

Using the U.S. Climate Resilience Toolkit to inspire authentic student-led projects

Starting with case studies of people who are taking steps to build climate resilience, participants will explore a spectrum of potential pathways for encouraging/inspiring students to initiate resilience-building efforts in their own communities.

Are YOU doing something about climate change?

- 1 – Yes, a lot.
- 2 – Yes, some.
- 3 – Only a little.
- 4 – Not much.
- 5 – No, nothing.

In your community, how easy/difficult would it be for students to identify a primary climate stressor?

- 1 – Very easy. Our biggest risk is very obvious.
- 2 – Somewhat easy based on past extreme events
- 3 – Somewhat difficult based on a range of past events.
- 4 – Very difficult. No clue of our vulnerabilities.

In your opinion, are your students
doing something about climate
change?

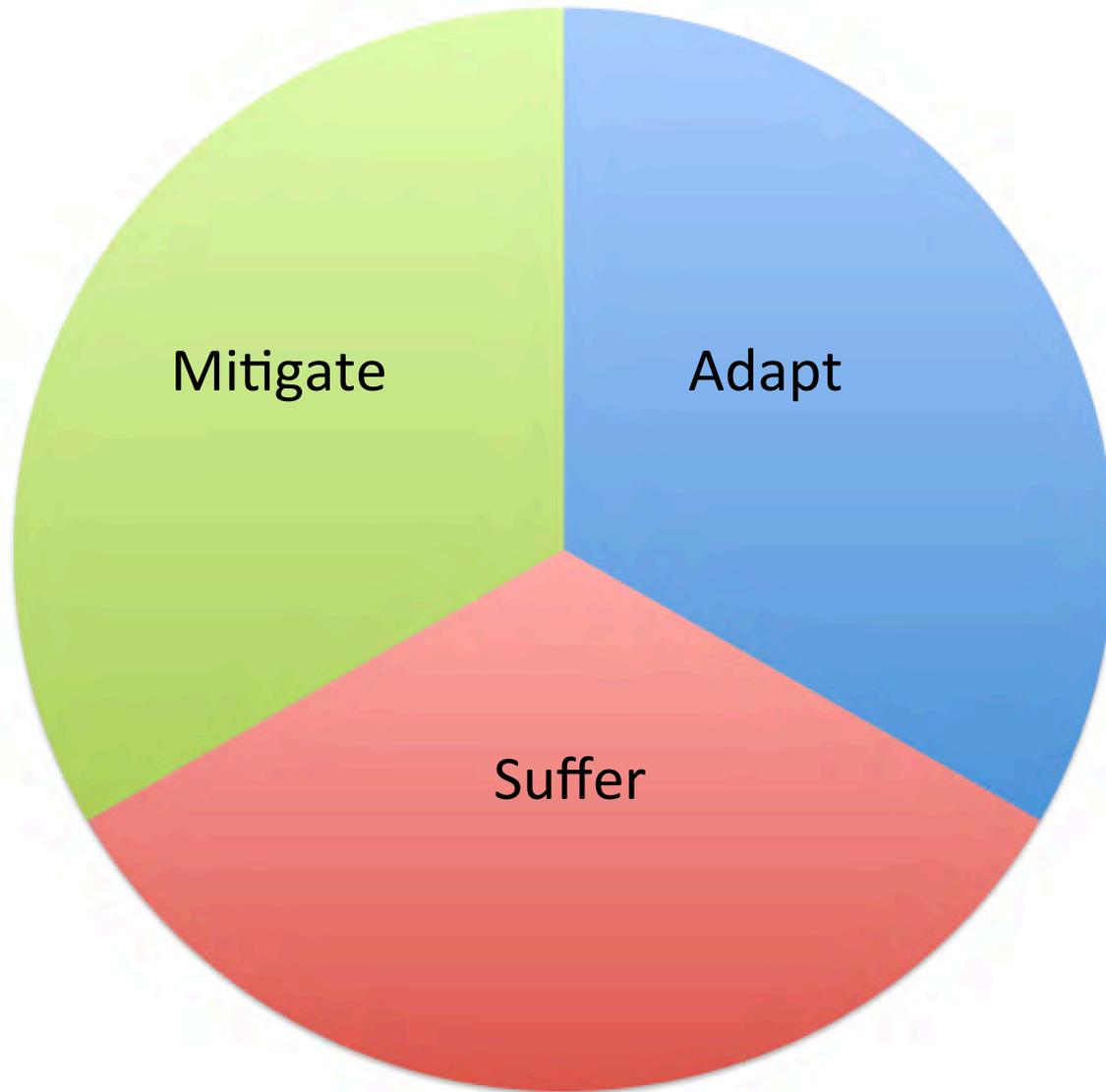
- 1 – Yes, a lot.
- 2 – Yes, some.
- 3 – Only a little.
- 4 – Not much.
- 5 – No, nothing.

