1. Dear Great Lakes

Overview and Purpose

To introduce students to the impacts of rising water levels and the particular effect they can have on coastal areas of the Great Lakes through making connections to the coastal flooding occurring on a Pacific island.

Lesson Summary

Students will be introduced to the threat of coastal flooding that faces the Great Lakes and many other coastal areas in the world due to climate change.

In order to understand some of the impact flooding has on the Great Lakes, both positive and negative, students will explore videos from Great Lakes Now about the impact of high lake levels in 2019 and 2020. They will learn more about the magnitude of long-term coastal flooding due to high water levels by exploring the stories of three children in a Frontline documentary about the Marshall Islands. Finally, they will integrate their knowledge of the situation in each of these videos by writing letters from the Marshall Islands to the Great Lakes.

By understanding the impact of long-term coastal flooding on a Pacific island and the short-term effects of high lake levels in the Great Lakes and coastal erosion, students will begin to understand the implications of increasing water levels in the Great Lakes over time.

The background context that is needed for this lesson is for students to know the basic geography of the Great Lakes and the Marshall Islands, the water cycle and how to write a standard letter.

This lesson focuses on writing, making connections between parallel situations, and productive student-to-student discourse and scaffolds students to clarify their own thinking, listen to others, deepen their understanding and think together with classmates. As they complete this lesson, they will become familiar with the reality of one of the major contemporary threats to the Great Lakes region: fluctuations in water level.

ESSENTIAL THEMES	● Lake Levels, Coastal Flooding, Water Cycle

NEXT GENERATION SCIENCE STANDARDS	➔ HS-ESS2.D.4: Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate. See More HS-ESS2.D.4 Resources ➔ SEP8: Integrate qualitative and/or quantitative scientific and/or technical information in written text with that contained in media and visual displays to clarify claims and findings.
OBJECTIVES	❑ Know the significance and impact of changing lake levels on coastal areas ❑ Engage in productive academic talk with others ❑ Write a persuasive letter to communicate a claim with evidence and reasoning
ESTIMATED TIME	❖ **2-3 class periods**

Materials Needed

- Video projection monitor or screen/speakers
- Internet access
- Computers or mobile devices (e.g., tablets, cellphones)
- Notebooks and pencils
- Chart paper or a dry erase board and markers

Facilitation Steps

WARM UP: Begin by asking students to call to mind what they already know about the essential themes of the lesson and what they wonder about it. Have them turn and talk with a partner. Then, after a minute of conversation, elicit responses from a couple of volunteers and jot down 2-3 ideas on the board under the categories KNOW and WONDER. The teacher should help students clarify their ideas as they are shared by checking for understanding using a talk move such as “so you are saying…” or help students think together by asking for a show of hands of agreement from the class in response to what individual students share.

LAUNCH: Once the warm up has concluded, give a brief overview of the background context to students, making connections to their KNOW and WONDER responses as well as any other relevant prior knowledge they would have from other lessons they have learned. Describe the activities planned for this lesson to students.

ACTIVITY 1: Lakes Overflowing

First, show this interactive graphic showing the change in water level by the Big Sable Point Lighthouse to the class. A teacher or student can drag the slider from one side of the image to the other to show the difference in water levels and how they have affected the shoreline. Continue on by asking for a show of hands of how many students have personally experienced a high water level in a lake (or other body of water, e.g., river) before. Follow up the show of hands by having 1-2 students briefly share with the class what their experience was. Transition from their share out to explain to students that they will be learning about the unusually high lake levels in the Great Lakes Basin during 2019 through three video segments from Great Lakes Now.

Next, proceed to the first clip by having someone read the introductory overview about the receding shorelines of Michigan's Lower Peninsula's Northwestern Coast to the class and prepare to show the video segment. Ask students to write down one thing that they predict will be impacted by rising lake levels. Show students the video segment entitled Vanishing Shorelines. Immediately transition to read the introductory overview from the Rising Waters article to the class and prepare to show the next video segment. Ask students to write down one thing that they predict will be impacted by rising lake levels. Show students the video segment entitled Lake Levels.

Then, ask the class to raise their hands if what they predicted was confirmed by what they saw in the video. Transition to the second video by reading the introductory overview from the In the Waters article to the class and then prepare to show the video segment. Ask students to write down one thing that they predict will be impacted by rising lake levels. Show students the video segment entitled Lake Ontario Shoreline Flooding. After the video finishes, ask the class to raise their hands if what they predicted was confirmed by what they saw in the video.

Last, have students collaborate in groups of four to list as many things as they learned from the video are impacted by rising lake levels — positive or negative — and put a check mark next to anything on their list that their group members predicted before the video. Have one group share their list with the whole class, and ask for a show of hands as to which list items matched those that other groups had.

Wrap up this activity by looking at current lake levels in the Great Lakes here with the entire class and ask a few volunteers to share what about the levels seems most unexpected to them and why.

