriented, and actionable. Since this shift occurred, the program has funded 22 community resilience education projects across the United States, testing approaches that target different audiences.

Community resilience education was not only a new area of investment for NOAA's Office of Education, but also an emerging field in education that required different ways of planning and implementing programs than previous approaches used in climate change and science education. Many lessons were being learned by ELP grantees and their peers who were working toward building community resilience through informal and formal education. At the same time, ELP staff were being asked to articulate how one would demonstrate that ELP-funded projects were contributing to achieving the stated goal of the funding program: to build the environmental literacy of children, youth and/or adults so they are knowledgeable of the ways in which their community can become more resilient to extreme weather events and/or other environmental hazards and become involved in achieving that resilience. The need to create a theory of change for the ELP's community resilience education grants became clear.



What Is a Theory of Change?

The ELP Community Resilience Education Theory of Change communicates the overarching philosophy guiding its grants program. It can also be used to inform project-level logic models, ensuring that a project's activities, outcomes, and goals are aligned with the ELP outcomes and goals articulated in this theory of change. Theories of change, much like logic models, are tools for planning, implementation, and evaluation of an initiative. They are broad in scope and are typically focused at the program level rather than on the individual project level. Following guidance from the United Kingdom Climate Impacts Programme's report Theory of Change approach to climate change adaptation programming (Bours, McGinn, and Pringle 2014), the ELP Community Resilience Education Theory of Change includes: (1) a problem statement, wherein the challenge to be addressed is articulated fully; (2) an end goal, which is the "big picture" outcome toward which the program resources and activities are aimed; and (3) the pathways that will lead toward achieving that outcome. The end goal here is large in scope and it cannot be accomplished by NOAA or the ELP alone. Therefore, an intermediate goal that articulates how the ELP contributes to the end goal has also been written and is referred to as the ELP goal. Interventions provided by the agency and program show how both are working to address the challenges laid out in the problem statement to achieve the end goal.

Defining Resilience

The ELP acknowledges that the concept of resilience has been defined, researched, and debated across many academic disciplines, and has grown increasingly popular in recent years in research and policy discourse (Dubois and Krasny 2016; Meerow, Newell, and Stults 2016). For this theory of change, the definition of resilience used is the one put forth by the U.S. Global Change Research Program (USGCRP), "a capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment" (2020). It is important to note that this definition of resilience, like many others, is limited to a concept of "bouncing back" to a previous state that may be fundamentally unstable and unjust. In the theory of change that follows, this limitation has been attempted to be addressed by articulating an end goal that encompasses "bouncing forward", that is, transforming to a more equitable and sustainable future state (Figure 1).



Situating Community Resilience Education among NOAA's Other Resilience Investments

This theory of change demonstrates the ways in which the ELP fills a gap in resilience-building approaches and the audiences engaged by those approaches. NOAA's other resilience investments are focused on creating and promoting the use of science-based information and training for adults to apply that information within the context of their professions. While building the capacity of adults to use this information in a professional context is essential, so is equipping community members with the environmental literacy necessary to make informed decisions about the place-based challenges they face outside of a professional context. When community members engage in informed decision making, the efforts of resilience practitioners and local or state officials engaged in building community resilience are further supported.

Purposes of This Theory of Change

The ELP's aim in creating this theory of change is to outline the conceptual framework for the ways in which community resilience education can lead to increased community engagement and civic action, ultimately leading to a healthier, more resilient, and equitable society. This theory of change will serve a suite of purposes:

1. To provide a visual representation of the overarching philosophy that guides the current focus of the ELP grants program, informing program evaluation and future funding announcements. The theory of change is a tool to communicate the program's purpose, audiences, and activities, as well as the assumptions, intended outcomes, and ultimate end goal of ELP investments.
2. To offer current and future ELP grantees a resource to understand how their local efforts contribute to a broader, national effort to increase resilience to extreme weather, climate change, and other environmental hazards.
3. To aggregate effective approaches and outcomes identified by grantees.
4. To articulate the value of education in community, city, state, and national efforts to build community resilience to extreme weather, climate change, and other environmental hazards.
5. To serve as a model for how environmental literacy contributes to resilience that others working in the field of community resilience might use.

Intended Audiences

The intended audiences for this theory of change are NOAA colleagues; grantees; grantee partners; applicants; education professionals; resilience practitioners; and individuals from other local, state, and federal government agencies, environmental non-governmental organizations, and community, corporate, and private foundations.



Sources and Feedback

Numerous sources were consulted in the development of this theory of change. The community resilience education projects funded by the ELP served as the primary basis for the theory of change. Relevant theories of change from other programs were also consulted. An extensive review of published literature in related fields was conducted (see Section II). The concepts explored through the literature review form the basis for the set of assumptions that explain the relationship within and among the causal pathways of the ELP theory of change.