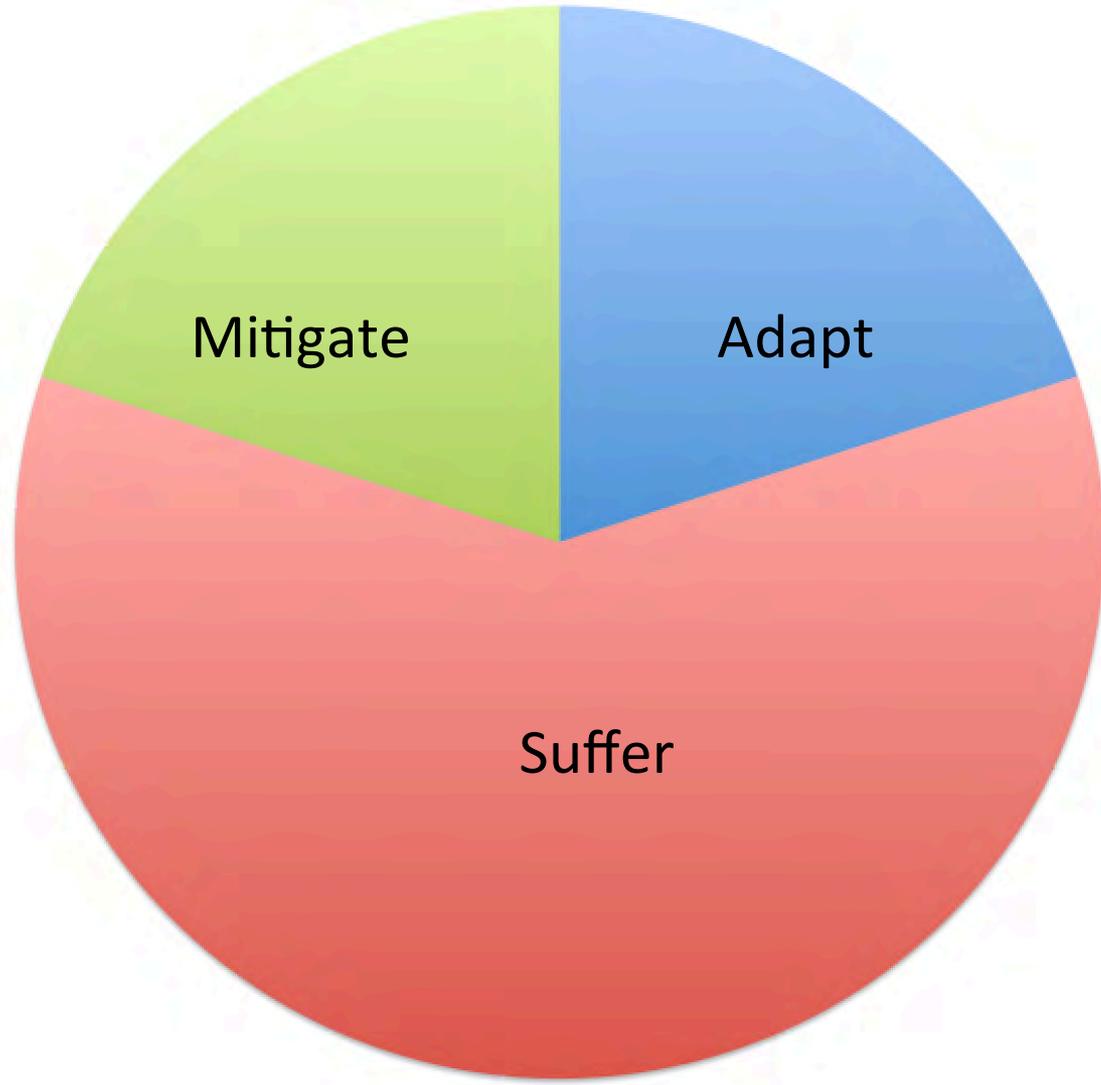
In your opinion, which of the following best describes students' attitudes about their ability to do something about climate change?

- 1 – Confident they can change the world
- 2 – Hopeful they can make a difference and willing to try
- 3 – Unsure they can make a difference so not willing to try
- 4 – Powerless to make any change

Which of the following do you perceive as the biggest obstacle keeping your community from addressing climate change?