ACTIVITY 2: The Last Generation

First, explain to students that they are going to be viewing a documentary, which follows three children through the impact of rising waters on their Pacific Island, and then creating letters from the children in the Marshall Islands to one of the Great Lakes cities featured in the videos that was affected by coastal flooding. Let students know that you will be watching the introduction to the documentary as a class and then breaking off into groups to watch the segments on each child: Izerman, Julia, and Wilmer. This video will provide some basic information to them about the impacts of, and potential solutions to, coastal flooding due to rising water levels from the perspectives of children, and it may address some of their KNOWS/WONDERS from the warm up.

Introduce students to the 4 Notes Summary protocol that they will use after their group finishes the entire documentary, where they write one of each of the following:

- Oooh! (something that was interesting)
- Aaah! (something that was an ah-ha moment)
- Hmmm... (something that left them thinking afterward)
- Huh? (a question they have afterward)

Ask students to give an example of each type of note that they will be making to check for understanding.

Next, view the introduction section of the Last Generation documentary from Frontline to the whole class.

Then, after the introduction, have students independently explore the remaining three segments about each child's story in groups of four—watching the video segments and reading the pop-up information that appears in between segments. Each student should record in their notebooks a 4 Notes Summary after they complete the documentary.

Last, have groups discuss their takeaways from the video using the Conversation Roundtable protocol. In this protocol, students take turns sharing what they wrote for their individual responses to the 4 Notes Summary with their group while each student writes down what they heard the speaker say. Then, each student writes their own "sum it up" statement of their group members' responses.

ACTIVITY 3: To the Great Lakes, From the Marshall Islands

First, have a whole-class share out from the conversation roundtable. Do this by choosing a few students to share aloud with the whole class their "sum it up" statements from the conversation roundtable in their group. After each, ask all students to raise hands if what was just shared matches something that came up in their group discussion as well.

Next, tell students to recall the stories of each child they learned about in the documentary and that they will be creating a letter about one of the children's individual perspectives on flooding. To assign groups to write about each child's perspective, number off the groups from 1 to 3 (Group 1 will be writing about the perspective of Izerman, Group 2 about Julia's point of view, and Group 3 about the viewpoint of Wilmer.) Assign half of the groups to make connections between the Marshall Islands and Chicago, IL and the other groups to focus on Sodus Bay, NY. Have each group nominate a recorder (someone who will write down what everyone says) and a reporter (someone who will read the finished letter aloud) in their group.

**Optionally, if the issue of coastal flooding affects your school community directly, consider having students write their letters to local leaders in your area and actually send them in to those leaders. You might just get a response!*

Then, give students time to work with their group to write up a one-page letter about their respective child from the documentary to either the Mayor of Chicago, IL (featured in segment one video) or the Mayor of Sodus Bay, NY (featured in segment two video) addressing the high lake levels, as depicted in the Great Lakes Now video segments.

To help them begin writing their letters, give them a few starter prompts to help them begin their collaboration on writing the letters, such as:

- How would you explain who the children are and why their opinion matters to this issue?
- How would the child respond to the high lake levels situation based on what you know of him or her?
- How would his or her experience in the Marshall Islands be relatable to the situation in Chicago or Sodus Bay (or your local community)?
- What solutions might be considered or suggested in the letter?

Last, give each group the opportunity to have their designated reporter read their group's letter aloud to the class.

**Share what students create with Great Lakes Now by emailing their letters to gln@dptv.org or by posting them on Facebook or Twitter with @GreatLakesNow! And if you get a response from your letters, you can share that as well.*

SYNTHESIS: Give students individual thinking and writing time in their notebooks to synthesize their learning by jotting down their own reflections using a Word, Phrase, Sentence protocol, with:

- A **word** that they thought was most important from the lesson
- A **phrase** that they would like to remember
- A **sentence** that sums up what they learned in the lesson

After the individual synthesis is complete, students should share their synthesis with a shoulder partner.

COOL DOWN: Have students complete a 3, 2, 1 Review protocol for the lesson with a partner, recording in their notebooks or, optionally, on exit ticket slips to submit, the following:

- **3** things that they liked or learned
- **2** things that make more sense now
- **1** question that they were left with

CLOSURE: Have one student share a response from each of the categories of the 3, 2, 1 Review. Depending on the available time, the teacher can make connections between the ideas students share and the learning objectives of the lesson, and respond to the question that is shared.

EXIT TICKET: Students vote for their favorite letter and give a brief explanation of their choice.

About the Author

Gary is an educational consultant, award-winning science educator and the author of *Science With Scarlett*. He is also a double cornea transplant recipient who, since having his sight restored, was moved to use his teaching gifts to make science fun for kids. He lives with his family near Detroit and designs learning experiences to inspire children, like his own daughter, to love science. Gary is the 2014 recipient of the Michigan Teacher of the Year honor. Contact him via his consulting firm, Saga Educators, or connect with him on Twitter.

About Great Lakes Now

With a monthly magazine-style television program and daily online reports at GreatLakesNow.org, the ***Great Lakes Now*** initiative offers in-depth coverage of news, issues, events and developments affecting the lakes and the communities that depend on them, while capturing the character and culture of the region.