Teacher Case Study Activity: PFAS Contamination in Westfield, Massachusetts

Goal:

The Case Study Activity: PFAS Contamination in Westfield, Massachusetts aims to immerse students in a real-world environmental issue, encouraging them to examine the complexities of PFAS contamination from multiple stakeholder perspectives. By engaging in role-based discussions, students will develop a deeper understanding of policy-making, environmental responsibility, and community impact while strengthening their problem-solving and collaboration skills.

Expected Outcomes:

By the end of this activity, students will:

1. Analyze the Impact of PFAS Contamination: Explore how PFAS pollution affects public health, the environment, and local communities.
2. Understand Stakeholder Perspectives: Recognize the diverse concerns and priorities of residents, government officials, scientists, industry representatives, and advocacy groups.
3. Develop Problem-Solving and Negotiation Skills: Work collaboratively to propose balanced and realistic solutions to PFAS contamination challenges.
4. Apply Scientific and Policy Knowledge: Use research and case studies to support discussions on regulations, remediation strategies, and community actions.
5. Enhance Critical Thinking and Decision-Making: Evaluate competing interests and evidence to make informed decisions about addressing PFAS pollution.
6. Improve Communication and Collaboration: Engage in respectful dialogue, present arguments effectively, and understand different viewpoints on environmental issues.
7. Connect Classroom Learning to Real-World Issues: Recognize how environmental science, policy, and social responsibility intersect in addressing PFAS contamination.

Background Information:

Westfield, Massachusetts, is a small town with a history of industrial and military activities. In 2016, the town discovered that its drinking water wells were contaminated with high levels of PFAS (Per- and Polyfluoroalkyl Substances), particularly PFOS and PFOA, two chemicals used in firefighting foams at a nearby military airbase. The contamination caused public outcry, with residents concerned about their health, while local officials faced challenges in finding solutions. Scientists, educators, and students also became active voices in addressing the issue, contributing their expertise and perspectives to the discussion.

Key Details:

1. **The Problem:**

- Two of the town's drinking water wells tested positive for PFAS levels far exceeding federal health advisory limits.
- PFAS were traced to firefighting foams used at the Barnes Air National Guard Base near the town.
- Residents feared health risks and environmental damage from the contamination.

2. **Key Stakeholders:**
   - **Residents:** Concerned about health risks, property values, and long-term exposure.
   - **Town Officials:** Tasked with ensuring clean water while balancing budget constraints.
   - **Military Base Representatives:** Acknowledging historical use of PFAS but seeking collaboration with federal agencies.
   - **EPA and State Agencies:** Monitoring contamination levels and providing safety guidelines.
   - **Environmental Advocacy Groups:** Calling for stronger regulations and corporate accountability.
   - **Scientists:** Studying the impacts of PFAS and exploring innovative remediation techniques.
   - **Educators:** Raising awareness about PFAS in schools and empowering students to engage with local issues.
   - **Students:** Representing the future generation affected by PFAS and advocating for action through youth-led initiatives.
3. **Challenges:**
   - High costs for well remediation or replacement.
   - Disputes over financial responsibility (military base, town, or manufacturers).
   - Educating the community about the science of PFAS and its risks.
   - Balancing the urgent need for clean water with long-term sustainability.

Activity Instructions:

Step 1: Assign Stakeholder Groups

Divide students into small groups, assigning each group one stakeholder role:

1. Residents
2. Town Officials

3. Military Base Representatives
4. EPA and State Agencies
5. Environmental Advocacy Groups
6. Scientists
7. Educators (e.g., high school teachers)
8. Students

Step 2: Research and Discuss

Within each group, students discuss their stakeholder's perspective. Use the following guiding questions:

1. **What are your stakeholder group's main concerns regarding PFAS contamination?**
2. **What actions or solutions do you believe should be prioritized?**
3. **What obstacles might you face in implementing these solutions?**

Step 3: Simulated Community Meeting

Groups come together in a simulated community meeting to present their perspectives and proposed solutions.

- Each group has 3 minutes to present their case.
- Groups can respond to questions or challenges from other stakeholders.

Step 4: Collaborative Problem-Solving

After the presentations, students work together as a class to create a comprehensive action plan addressing:

Construct the following table on the board and complete it with students.

Plan to solve the problem:

Immediate needs	Long-term solutions	Responsibility
1. Providing safe drinking water	1. Water treatment technologies to remove PFAS	1. Funding (Town Officials & EPA)
2.	2. Alternative water sources	2.
3.	3. Community education	3.
4.	4.	4.
5.	5.	5.

Step 5: Reflection and Call to Action

Individually or in groups, students write a short reflection addressing the following:

1. What did you learn about balancing different perspectives in solving environmental issues?
2. What role do you think scientists, educators, and students play in addressing community problems?
3. How would you take action in your community if faced with a similar issue?

Teacher's Notes:

- Provide resources such as maps of Westfield, contamination data, and articles on PFAS effects.
- Include examples of youth advocacy (e.g., Greta Thunberg) to inspire students in the "Students" group.
- Emphasize that scientists, educators, and students often bring fresh ideas and long-term perspectives to complex problems.