- 1 – Belief they can't make a difference
- 2 – Waiting for “orders”
- 3 – Sense of having to give up comforts
- 4 – Waiting for someone else to start
- 5 – No, nothing

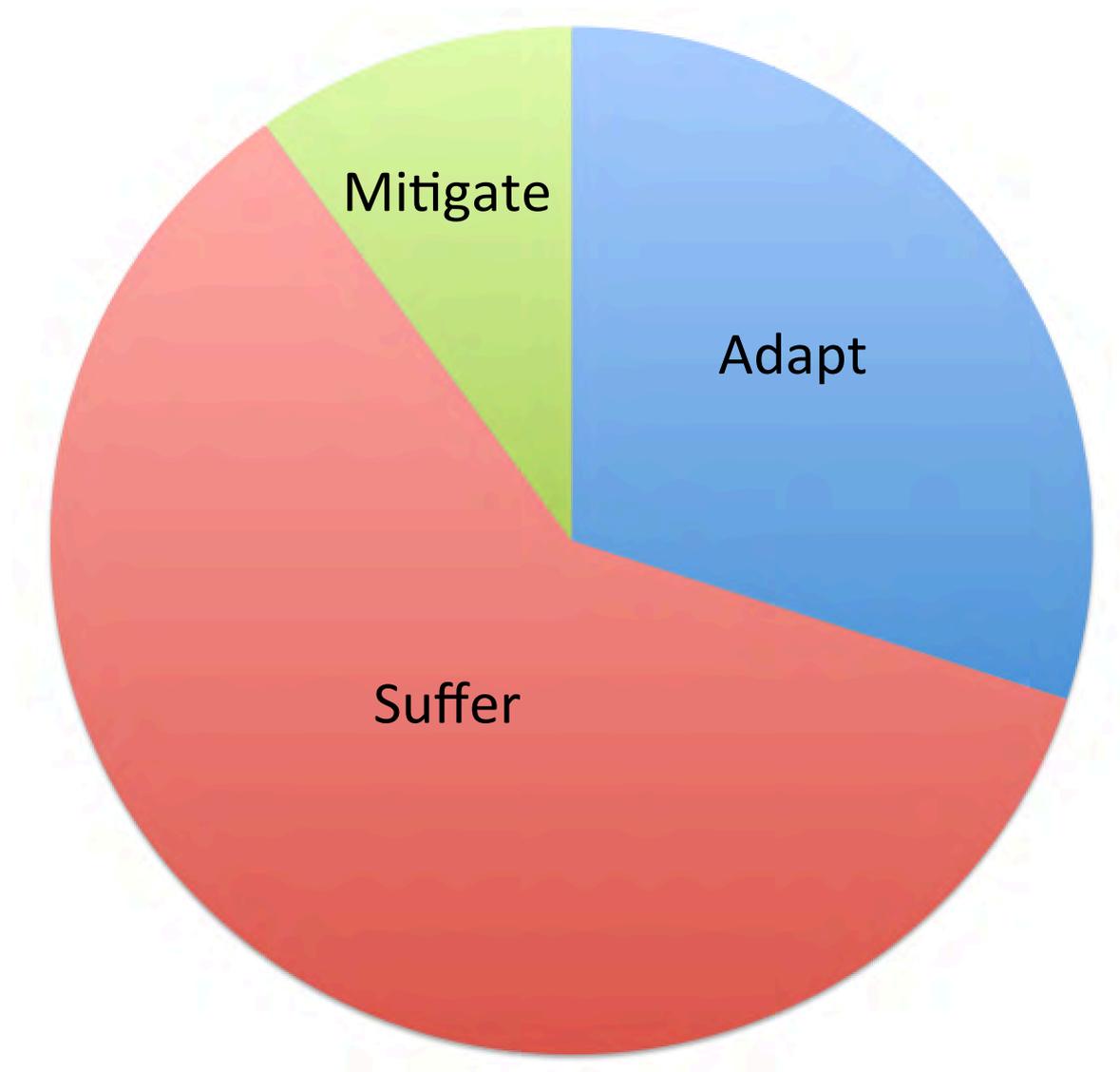




Mitigate

Adapt

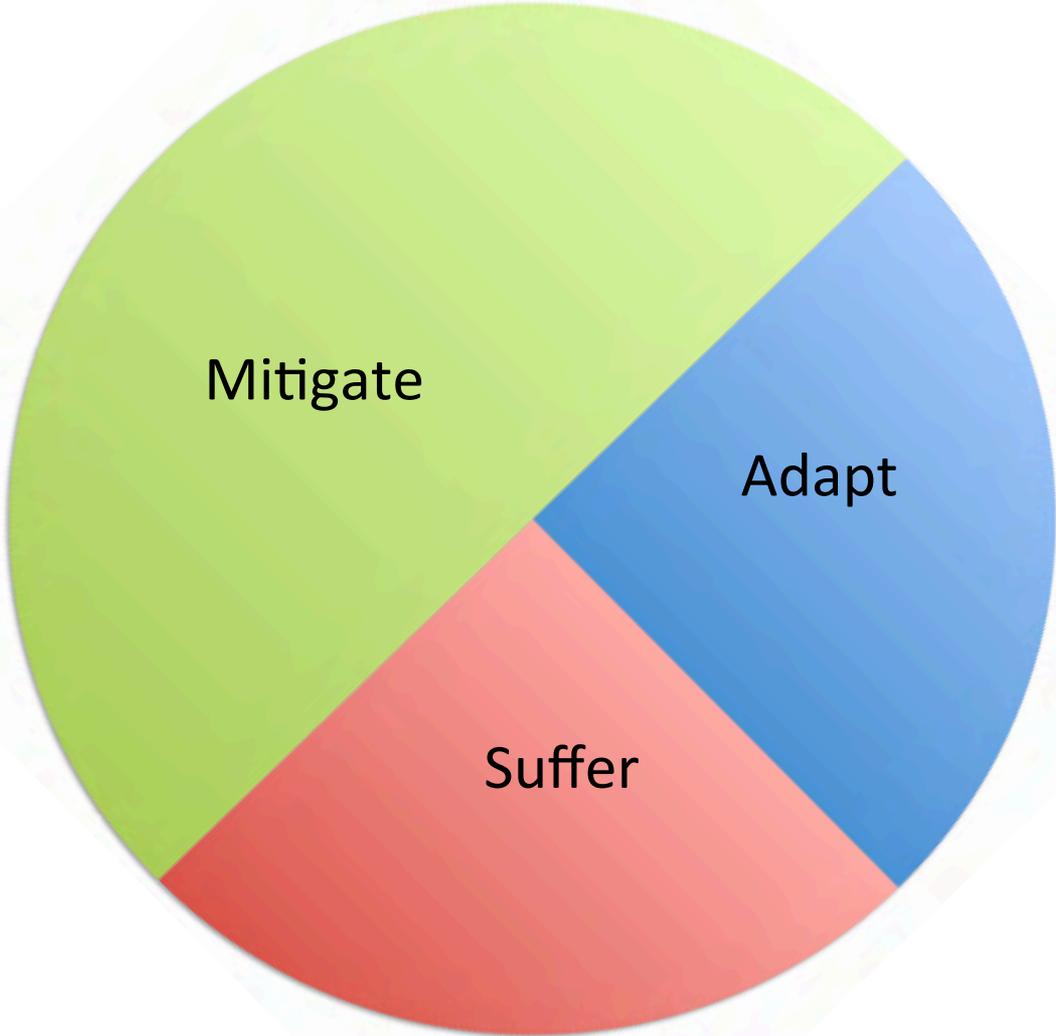
Suffer



Mitigate

Adapt

Suffer



Mitigate

Adapt

Suffer

CRT case studies that may inspire student interest

The screenshot shows the U.S. Climate Resilience Toolkit website. The header includes the logo, navigation links (Get Started, Taking Action, Tools, Topics, Expertise), and a search bar. The main content area features a large image of a mountain landscape with a text overlay titled "Anticipating and Preventing the Spread of Invasive Plants". Below the image, there are sections for "Intermingled ecosystems", "A leader in wildland stewardship", "Steps to Resilience:", "Tools:", "Topic:", and "Partners:".

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Taking Action > Anticipating and Preventing the Spread of Invasive Plants >

Anticipating and Preventing the Spread of Invasive Plants

Finding and eradicating invasive plants is a tough job that requires constant vigilance. County-scale maps that show where invasive plants are and where they have the potential to spread in the future are helping on-the-ground efforts to build the resilience of natural vegetation.

Intermingled ecosystems

The Klamath region of Northern California encompasses some of the wildest and least populated territory in the state. In this region, the Sierra Nevada range meets the volcanic Cascades and younger coastal mountains, and an incredible range of plant life springs from the diverse soils and varied microclimates.

Complex places like this are where scientists expect climate change to significantly scramble ecosystems. Shifts in temperatures, precipitation, wildfire regime, and atmospheric carbon will shift the geography in which species can thrive, leading to competition, migration, and adaptation.

A leader in wildland stewardship

Joshua Smith serves as Restoration Program Manager for the nonprofit Watershed Research and Training Center. The Center is based in the once-booming timber town of Hayfork, California, and Smith coordinates many wildland stewardship efforts across the Klamath region. One of the biggest challenges he faces in his work is preventing the spread of invasive plants. "It's one of the top ways we can protect the health of our forests and rivers," says Smith.