These summaries fall into six thematic clusters:

1. Resilience to Extreme Weather, Climate Change, and Other Environmental Hazards;
2. Science, Technology, Engineering, and Math (STEM) Education, Environmental Education, Social Studies Education, and Related Literacies;
3. Connecting Environmental Literacy and Social-Ecological Resilience;
4. Active Learning, Social Learning, and Co-Production of Knowledge;
5. Equitable Resilience and Climate Justice; and
6. Empowering Agents of Change.

Just as important was the input received throughout the development process. NOAA leadership and staff in NOAA's Office of Education, the NOAA Education Council, and NOAA experts in climate resilience and education provided feedback. Stakeholder input was also gathered at the 2019 NOAA ELP Community Resilience Education Grantee Workshop and the 2019 American Geophysical Union Fall Meeting.



Characteristics of NOAA's ELP Community Resilience Education Projects

Community resilience education programs differ from other science or environmental education programs in that they have different objectives, novel methods, and rely heavily on strategic partnerships (e.g., local/state government agencies and community-based organizations). Recognizing the importance of peer-to-peer learning and sharing best practices in developing fields, the ELP formed a community of practice among the ELP community resilience education grantees, their partners, and other resilience programs at NOAA. Collaboration within this group allows for identification of unique aspects of community resilience education projects and advances the field more rapidly. The concept of **community resilience education** has emerged from what the ELP community of practice learned collectively and has formed the basis of this theory of change.

A definition of education as it pertains to community resilience to extreme weather, climate change, and other environmental hazards has also been generated:

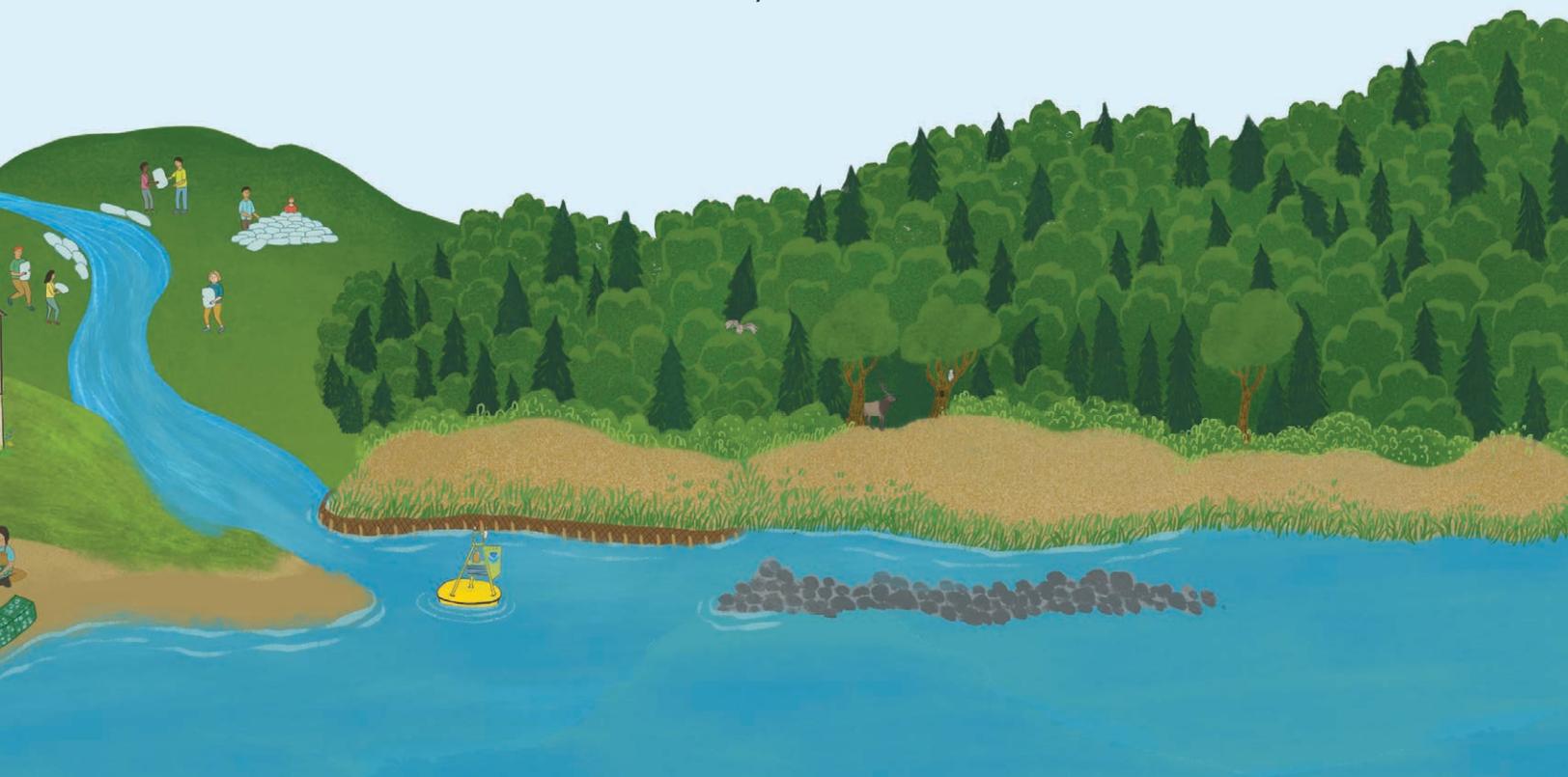
Community resilience education: Educational approaches that develop community-level environmental literacy to understand threats and implement solutions that build resilience to extreme weather, climate change, and other environmental hazards. Environmental literacy here includes the knowledge, skills, and confidence to: (1) reason about the ways that human and natural systems interact globally and locally, including the acknowledgement of disproportionately distributed vulnerabilities; (2) participate in civic processes; and (3) incorporate scientific information, cultural knowledge, and diverse community values when taking action to anticipate, prepare for, respond to, and recover from environmental hazards, including mitigating and adapting to climate change.

