**Climate Change and its impacts on policy: As case study**

**Incorporating Climate Change into TMDL Decisions for Lake Champlain**

**Text Adapted** from

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| **Project Background** |
| Lake Champlain has a pollution problem. The lake – situated between the Green Mountains of Vermont and the Adirondack Mountains of New York – suffers from problematic blue-green algae blooms (also known as “pond scum”). When environmental conditions are just right – the algae prefer warm, slow-moving water enriched with nutrients like phosphorous or nitrogen – blue-green algae can grow fast, creating scum layers or floating mats which, in addition to being unsightly, are dangerous to human, fish, and wildlife health. In Lake Champlain, the primary culprit causing these massive blooms is excess phosphorous. |
| *Explain the problem faced by Lake Champlain.*  *How are the Chesapeake Bay and Lake Champlain similar?* |
| Pollutants such as phosphorous enter a lake from two types of sources: point sources – clearly identifiable sources like a pipe or ditch that flows directly into the lake – or non-point sources, which are more diffuse. With non-point source pollution, pollutants may be deposited into lakes and water bodies directly by wind or rain, or they may be picked up by rainfall or snowmelt moving over the ground and carried into lakes and water bodies that way. In Lake Champlain, excess phosphorous mainly comes from non-point sources like agricultural and urban runoff, although sewage treatment plants also contribute. |
| *Draw a conceptual model showing how pollutants enter into Lake Champlain.* |
| People have been combating the Lake Champlain pollution problem for a number of years. In 2002, the states of Vermont and New York jointly developed a Total Maximum Daily Load (TMDL) for the lake, which was approved by the U.S. Environmental Protection Agency (EPA). A TMDL describes the total amount of a pollutant – in this case, phosphorous – that can be put into the lake but is still considered safe for people, fish, birds, and other wildlife. Both point and non-point source pollutant amounts are used to calculate the TMDL, but while point source pollution amounts are relatively easy to determine, non-point source pollution is not. |
| *What is TMDL? Why is setting TMDL important?* |
| In order to calculate the amount of non-point source pollutants, the EPA uses watershed models based on how much precipitation (rain and snow) falls in a single year. In the case of Lake Champlain, 1991 was chosen as the representative year and used to determine the total non-point source pollutant amount. However, since 1991 there has been a trend toward wetter years overall and more intense storms that produce higher flows. More precipitation and higher flows mean more polluted runoff, whether it’s through erosion from a farm field with layers of fertilizer or from a construction site. By using precipitation numbers that were already 10 years old and ignoring long-term trends in precipitation and storminess, the 2002 TMDL was likely to grossly underestimate the amount of non-point source pollution. In addition, future climate projections including warmer temperatures, changes in precipitation, and increased frequency and intensity of storms would likely exacerbate existing conditions. Based on these concerns, staff at the Conservation Law Foundation (CLF) began reviewing the literature to find support for appealing the TMDL. |
| *Why is just choosing 1991 just data to calculate TMDL not a good science practice?*  *Why is it important to take into consideration long-term trends when deciding policies TMDL? Cite evidence from the text to support your answer.* |
| In reviewing the literature, the CLF found a 2008 EPA publication looking at climate change and the water cycle, and ways the EPA would need to adjust its regulatory program (including the TMDL) to account for these changes. In particular, the paper talked about the impact of global warming on precipitation and how it was likely to make preexisting problems, such as non-point source pollution, worse. However, in order to repeal a decision that has already been made, the CLF needed to find evidence demonstrating that the EPA knew or should have known about climate change impacts back in 2002. In their researching, the CLF found that the U.S. government had been funding climate change research since at least the 1980s, including an interagency work group that had been developing different scenarios of climate impacts on water and other important resources. |
| *Gathering evidence is a good science practice. Cite two examples from this passage where you see evidence being gathered.* |
| After finding enough support for repealing the Lake Champlain TMDL, the CLF filed a lawsuit against the EPA in 2008. In January 2011, the EPA rescinded their approval of the Vermont portion of the Lake Champlain TMDL, due in part to the predicted effects of climate change on lake water quality. |
| *What does the word rescind mean?* |
| **Project Outcomes and Conclusions**  As a result of this lawsuit, the EPA has initiated a nationwide study of the relationship between potential climatic changes and increasing non-point source pollution. They plan to look at how different pollution control techniques (e.g., conventional practices vs. green infrastructure) work under changing climatic conditions. Lake Champlain will be included in the nationwide study and the results will be factored into the new TMDL. |
| *Why is it important to include climate change as a part of a nationwide TMDL plan?* |

**Assignment**

**Argumentative Essay**

***Do you support EPA’s decision to include climate change as part of the nationwide TMDL plan? Write an argumentative essay defending your position.***

Use the outline below to write your essay

* Intro Paragraph (include your thesis/stance here)
* 2 Supporting Paragraphs: Purpose: to prove your argument. Each should include:
* Topic sentence
* Introduce evidence: Introduce your evidence either in a few words (As Dr. Brown states ―…) or in a single sentence.
* State Evidence: What supporting evidence (reasons, examples, facts, statistics, and/or quotations) can you include to prove/support/explain your topic sentence?
* Explain Evidence: How should we read or interpret the evidence you are providing us? How does this evidence prove the point you are trying to make in this paragraph?
* Concluding Sentence: How does this paragraph help to prove your essay’s overall claim?
* Include one direct quote from research.
* Counterargument Paragraph (or 2): Purpose: to anticipate your reader’s objections. This will make you sound more objective and reasonable. This paragraph should include:
* What possible argument might your reader pose against your argument and/or some aspect of your reasoning? Insert one or more of those arguments here and refute them.
* Make sure to end with a concluding sentence that again reassures your paper’s claim/stance.
* Conclusion Paragraph