Steps to Resilience:

- Step 1: Identify the Problem
- Step 2: Determine Vulnerabilities
- Step 3: Investigate Options
- Step 4: Evaluate Risks & Costs
- Step 5: Take Action

Tools:

[CalWeedMapper >](#)

Topic:

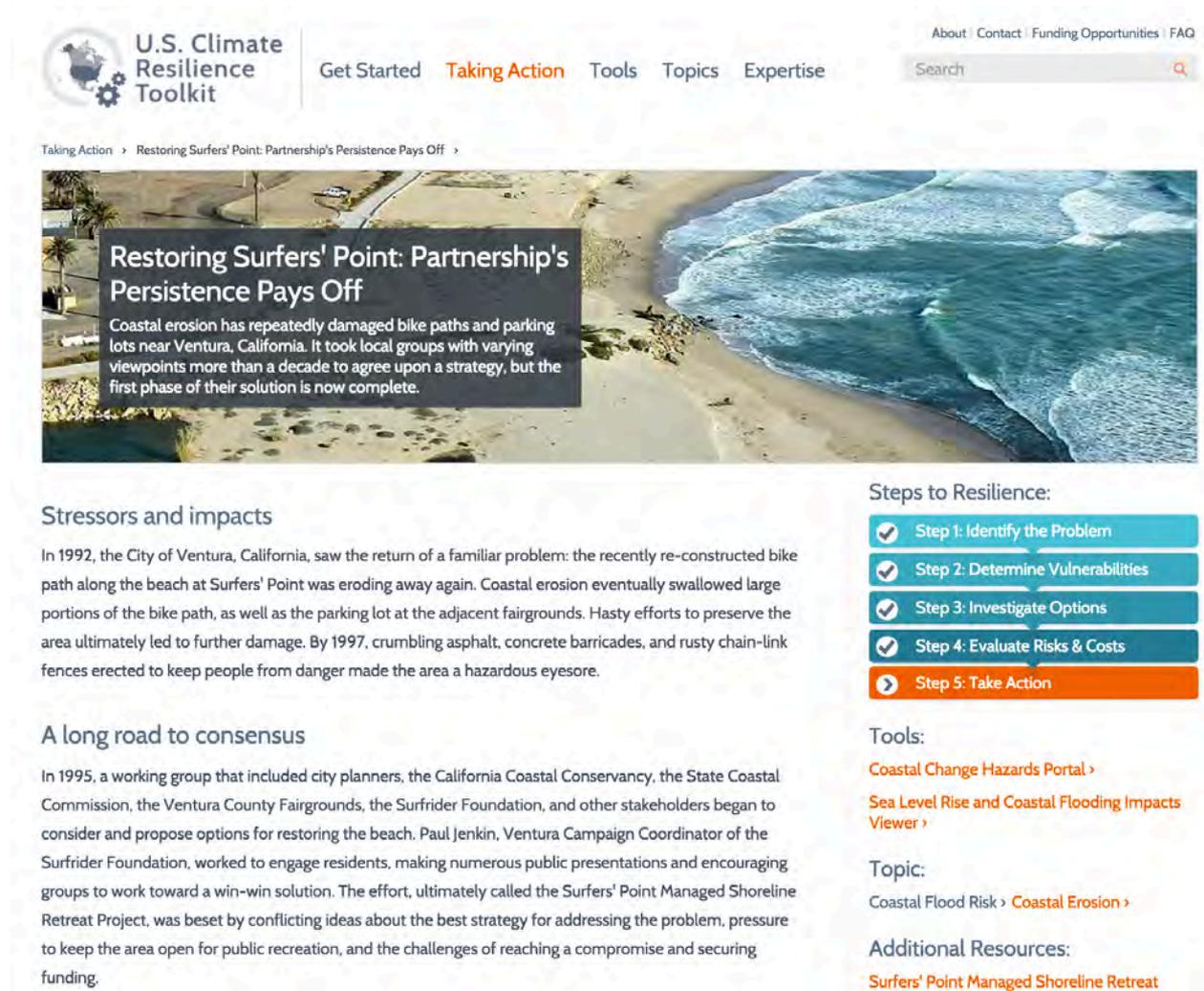
[Ecosystem Vulnerability >](#) [Invasive Species >](#)

[Ecosystem Vulnerability >](#)
[Biodiversity Conservation >](#)

Partners:

<http://toolkit.climate.gov/taking-action/anticipating-and-preventing-spread-invasive-plants>

CRT case studies that may inspire student interest



The screenshot shows the U.S. Climate Resilience Toolkit website. The header includes the logo, navigation links (Get Started, Taking Action, Tools, Topics, Expertise), and a search bar. The main content area features a large image of a beach with a text overlay titled "Restoring Surfers' Point: Partnership's Persistence Pays Off". Below the image, there are sections for "Stressors and impacts", "A long road to consensus", "Steps to Resilience", "Tools", "Topic", and "Additional Resources".

