BioMap Activity

Contents

Educator Guide

<u>Title:</u> BioMap: Biodiversity, Conservation, and Mapping in Massachusetts
<u>Theme</u>: Biodiversity, Conservation, Mapping, Local Conservation Action
<u>State Standards:</u>

- 7.MS-LS2-6(MA)
- 8.MS-ESS3-5
- HS-ESS3-3
- HS-LS2-7
- HS-ETS1-3
- HS-ETS1-4

Source: [2016 Massachusetts Science Technology and Engineering Learning Standards](#)

<u>Goal</u>: Students will understand the concept of conserving land and water for biodiversity, and how to use the BioMap interactive mapper. They will also be able to analyze a map with biodiversity, climate resilience and local issues in mind.

<u>Objectives</u>
- Discuss the importance of biodiversity conservation in the state of Massachusetts
- Learn how to use the BioMap interactive mapper and design a map for a given area of interest
- Analyze map(s) for conservation implications

<u>Guiding Questions</u>:
1. What is land conservation and how is it accomplished in Massachusetts?

2. What is biodiversity?

3. How do diverse ecosystems provide resilience to climate change?

4. What are the benefits of acting locally versus on a national or global scale?

5. How do local committees or organizations play a role in conservation?

Introductory Questions:
These questions focus on the ideas of conservation, biodiversity, and climate change.
1. What do you think of when you hear "land conservation"?

2. What is biodiversity to you?

3. What do you know about climate change?

4. How is climate change impacting Massachusetts?

5. What do you use maps for?

Background on BioMap:

Using a computer or smartphone, open a new browser window and go to mass.gov/BioMap.
On the home page, there are two buttons that lead to StoryMaps:
- "What is BioMap?"
- "How to Use BioMap"

Read through these StoryMaps to learn about the different components of BioMap and how to use the interactive mapper. Then use the interactive mapper to explore BioMap data in your community.

> *Educator Note: To watch a more in-depth presentation and demonstration about BioMap, visit the link below to view a recording from a MassWildlife webinar. It is approximately 30 minutes long.*
> [*https://www.mass.gov/service-details/biomap-the-future-of-conservation-in-massachusetts*](https://www.mass.gov/service-details/biomap-the-future-of-conservation-in-massachusetts)*.*

Explore the BioMap Interactive Mapper: Practice Exercise
On the home page, click the "Interactive Map" header, which will open a full screen window for the BioMap Interactive Mapper.

The exercise below is designed to serve as an introduction to navigating the map. Refer to the "How to Use BioMap" StoryMap for reminders of how to use the map.

- In the "Find address or place" window, search for Westborough.

- Turn off the BioMap Elements layer and turn on the Core Habitat and Critical Natural Landscapes layers.

- Search for (or zoom to) Chauncy Lake in the northern part of Westborough. Explore the different BioMap layers surrounding Chauncy Lake.

- Turn on the Permanently Protected Open Space layer, and find the Wayne F. MacCallum WMA (Wildlife Management Area) polygon next to Chauncy Lake with the 1511 POLY_ID number.

- Change the Basemap to "Imagery with Labels".

Next, answer the following questions to help you explore the data.
1. Who is the owner of the Wayne F. MacCallum WMA?

2. How many GIS acres is the WMA 1511 polygon?

3. What Core or CNL elements of BioMap are in the WMA 1511 polygon?

4. What local component does Chauncy lake represent?

5. Are there any regional components near Chauncy Lake?

> *Educator note: See final page for answers.*

Once students play with the interactive mapper and get comfortable with the process, move on to the challenge scenario.

Challenge Scenario:
Your town is looking to conserve a parcel of land, in accordance with your town's Open Space and Recreation Plan (OSRP). In choosing this area you want to prioritize places of high biodiversity and resilience. Using the BioMap interactive mapper, create a map using the Print tool that illustrates the priority conservation land in your town, and craft an argument for which area(s) your town should conserve.

> *Educator note:*
> *Students can find their town's most recent OSRP by simply searching "OSRP [Town Name]" on Google. Some towns might not have an updated OSRP, but their most recent version will likely be accessible online and is usually found on the Town's Open Space Committee webpage. Alternatively, a nearby town will likely have a plan.*

Go to the BioMap Interactive Map and search for the town to visualize BioMap data in the town. Take some time to explore the BioMap data and patterns of development, to understand why certain areas are of local or statewide priority.

Determine areas on your map that may be good for conservation. Change the basemap to the Imagery with Labels or Orthophotos and examine the landscape within or outside of the BioMap footprint to help you identify potential areas. Once you identify potential areas for conservation, break into small groups to discuss your process and findings.

Small Group Discussion:
Split students into groups to talk about similarities and differences in their maps.
- Share your maps with each other. What is similar about them? What is different?

- What it was like trying to pick one area from the town to conserve?

- Is it easy or challenging to prioritize one BioMap component over another?

- What other information might you use to inform and support your decision?

Concluding Questions:
1. Why is it important to consider BioMap when prioritizing areas to conserve?

2. How would public opinion, budget, or other town priorities play into the decision to conserve land? If, for example, your town had a history of flooding, would that change which parcel you prioritized?

3. Considering the larger landscape outside of your town, does the surrounding landscape change your decision for the location of a conservation area in your town?

Student Worksheet

Introduction Questions

1. What do you think of when you hear "land conservation"?

2. What does biodiversity mean to you?

3. What do you know about climate change? How is climate change impacting Massachusetts?

4. What do you use maps for?

Background on BioMap:
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- "What is BioMap?"
- "How to Use BioMap"

Read through these StoryMaps to learn about the different components of BioMap and how to use the interactive mapper. Then use the interactive mapper to explore BioMap data in your community.

