Target Grade Levels: 3-5th

Subjects: Water Quality, Ecosystems, Pollution, Climate Change

Authors: MacKenzie Tanguay, Kate Crabtree, Caitlyn West, Katie Uppendahl, Wade Phillips, Abhishek Guptta, Han-Wei Shih

**Problem Statement:**

Picture this: It’s a beautiful summer day and your family goes to the lake to swim. When you arrive there is a large sign that reads “Lake closed for swimming due to pollution.” While you are bummed out, you overhear a lifeguard stating that he hasn’t seen any salmon either. This gets you thinking about the connection between not being able to swim and the missing salmon.

The health of the environment is at a critical point. The government agency that oversees this, The Environmental Protection Agency (EPA), has lost a big portion of its budget. That means that they are unable to have enough employees to help make sure people are following the laws. Since people are not being held accountable, some people are breaking the laws and causing damage. One piece of the environment that is greatly impacted is the water. Bodies of water, like lakes and rivers, provide homes to many different types of plants and animals. When pollution enters these ecosystems the damage done is difficult to repair.

*The Environmental Protection Agency is looking for new ideas to solve the water pollution problem. You will need to convince the EPA that your plan is the right one to solve this problem and save the fish!*

**Unit Overview and Table of Contents**

See “Unit Outline” in “Teacher Materials” Folder

**Provide the following items for the entire unit:**

Standards (NGSS, CCSS, CTE):

**Overall Unit Standards:**

**4-LS1-1** Construct an argument the the plants and animals have internal and external structures that function to support survival growth, behavior and reproduction.

**4-ESS3-2: Crosscutting Concept:** Cause and effect relationships are routinely identified and used to explain change.

**4-LS1-1 and 4-LS1-2 Cross Cutting Concept:** A system can be described in terms of its components and their interactions.

**ETS1.B Designing solutions to engineering problems:** Testing a solution involves investigating how well it performs under a range of likely conditions.

**4-ESS3-2 Constructing Explanations and Designing Solutions**: Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.

**4-ESS3-1 Obtaining, Evaluating and Communicating Information:** Obtain and combine information from books and other reliable media to explain phenomena.

**4-PS4-1 Developing and Using Models:** Develop a model using analogy, example or abstract representation to describe a scientific principal

**4-LS1-1 Engaging in Argument from Evidence:** Construct an argument with evidence, data and or a model.

**4-PS3-4 Science is a Human Endeavor:** Most scientists and engineers work in teams. Science affects everyday life.

**4-LS1-1 4-LS1-2 Systems and Systems Models:** A system can be described in terms of its components and their interactions.

**Soft Skills:** [**http://www.p21.org/storage/documents/docs/P21\_Framework\_Definitions\_New\_Logo\_2015.pdf**](http://www.p21.org/storage/documents/docs/P21_Framework_Definitions_New_Logo_2015.pdf)

* Creativity, flexibility, adaptability
  + Design or create new systems that can solve a problem
  + Able to re-think, re-design, re-imagine when solutions do not work
* Cooperation, communication, public speaking
  + Interact with others in a group in a positive and effective manner
  + Engage effectively in a range of collaborative discussions
  + Able to build on others’ ideas and express own ideas clearly
  + Follow agreed upon rules for discussions and carry out assigned roles
  + Pose and respond to specific questions to clarify or follow up on information
* Critical thinking, problem solving
  + Build a logical flow to innovate new solutions to existing problems that effectively and efficiently solve the problem
* Organization, meeting deadlines, productivity, accountability
  + Delegating tasks and assigning roles
  + Follow through on assigned tasks and come prepared
* Global awareness, environmental literacy, managing resources
  + *Demonstrate knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water and ecosystems*
  + *Demonstrate knowledge and understanding of society’s impact on the natural world*
  + *Investigate and analyze environmental issues, and make accurate conclusions about effective solutions*
  + *Take individual and collective action towards addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues)*
  + *Learning from and working collaboratively with individuals representing diverse cultures, religions and lifestyles in a spirit of mutual respect and open dialogue in personal, work and community contexts*
  + Make a plan to best use financial and physical resources with as little waste as possible
  + \*\*\**Kate needs to un-plagiarize these*

**Locally and/or Personally Relevant for Students:**

FIX THIS… UNDECIDED

Give them an idea of a water treatment facility or polluted bodies of water near you to get students interested in this PBL. For example, we are using Lake Washington in Seattle, Washington because it has had problems with pollution and the water being unsafe to swim in at times.

Community in school - Students will work together and make sure everyone is included. They will understand that their work can take them farther than inside our classroom and can be applied anywhere around school or in life. Taking care of the natural resources available i.e. water, and respecting their environment and taking care of. respecting others ideas and opinions. Working together. Grade levels, clubs after before or after school, same lunch/recess

Ways to make a strong connection - use resources from men and women and give examples of minorities and women in STEM fields. → Flipgrid video

Suggestion: Assign a female to be a group leader so they feel equally represented and know that just because they are a female they can still be in charge and be a leader even in fields that are predominantly men.

**Connections to career and educational pathways:**

Throughout the unit, share the videos of STEM industry professionals. These videos are interviews with STEM industry professionals that explain their love of STEM, how they got to where they are and what their job is. These are great ways to show students examples of potential STEM careers!