The effort to articulate a theory of change for community resilience education also motivated program staff to identify the characteristics that make NOAA's ELP community resilience education projects different from previous investments. These characteristics are summarized on the facing page.



NOAA's ELP Resilience Education Projects...

1. Build collective environmental literacy
2. Focus on current and future place-based environmental hazards
3. Support local and state government resilience efforts through use of resilience plans and creation of new partnerships between education institutions and local or state government offices charged with resilience planning
4. Incorporate scientific information, including NOAA's resilience assets
5. Explore and implement community-scale solutions to improve community resilience
6. Integrate social, historical, economic, and ecological factors into teaching about the ways human and natural systems interact
7. Integrate the history, culture, and lived experiences of diverse community members
8. Promote equitable and inclusive resilience planning that ensures historically marginalized voices are incorporated in the process and contributes to overall community health
9. Use active learning
10. Use social learning approaches that cultivate social cohesion
11. Facilitate opportunities for civic engagement and enable audiences to take action in their communities
12. Inspire hope and empower agents of change
13. Build capacity within education systems to address community resilience
14. Develop successful community resilience education approaches that contribute to the ELP Community of Practice





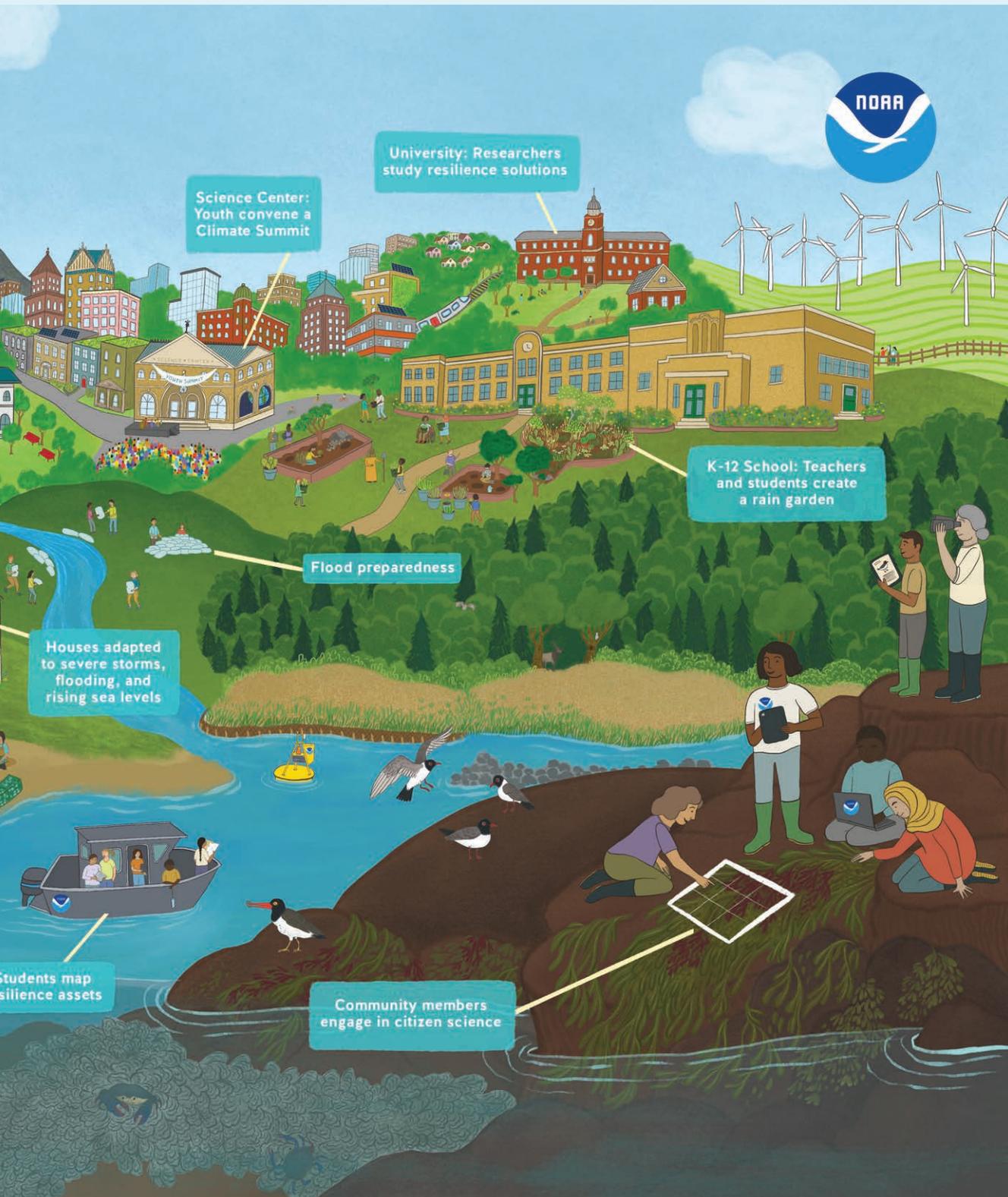


Figure 1: This illustration of the ELP Vision of a Resilient Community depicts several key aspects of the ELP Community Resilience Education Theory of Change. The ELP and end goals are brought to life through this portrayal of the future. The illustration also depicts all of the major institutional players, such as museums, aquariums, K–12 schools, universities and other educational and community-based organizations; the audiences; and the key approaches that have been identified as effective in using education to build community resilience. Children, youth, and adults are learning together and are directly engaged in activities that improve the resilience of their community.

Introducing the ELP Community Resilience Education Theory of Change