Follow-Up Activities:

1. **Scientific Exploration:** Have students research filtration systems or innovative technologies for PFAS cleanup and create models or presentations.
2. **Community Engagement:** Encourage students to draft letters to local officials or create awareness campaigns about PFAS.
3. **Debate:** Host a structured debate where students argue for or against specific solutions (e.g., stricter regulations, suing manufacturers, or public-private partnerships).

This activity highlights the diverse roles in addressing environmental crises and empowers students to think critically about real-world challenges.

Possible Solutions to Guide Student Analysis:

1. Install filtration systems on contaminated wells (e.g., granular activated carbon or reverse osmosis).
2. Negotiate federal funding or lawsuits to hold the military or chemical manufacturers accountable.
3. Increase public awareness through community meetings and education campaigns.

4. Develop alternative water sources, such as drilling new wells or connecting to regional water systems.
5. Advocate for stricter PFAS regulations and bans on future production of harmful variants

Example of solutions:

Role	Concerns	Challenges
Residents		
○ Advocate for clean, safe drinking water and the health of their families. ○ Pressure local officials and other stakeholders to act quickly.	○ Long-term health risks from PFAS exposure (e.g., cancer, developmental delays). ○ Property value decline due to contamination. ○ Lack of transparency and slow responses from authorities.	○ Limited technical understanding of the issue, making it difficult to evaluate solutions. ○ Balancing activism with personal responsibilities. ○ Potential distrust of government or corporate entities.
Town Officials		
○ Ensure the community has access to clean drinking water. ○ Allocate budget and resources to address the issue.	○ Balancing the high cost of cleanup with other town priorities. ○ Maintaining public trust and avoiding political fallout. ○ Navigating legal and bureaucratic hurdles to secure funding or approvals.	○ Limited budget and expertise to manage large-scale contamination. ○ Dependence on state and federal agencies for assistance. ○ Facing criticism from residents and advocacy groups.
Military Base Representatives		
○ Represent the military base's interests and collaborate with local authorities to address the contamination. ○ Work with federal agencies to assess liability and remediation efforts.	○ Protecting the reputation of the military base. ○ Avoiding excessive financial liability for cleanup. ○ Ensuring continued operations at the base.	○ Potential legal battles over responsibility for contamination. ○ Limited funding or approval for remediation projects. ○ Balancing national defense priorities with local environmental concerns.
EPA and State Agencies		
○ Monitor contamination levels and provide guidance on health and safety thresholds. ○ Enforce regulations and oversee remediation efforts.	○ Ensuring that PFAS levels in drinking water meet or exceed safety standards. ○ Addressing public concerns and maintaining credibility. ○ Supporting local communities with limited resources.	○ Balancing strict regulations with the economic impact on industries and municipalities. ○ Limited funding or manpower for thorough oversight.

		○ Managing conflicting demands from stakeholders (e.g., residents vs. industries).
Environmental Advocacy Groups		
○ Advocate for stricter regulations on PFAS use and cleanup efforts. ○ Educate the public about the dangers of PFAS and push for corporate accountability.	○ Insufficient action from governments and corporations. ○ Lack of public awareness or urgency about the issue. ○ Ensuring long-term environmental sustainability.	○ Gaining access to funding and resources for campaigns. ○ Overcoming resistance from powerful industries or government entities. ○ Avoiding being labeled as alarmist or extreme.
Scientists		
○ Conduct research on PFAS toxicity, environmental persistence, and health effects. ○ Develop innovative technologies for PFAS remediation and removal.	○ Ensuring public understanding of the scientific evidence. ○ Lack of funding for extensive research projects. ○ The slow pace of translating research into actionable solutions.	○ Communicating complex scientific findings to non-experts. ○ Navigating the intersection of science and policy-making. ○ Gaining access to real-world contamination sites for study.
Educators (e.g., High School Teachers)		
○ Raise awareness about PFAS issues in the classroom and empower students to engage in community problem-solving. ○ Facilitate critical thinking and civic engagement through activities like this case study.	○ Ensuring students understand the complexity of the issue. ○ Balancing curriculum requirements with time for real-world learning. ○ Protecting students from feeling overwhelmed or powerless in the face of environmental crises.	○ Limited time and resources to incorporate in-depth lessons on PFAS. ○ Finding accessible, up-to-date information for students. ○ Encouraging action without advocacy turning into activism that may face community resistance.
Students		
○ Represent the future generation directly impacted by PFAS contamination. ○ Advocate for sustainable solutions and participate in awareness campaigns or initiatives.	○ Long-term health and environmental impacts of PFAS exposure. ○ Feeling voiceless or dismissed in adult-driven discussions. ○ The need for immediate action to prevent future harm.	○ Limited knowledge or experience to influence decision-making effectively. ○ Balancing advocacy efforts with school and personal responsibilities. ○ Gaining recognition as valid stakeholders by other groups.

Student Case Study Activity: PFAS Contamination in Westfield, Massachusetts

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3. Residents feared health risks and environmental damage from the contamination.

Activity

Discuss your stakeholder's perspective and complete the following table

Stakeholder Group: ----------

Role	Concerns	Challenges