

Mathematical Modeling: The Flint Water Crisis

SETUP LOGISTICS:

Break into groups of 4-5. One person should serve as a facilitator to make sure all voices are heard (but not to be in charge and set the mathematical direction).

GOALS:

The goal of Task A is to evaluate a plan of water donation by large corporations for the school children of Flint, Michigan. The goal of Task B is to determine the amount of waste generated by the plastic bottles.

DELIVERABLES:

You have one sheet of poster paper to communicate your questions, assumptions, mathematical model, recommendation and justifications. The poster should be readable to someone not yet fully familiar with the problem or the client.

TIME ALLOTTED:

You have one hour to discuss the problem, work on the problem, and post your work for all participants to consider during the reception this evening and for the rest of the conference.

INCLUSION:

As you work, make sure all voices in your group are heard. Pay attention to the social and power dynamics, and be considerate of all ideas from all members of the group.

PURPOSES OF THE ACTIVITY

- To provide a shared mathematical modeling experience for CIME participants based on a common problem so that it can serve as a reference point from which we can draw for the rest of the workshop.
- Generate a foundation for a vision of mathematical modeling that engages community, cultural, and critical social contexts.
- Generate awareness of the discretionary spaces for students and teachers created in modeling and how to address bias, equity and inclusivity.
- Generate ideas about why modeling has not fully taken off yet as an imperative and fundamental mathematics education component.
- Generate possible ways forward to infuse all aspects of mathematics education with more mathematical modeling.

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TASK A: Flint Water Task: “Is this Enough Water for Flint, MI Schoolchildren?”

Walmart, Coca Cola, Nestlé, PepsiCo said that they will donate bottles of water for school children in Flint, Michigan, to help with the city’s public health crisis over lead contaminated water. On January 26 the companies said that they are planning to “collectively donate water to meet the daily needs of over 10,000 school children for the balance of the calendar year” (Bever, 2016, p. 1). To do so, the companies will send 176 truckloads of bottled water – up to 6.5 million bottles – to Flint.

- How do we know how much water will be enough to meet the daily needs of Flint school children until December 31, 2016?
- Is the companies’ plan a good one?

TASK B: Flint Plastic Waste Task: “How Large is the Environmental Problem?”

The article *Flint water crisis: Companies, community groups work to reduce plastic waste as residents rely heavily on bottled water* written by Adriana Navarro on July 27, 2018 includes the excerpt:

Companies that sell bottled water such as Nestle and Coca-Cola came to Flint's aid starting in 2015, contributing to the amount of water donated. After the officials declared the tap water safe to drink, Nestle's partners in Flint prompted them to continue providing water in a new effort that started mid-May and will continue to Labor Day.

"They said the best way to meet the needs of the community this summer is to provide water at these help centers when it's needed the most because of the high temperatures, higher humidity, etc. So that's what we've been doing." [a representative] said. Nestle sends about 33,000 bottles worth of water to Flint three times a week, providing about 100,000 bottles worth of water each week until Labor Day. Nestle has also taken efforts to not just send water, but to manage the result of more plastic waste in the community. "It's important for people to understand we recognize when you're providing an abundance of bottled water for a community, you're also providing additional plastic," Manshum said.

- How much environmental waste of plastic is generated by the Nestle donation over an entire year?
- What about the amount of environmental waste of plastic in the donation by the four companies in Task A?
- Is there a bottle size that minimizes the plastic waste while providing the needed aid?

Reflection Questions

After working through Task A and B, respond to the following prompts:

- How does the open-ended nature of the modeling tasks provide access for everyone in your group to contribute to the solutions?
- What role did having to make assumptions and decisions play in moving your group forward when you found that you did not have all the information required to solve the problem?
- What other social issues were discussed in your group related to the problem?
- How do these tasks address issues of equity, inclusion, and social justice?

Aguirre, J.M., Anhalt, C.O., Cortez, R., Turner, E.E., & Simic-Muller, K. (2019). Engaging teachers in the powerful combination of mathematical modeling and social justice: The Flint water task. *Mathematics Teacher Educator*, 7(2) 7-26.