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Restoring Surfers' Point: Partnership's Persistence Pays Off

Coastal erosion has repeatedly damaged bike paths and parking lots near Ventura, California. It took local groups with varying viewpoints more than a decade to agree upon a strategy, but the first phase of their solution is now complete.

Stressors and impacts

In 1992, the City of Ventura, California, saw the return of a familiar problem: the recently re-constructed bike path along the beach at Surfers' Point was eroding away again. Coastal erosion eventually swallowed large portions of the bike path, as well as the parking lot at the adjacent fairgrounds. Hasty efforts to preserve the area ultimately led to further damage. By 1997, crumbling asphalt, concrete barricades, and rusty chain-link fences erected to keep people from danger made the area a hazardous eyesore.

A long road to consensus

In 1995, a working group that included city planners, the California Coastal Conservancy, the State Coastal Commission, the Ventura County Fairgrounds, the Surfrider Foundation, and other stakeholders began to consider and propose options for restoring the beach. Paul Jenkin, Ventura Campaign Coordinator of the Surfrider Foundation, worked to engage residents, making numerous public presentations and encouraging groups to work toward a win-win solution. The effort, ultimately called the Surfers' Point Managed Shoreline Retreat Project, was beset by conflicting ideas about the best strategy for addressing the problem, pressure to keep the area open for public recreation, and the challenges of reaching a compromise and securing funding.

Steps to Resilience:

- Step 1: Identify the Problem
- Step 2: Determine Vulnerabilities
- Step 3: Investigate Options
- Step 4: Evaluate Risks & Costs
- Step 5: Take Action

Tools:

- [Coastal Change Hazards Portal >](#)
- [Sea Level Rise and Coastal Flooding Impacts Viewer >](#)

Topic:

- [Coastal Flood Risk >](#) [Coastal Erosion >](#)

Additional Resources:

- [Surfers' Point Managed Shoreline Retreat](#)

<http://toolkit.climate.gov/taking-action/restoring-surfers-point-partnerships-persistence-pays>

CRT case studies that may inspire student interest

The screenshot shows the U.S. Climate Resilience Toolkit website. The header includes the logo, navigation links (Get Started, Taking Action, Tools, Topics, Expertise), and a search bar. The main content area features a large image of a pier over the ocean with a text overlay: "Show Don't Tell: Visualizing Sea Level Rise to Set Planning Priorities". Below this, a text box explains that city officials in Tybee Island, Georgia, used visualizations to raise awareness of sea level rise. To the right, a "Steps to Resilience" sidebar lists five steps: 1. Identify the Problem, 2. Determine Vulnerabilities, 3. Investigate Options, 4. Evaluate Risks & Costs, and 5. Take Action. Below the steps, there are links for "Tools" and "Topic".

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Taking Action > Show Don't Tell: Visualizing Sea Level Rise to Set Planning Priorities >

Show Don't Tell: Visualizing Sea Level Rise to Set Planning Priorities

City officials in Tybee Island, Georgia, recognized sea level rise as a growing problem for their community. Visualizations from a sea level rise viewer helped them raise awareness of the city's vulnerabilities and set priorities for adaptation efforts.

Stressors and impacts

As sea levels rise, Tybee Island, Georgia—once a favorite haunt of the notorious pirate, Blackbeard—faces a very different kind of threat from the ocean. The city is Georgia's most densely developed barrier island and a popular tourist destination: its year round population of 3,000 swells to roughly 30,000 during summer weekends. Since 1935, sea levels at nearby Fort Pulaski have risen 10 to 11 inches, and levels are projected to keep rising in the coming years. In order to prepare for and adapt to rising waters, Tybee Island officials knew they needed a plan.

Learning what's at stake

To develop a plan that could prepare their island for the future, city officials reached out to Dr. Jason Evans, an environmental sustainability analyst with the University of Georgia and Georgia Sea Grant. Evans worked with the city to help identify areas were most vulnerable to sea level rise.