The complete theory of change is contained in Section IV of this report. It includes the full text of the problem statement; agency and program-level interventions; the ELP goal; the end goal; as well as a “Pathway to Change” diagram that depicts the major outcomes from the six causal pathways and how they relate to the problem statement, interventions, ELP goal, and end goal (Figures 2a and 2b).

In addition, causal pathway diagrams showing all short-, mid-, and long-term outcomes are included. The causal pathways are based on the approaches and outcomes from the ELP-funded community resilience education projects and assumptions gleaned from the literature review discussed in Section II of this report.

The Causal Pathways are as follows:

- **Causal Pathway 1:** ELP Community of Practice Advances Effective Approaches
- **Causal Pathway 2:** Resilience Planning and Policies Integrate Education
- **Causal Pathway 3:** Active Learning Enables Community Engagement in Civic Processes
- **Causal Pathway 4:** Understanding Cultural and Historical Context of Place Builds Social Cohesion
- **Causal Pathway 5:** Student-driven Action Projects Implement Resilience Measures
- **Causal Pathway 6:** Youth Summits Empower Agents of Change





The six causal pathways in this theory of change are not the only means to achieve community resilience through education, nor are they meant to be prescriptive. Successful projects may achieve outcomes in several different causal pathways and not all projects will achieve all of the long-term goals in a pathway. Most of the short- and mid-term outcomes encompassed in these pathways are already occurring in existing projects, whereas the long-term outcomes are aspirational and may occur with more effort (i.e., more than one project) and over a longer time period. Community resilience education projects can be evaluated based on pathway outcomes, although impact evaluation would likely include outcomes specific to project goals and context. As additional investments in this area are made and the program evolves, additional outcomes or causal pathways may be developed. Other institutions beyond those funded through NOAA's ELP may identify other causal pathways that contribute to the end goal articulated in this theory of change.

The Community Resilience Education Theory of Change is a living document that will be updated regularly to reflect progress made by the ELP, as well as other contributions to the field of community resilience education.



