

Our Coast, Our Future



Mass Audubon



Massachusetts Office of
Coastal Zone Management

Coastal Climate Resilience in Massachusetts

This 7-part unit framework for middle school students presents a snapshot of Massachusetts coastal communities in the face of climate change, then uses a challenge-based structure to provide students an opportunity to dig into locally relevant issues. Students practice skills in defining problems and decision making while conducting research and constructing explanations. Using a hypothetical and locally relevant community-level challenge, students work together to weigh the pros and cons of solutions across various social, economic and environmental impacts. The culminating project is a communication piece that is student-driven to reach the broader community, such as a blog post, video project, art installation or news story. The product will feature a presentation of their challenge and recommendations as a mock case study, with the option to make a direct connection to a real-world scenario that could be addressed with similar considerations and solutions.

Background: Climate change affects all communities in Massachusetts, but has particular impacts along our coast. As global temperatures increase, a common set of factors drive the effects on all coastal cities and towns. Like all communities, coastal communities have existing structures, policies, and practices which affect residents in ways that are not always equitable. Responses to climate change can make existing inequities worse or better depending on how they are addressed, and whether a full range of community voices are included in the discussion.

Unit Overview

This unit is composed of four principles that are essential to the goals of the project:

- The intersection of CLIMATE IMPACTS and JUSTICE is critical in understanding challenges and exploring solutions.
- Youth can become CHANGEMAKERS by learning the process of decision making, emphasizing community level solutions, and understanding the differences between policy and practice.
- Multiple PERSPECTIVES and EXPERIENCES need to be considered and valued in decision making. Those most in harm's way should be prioritized.
- Youth should USE THEIR VOICE. What is the story to tell about what they've learned, who can they reach and how?

Unit Outline and Resources:

The unit is designed to be facilitated over 7 lessons that are broken up into a total of 16 classes, with recommendations for modifications.

1. **Presenting the Challenge** -- *Introduction to the unit and the challenges students will address*
2. **Issue Selection** -- *Choosing which of the three challenges the class will focus on*
3. **Research Preparation** -- *Learning how to research problems and solutions effectively*
4. **Research** -- *Investigating the specific scenario and ways to address it, in depth*
5. **Perspectives** -- *Taking roles of community stakeholders to evaluate possible solutions*
6. **Community Presentation** -- *Discussion of stakeholder perspectives and optimal solutions*
7. **Report Out and Civic Engagement** -- *Presentation of results to the wider community*

The facilitator's guide highlights the **Priority Activities** that follow the 'through line' and will meet the priorities of the unit as outlined above. It also identifies **Secondary Activities** which were designed to be included in the unit but can be modified or eliminated if time constraints exist.

In the facilitator's guide each class description contains:

- **How to prepare** to facilitate lessons including tips on what materials to gather and what student supports should be prepared.
- **Essential questions** that focus the purpose of the class investigation.
- **Vocabulary and terms** divided into "tier two" words (academic words that are frequently used in many disciplines and may have different meanings depending on context) and "tier three" words (discipline specific academic words that are infrequently used outside of a specific context, in this case within the science and policy of climate change). Definitions for tier three words are provided in the *Student Glossary of Terms*.
- **Class procedure** that outlines student activities and provides guiding questions and discussion facilitations tips.
- **Assessment** tools to gauge student engagement, understanding, and skill acquisition. These are generally reflection questions to be answered by students at the end of each class.

This unit has adapted a framework and modified tools from [Earth Force](#), with permission. Earth Force is an enthusiastic partner and willing to share and shape their materials to encourage environmental civic engagement with youth. We encourage teachers to explore the extensive supplementary information for this unit and encourage adoption of Earth Force resources for future projects.

Background Knowledge and Common Misconceptions:

The following concepts are not included in this unit, but students should begin with a general understanding of:

- The difference between weather and climate
- Climate systems: Greenhouse gases, the greenhouse effect, warming, and human activity as the source of excess GHGs.
- Activities / sites that produce atmospheric carbon (carbon sources) and those that absorb or hold it (carbon sinks).
- Impacts of climate change, such as more frequent heat waves, more extreme storms, and rising seas, and how these will affect the environment in general, and human beings in particular.

Links to background materials on these topics can be found in the Read this First folder. The structure of the unit is designed to help Middle School students gain an understanding of how the climate science connects to challenges, solutions, strategies, and civic engagement.

The following are common issues and misconceptions which may arise when teaching this unit, and should be avoided and corrected:

- Students frequently start out thinking that that things like recycling, cleaning up ocean plastic, and protecting endangered species are part of addressing climate change. These efforts, while important, are not strategies to address climate change. Lumping issues in this way is a common misconception which prevents students from understanding the specific causes and solutions for a warming climate.
- Individual steps like home energy conservation or changing driving habits are often seen as the most important things one can do about climate change. These do have a role to play, but systemic approaches have a far greater overall impact. For this reason, and to promote civic engagement, this unit focuses on community-level solutions rather than individual actions.
- Addressing climate change requires both long-term approaches which reduce greenhouse gases (mitigation) and shorter-term steps that lessen the impacts of a changing climate (adaptation). It's important for students to be exposed to this distinction, and to learn that there is no single solution to climate change -- many steps need to be taken simultaneously, in both categories. For this reason, you will see that we often refer to 'strategies' instead of 'solutions'.

Standards Alignment:

While the unit is developed for all middle grade students, the strongest alignment according to Mass Curriculum Frameworks is with 6th grade and 8th grade. However, individual school districts may adjust their scope and sequence so this is presented as a guideline. Additionally, the 8th grade unit supports the Massachusetts Civic Education requirements, which align well with the product in the final lesson. This unit also provides opportunities to engage in standards-based **science practices**, including particularly:

1. Asking questions
2. Developing and using models
4. Analyzing and interpreting data
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

A background in these practices will enhance students' experiences in this unit, but they are not prerequisites, and students can develop new skills in these areas as they complete the unit.