Explore the BioMap Interactive Mapper
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The exercise below is designed to serve as an introduction to navigating the map. Refer to the "How to Use BioMap" StoryMap for reminders of how to use the map.

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- Turn off the BioMap Elements layer and turn on the Core Habitat and Critical Natural Landscapes layers.

- Search for (or zoom to) Chauncy Lake in the northern part of Westborough. Explore the different BioMap layers surrounding Chauncy Lake.

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- Change the Basemap to "Imagery with Labels".

Next, answer the following questions to help you explore the data.

2. Who is the owner of the Wayne F. MacCallum WMA?

3. How many GIS acres is the WMA 1511 polygon?

4. What Core or CNL elements of BioMap are in the WMA 1511 polygon?

5. What local component does Chauncy lake represent?

6. Are there any regional components near Chauncy Lake?

Challenge Scenario:
Your town is looking to conserve more land, in accordance with your town's Open Space and Recreation Plan (OSRP). You want to place it in such a way to prioritize places of high biodiversity and resilience. Using the BioMap interactive mapper, create a map using the Print tool that illustrates the priority conservation land in your town, and craft an argument for which area(s) your town should conserve.

Go to the BioMap Interactive Map and search for the town to visualize BioMap data in the town. Take some time to explore the BioMap data and patterns of development, to understand why certain areas are of local or statewide priority.

Determine areas on your map that may be good for conservation. Change the basemap to the Imagery with Labels or Orthophotos and examine the landscape within or outside of the BioMap footprint to help you identify potential areas. Once you identify potential areas for development, break into small groups to discuss your process and findings.

Supplemental Resources

For troubleshooting, refer to [BioMap Frequently Asked Questions.](#)

<u>Optional Discussion Materials:</u>

Source 1: [Restoring Nature Could Be the Key to Fighting Climate Change | Time](#)
"For decades, scientists and policymakers have focused on changing human behavior to address climate change. Regulations have mandated reduced carbon emissions, subsidies have supported the development of renewable energy, and individuals have worked to make their lifestyles more sustainable. But, while addressing global warming will inevitably require humans to change behavior, a growing body of research supports the need for solutions rooted in nature: ensuring biodiversity, revitalizing forests and supporting other natural environments. A new study in the journal *Nature* offers the strongest evidence yet that biodiversity strengthens ecosystems, increasing their resistance to extreme climate events and improving their capacity to stem climate change."

Source 2: [Biodiversity Loss & Climate Change: Twin Challenges Defining Our Future (massaudubon.org)](#)
"Over the past half-century, North America has lost more than quarter of its entire bird population—roughly 3 billion birds. Globally, nearly one-third of forests have been destroyed, and 40% of pollinators face extinction. Yet, the issue of biodiversity loss has not received similar attention from policymakers, financial institutions, and the public as climate change. Both the loss of biodiversity and climate change suffer from a societal failure to understand the true level risks these present to people and our economy. As a result, we are underinvesting in solutions. The first step to solving both is to stop treating them as separate and distinct problems."

Source 3: [As Federal Climate-Fighting Tools Are Taken Away, Cities and States Step Up - The New York Times (nytimes.com)](#)
"One advantage of community strategies is that they can be tailored to the needs of the local economy – in the case of Morris [Montana], farming.
Phoenix, a sprawling, hot and car-dependent city, has focused on electric-vehicle adoption and mitigating the effects of life-threatening heat waves. The city has allocated $6 million to plant trees in primarily low-income neighborhoods. It has installed 40 miles of cool pavement, which can lower nighttime temperatures. And it has a plan to bring 280,000 electric vehicles to city roads by 2030.
The city council committee that developed the plan includes elected officials as well as representatives of utilities, auto manufacturers, and environmental justice groups. It hosted one meeting between housing developers – who were reluctant to install electric vehicle charging stations in new buildings – and representatives from Ford and General Motors. Councilwoman Yassamin Ansari said the session seemed to help the developers realize that installing chargers was in line with market trends."

Source 4: Open Space Handbook from the [Open Space Network](#)

KEY TERMS

CONSERVATION RESTRICTION (CR)
An agreement in which a landowner restricts certain uses of a piece of land—such as development—but retains ownership. Conservation restrictions must be held and monitored by a qualified organization, such as a land trust or a Conservation Commission.

LAND TRUST A nonprofit organization focused on acquiring and stewarding land.

OPEN SPACE COMMITTEE (OSC) A town committee dedicated to helping achieve community goals for open space.

OPEN SPACE AND RECREATION PLAN (OSRP) A seven-year plan for a town's open space. Requires community input and approval by the state; makes the town eligible for several state grants.

WOOD BANK A program that supplies wood for heat to community members at low or no cost.

CONSERVATION COMMISSION (CON COM) The municipal committee tasked with enforcing the Wetlands Protection Act. Can hold a conservation restriction.

Background on Geographic Information Systems

If students are not familiar with Geographic Information Systems (GIS), how GIS data is created, or how it is used for mapping, watch the short video below. It is approximately four minutes long.
https://www.youtube.com/watch?v=AGWbKVp0rWc&list=PLVChLOrFQyZRb_h2s0zgYZA2y7v5uXlxw
An additional video that provides an example of how GIS is used in wildlife management can be accessed with this link:
https://www.youtube.com/watch?v=FggpvO8J-P8

Answers to Practice Exercise

1. *Department of Fish and Game (DFG)*
2. *136.102018 acres* (as of 12/15/2023)
3. *Vernal Pool Core and Rare Species Core*
4. *Local Aquatic Habitats*
5. *No*