NOAA's Environmental Literacy Program Community Resilience Education Theory of Change PATHWAY TO CHANGE

LEGEND

- No order of occurrence
- Occurs first
- Occurs second

PROBLEM STATEMENT

- Climate change is an increasing threat and communities are not fully prepared;
- Some groups are more vulnerable than others;
- More policies and actions that promote preparation, adaptation, and greenhouse gas mitigation are needed; and
- Policies and actions need to be informed by, and reflect the values of, community members.

Therefore...

- Communities need the collective skills, knowledge, and confidence (i.e., environmental literacy) to participate in decision making that informs policies and practices; and
- Different education approaches are needed to build environmental literacy and encourage civic engagement around resilience.

NOAA's INTERVENTIONS

NOAA focuses on four long-term goals that make important contributions to resilient ecosystems, communities, and economies. These goals include: Climate Adaptation and Mitigation, Weather-Ready Nation, Healthy Oceans, Resilient Coastal Communities and Economies.

ELP's INTERVENTIONS

In response to the great need throughout the United States, NOAA's Environmental Literacy Program (ELP) supports the development and strengthening of resilient communities through competitive grants, in-kind support (including NOAA personnel and other scientific assets), and an ELP Community of Practice.

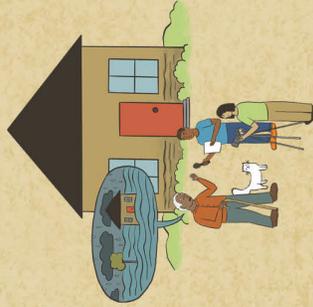
SHORT-TERM OUTCOMES



Children, youth, and adults learn about the most pertinent environmental hazards of the place where they live and potential solutions.



Community members develop an understanding of the history, culture, and lived experiences of diverse community members and the socio-economic factors of environmental hazards.



Civic engagement opportunities for community resilience are explicit and accessible to community members.

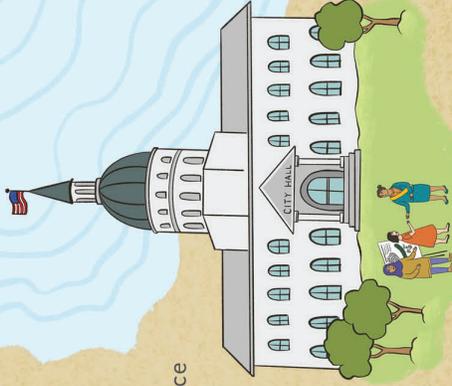


Community resilience education grantees convene and share their findings.

Community members have the knowledge, skills, and confidence to implement solutions to improve community resilience.



Community members are familiar with local and state resilience plans and can use science tools to make informed decisions.



Education organizations create new partnerships with local and state government offices charged with resilience efforts.



Figure 2a: Pathway to Change

MID-TERM OUTCOMES

Diverse community members are civically engaged and make informed contributions to community resilience decisions.

NOAA's ELP Community of Practice advances effective community resilience education.

Community members help resilience practitioners implement equitable and culturally relevant preparedness, adaptation, and carbon mitigation actions.

LONG-TERM OUTCOMES

Collective environmental literacy is built among children, youth, and adults within a community.

Equity is central to community resilience education approaches.

Social cohesion is increased, contributing to community resilience.

Government resilience policies and plans incorporate and provide support for community resilience education.

Community resilience policies reflect the values of society.

Communities have greater adaptive capacity.

Youth act as agents of change to increase resilience in their community.

Educational activities support local and state government resilience efforts.

Student-driven, and educator supported, action projects improve community resilience.

Resilience practitioners value and support education projects.



Community members feel hopeful and are motivated to take action.

Community members understand and act in support of local and state resilience efforts.

ELP OUTCOME = ELP GOAL

Communities have sufficient collective environmental literacy to take actions that build resilience to extreme weather, climate change, and other environmental hazards in ways that contribute to community health, social cohesion, and socioeconomic equity. These communities are composed of individuals who participate in formal and informal education experiences that develop their knowledge, skills, and confidence to:

- reason about the ways that human and natural systems interact globally and locally, including the acknowledgement of disproportionately distributed vulnerabilities;
- participate in civic processes; and
- incorporate scientific information, cultural knowledge, and diverse community values in decision making.

END GOAL

Communities are resilient to current and future environmental hazards in that they have the capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment. Environmental literacy—along with community health, civic engagement, social cohesion, and equity—enhance resilience. Stewardship of healthy ecosystems, a low-carbon economy, and climate-smart and inclusive decision making further reduce risks from current and future environmental hazards.

LEGEND

- No order of occurrence
- Occurs first
- Occurs second



Figure 2b: Pathway to Change, continued

