

# Case Study: Decoding the Health of Massachusetts Waters

## 1. The Story

Massachusetts is home to a rich variety of rivers, lakes, and estuaries that support recreation, wildlife, and community life. Every year, the Massachusetts Department of Environmental Protection (MassDEP) collects thousands of water quality measurements through its [Water Quality Monitoring Program](#).

This dataset is publicly available through the MassDEP Environmental Data Portal and contains measurements such as:

- Dissolved Oxygen (DO): the amount of dissolved oxygen in the water where the reading was taken. Dissolved oxygen is crucial for marine life.
- pH: the acidity of the water where the reading was taken
- Temperature, Conductivity, TDS, Depth: signals of natural cycles, land use, and climate.

This treasure trove of information offers a unique opportunity: by exploring it, we can uncover patterns in nature, understand how water systems respond to seasons and land use, and share insights that help communities make smarter choices.

Think of yourselves as water detectives. You're not just looking for problems, you're discovering stories hidden in the data.

- Which water is safe to drink?
  - Which show interesting seasonal rhythms?
  - Where do environmental and community patterns intersect?
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## 2. Your Mission

You are investigators on a Water Health Task Force. As you explore the data, remember that every measurement represents a place where people live, fish, swim, or rely on clean water. Consider who is most affected by the patterns you uncover and how your findings could support healthier, more equitable communities. Your mission is to turn raw monitoring data into insights and actions that matter for ecosystems and communities.

There is no single path: you decide which questions to follow, which clues to use, and how to present your discoveries.

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### 3. Clues & Guiding Questions

Here are some prompts to get you started. You don't need to answer all of them — choose the ones that inspire your curiosity.

#### Detecting Risk

- At what point does oxygen become too low for fish to survive?
- Which months and seasons see the most unsafe events?
- Do some watersheds consistently show more stress than others?
- Which water is safe for consumption?

Reference: [EPA Dissolved Oxygen Criteria](#)

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#### Balancing Multiple Stressors

- Where do low oxygen and unsafe pH occur together?
- Do temperature or conductivity make these problems worse?
- Can you create a “stressor matrix” showing how risks overlap?

Reference: [USGS pH and Water](#)

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#### Communities & Equity

- Which towns or regions face the most unsafe events?
- Are vulnerable or disadvantaged communities exposed more often than others?

Reference: [NAACP EJScreen](#)

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#### Looking for Patterns

- Do some sites look “typical,” while others are consistently extreme?
- What features (temperature, depth, conductivity, season) seem to explain differences best?
- If summers get 2°C hotter, what might happen to oxygen levels?

Reference: [Climate Change & Water Quality](#)



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## 4. Data Driven Insights

For teams looking to dig deeper:

- Test your findings on different sites or years — do patterns hold everywhere?
- Explore “what if” scenarios: what happens with more rainstorms, more road salt, or hotter summers?
- Write a one-page “Water Alert” memo as if you were briefing state leaders.
- Create a map or infographic that communities could actually use.
- Identify which factors (like temperature or conductivity) play the biggest role, and explain them in plain language for constituents to easily understand

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## 5. Your Deliverables

At the end of the hackathon, your team should share:

1. A story from the data: A collection of charts, maps, and/or infographics that reveal the narrative for state leaders to understand
2. An insight: A discovery about patterns, risks, or drivers.
3. Insights for Decision-Makers: A short (1–2 paragraph) note answering:
  - Who is most impacted?
  - What should be done next?

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## Final Note

There is no “correct” answer. The challenge is to think like detectives, ask bold questions, and back up your ideas with evidence. Surprise us with your creativity; whether that’s through an elegant model, a compelling map, or a story that makes the data come alive.