Current MHHW

3 feet above MHHW

Steps to Resilience:

- Step 1: Identify the Problem
- Step 2: Determine Vulnerabilities
- Step 3: Investigate Options
- Step 4: Evaluate Risks & Costs
- Step 5: Take Action

Tools:

[Sea Level Rise and Coastal Flooding Impacts Viewer >](#)

Topic:

- Coastal Flood Risk > [Sea Level Rise >](#)
- Coastal Flood Risk > [Shallow Coastal Flooding \(Nuisance Flooding\) >](#)
- Transportation and Supply Chain > [Land-Based Transportation >](#)

Additional Resources:

<http://toolkit.climate.gov/taking-action/show-dont-tell-visualizing-sea-level-rise-set-planning-priorities>

CRT case studies that may inspire student interest

The screenshot shows the U.S. Climate Resilience Toolkit website. The header includes the logo, navigation links (Get Started, Taking Action, Tools, Topics, Expertise), and a search bar. The main content area features a large image of a sunset over a marsh with a text overlay: "Saving Tidal Marshes in the San Francisco Bay. As sea level rises, wetlands and marshes must move inland, or drown. The Sonoma Land Trust is using innovative strategies to restore and enhance marshlands and the ecosystems they support." Below this, the "Multiple threats" section describes how Julian Meisler, program manager for the Sonoma Land Trust's Baylands project, spends time in the area and knows the value of these wetlands. A photo of Julian Meisler kneeling in a marsh is shown with the caption "Julian Meisler, with tidal mudflats in background." The "The value of marshes" section states that San Francisco Bay is the second largest estuary in the United States and provides valuable ecosystem services. On the right, a "Steps to Resilience" section lists five steps: 1. Identify the Problem, 2. Determine Vulnerabilities, 3. Investigate Options, 4. Evaluate Risks & Costs, and 5. Take Action. Below this are "Tools" (Future San Francisco Bay Tidal Marshes) and "Topic" (Coastal Flood Risk > Sea Level Rise, Ecosystem Vulnerability > Biodiversity Conservation) links. Finally, an "Additional Resources" section includes a link to an FAQ about the Sears Point Wetland Restoration Project.

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Saving Tidal Marshes in the San Francisco Bay

As sea level rises, wetlands and marshes must move inland, or drown. The Sonoma Land Trust is using innovative strategies to restore and enhance marshlands and the ecosystems they support.

Multiple threats

In the glow of a winter sunrise, Julian Meisler admires a stretch of tidal mudflat and wetlands along the north shore of San Francisco Bay. As the program manager for the Sonoma Land Trust's Baylands project, Meisler spends plenty of personal and professional time in the area, and he knows how valuable these undisturbed and restored wetlands are for people and wildlife. The land here—once destined to host a casino-resort complex—was purchased by Sonoma Land Trust before construction began. This means the land will be conserved as open space into the future. However, Meisler perceives another threat to this valuable habitat: sea level rise.



Julian Meisler, with tidal mudflats in background.

The value of marshes

San Francisco Bay is the second largest estuary in the United States, and wetlands along its margin provide a range of valuable ecosystem services. For instance, tidal marshes provide flood protection for homes and businesses, filtration of stormwater runoff, prevention of

Steps to Resilience:

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Tools:

[Future San Francisco Bay Tidal Marshes >](#)

Topic:

[Coastal Flood Risk > Sea Level Rise >](#)

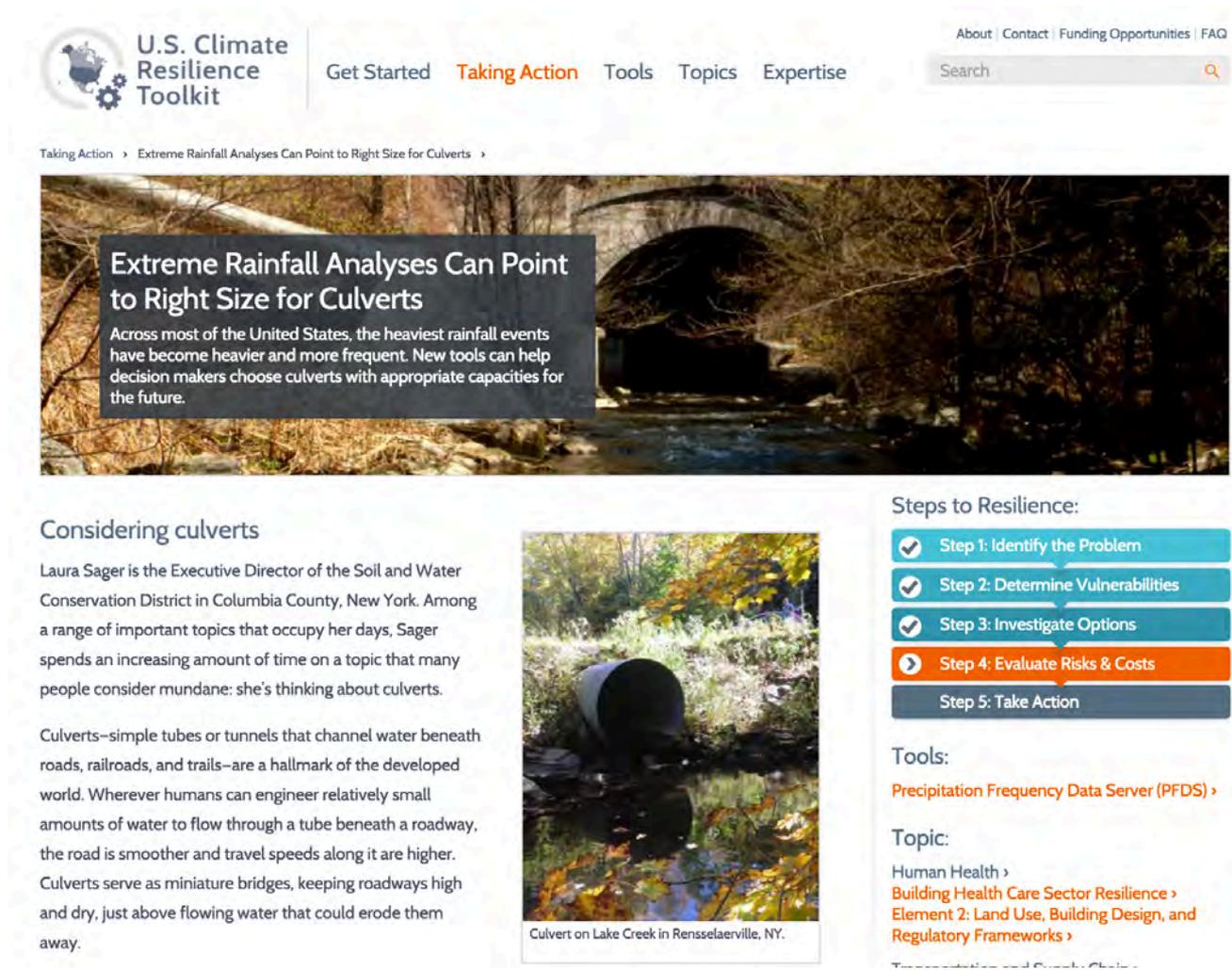
[Ecosystem Vulnerability >](#)
[Biodiversity Conservation >](#)

Additional Resources:

[FAQ: Sears Point Wetland Restoration Project >](#)

<http://toolkit.climate.gov/taking-action/saving-tidal-marshes-san-francisco-bay>

CRT case studies that may inspire student interest



The screenshot shows the U.S. Climate Resilience Toolkit website. The header includes the logo, navigation links (Get Started, Taking Action, Tools, Topics, Expertise), and a search bar. The main content area features a large image of a culvert under a bridge with a text overlay. Below the image is a section titled 'Considering culverts' with a paragraph about Laura Sager and a smaller image of a culvert. To the right is a 'Steps to Resilience' list with five steps, where 'Step 4: Evaluate Risks & Costs' is highlighted. Below that is a 'Tools' section with a link to 'Precipitation Frequency Data Server (PFDS)' and a 'Topic' section with a link to 'Building Health Care Sector Resilience > Element 2: Land Use, Building Design, and Regulatory Frameworks >'.

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Taking Action > Extreme Rainfall Analyses Can Point to Right Size for Culverts >

Extreme Rainfall Analyses Can Point to Right Size for Culverts

Across most of the United States, the heaviest rainfall events have become heavier and more frequent. New tools can help decision makers choose culverts with appropriate capacities for the future.

Considering culverts

Laura Sager is the Executive Director of the Soil and Water Conservation District in Columbia County, New York. Among a range of important topics that occupy her days, Sager spends an increasing amount of time on a topic that many people consider mundane: she's thinking about culverts.

Culverts—simple tubes or tunnels that channel water beneath roads, railroads, and trails—are a hallmark of the developed world. Wherever humans can engineer relatively small amounts of water to flow through a tube beneath a roadway, the road is smoother and travel speeds along it are higher. Culverts serve as miniature bridges, keeping roadways high and dry, just above flowing water that could erode them away.

Culvert on Lake Creek in Rensselaerville, NY.

Steps to Resilience:

- Step 1: Identify the Problem
- Step 2: Determine Vulnerabilities
- Step 3: Investigate Options
- Step 4: Evaluate Risks & Costs**
- Step 5: Take Action

Tools:

[Precipitation Frequency Data Server \(PFDS\) >](#)

Topic:

[Human Health >](#)
[Building Health Care Sector Resilience >](#)
[Element 2: Land Use, Building Design, and Regulatory Frameworks >](#)

<http://toolkit.climate.gov/taking-action/extreme-rainfall-analyses-can-point-right-size-culverts>