Lesson 6 - Temperature

**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!

**Learning Objectives:**

* I can compare temperatures of different environments in the past and currently.
* I can discuss why an increase in water temperature has a negative effect on fish.
* I can make a cause and effect relationship between humans and water quality based on air pollution and climate change.

**Lesson standards (NGSS, CCSS, CTE):**

**4-ESS-2: Cross Cutting Concept:** Cause and effect relationships are routinely identified and used to explain change.

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

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

**PS3.B:** Conservation of Energy and Energy Transfer - Light also transfers energy from place to place

**If relevant to lesson, include:**

**Soft skills:** Information, Media, and Technology Skills; Critical Thinking and Problem Solving Skills; Communication and Collaboration

**Locally and/or personally relevant for students:** Global warming effects everyone and coming up with ways to make small changes can cause a big impact.

**Connections to career and educational pathways:** Ecologist, Atmospheric Scientist, Meteorologist

**Materials:**

-YouTube videos

-KLEWS chart

-11x14 paper and markers

- Water Quality Science Journals

**Lesson preparation:**

- Preview the videos in order to know when to start and stop.

- Copy exit tickets.

**Time required:** 68 minutes

**Grouping of students for instruction:**

-Full class

-Pairs or larger groups that work for you

**What is the instruction?**

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| --- | --- | --- |
| **Time** | **Teacher** | **Student** |
| 5min  11 min  15min  5min  3 min  10 min  10min  10 min | Gather students in a way that works for your classroom. Introduce problem statement.  Review the KLEWS chart  Ask the class:  How do you think a change in water temperature in the ocean could be good or bad for organisms?  Add information to the KLEWS chart.  Today we are going to learn about how why the ocean temperature is rising, and how rising water temperature affects the organisms that live there.  What is global warming?  Show the kids the following videos to teach global warming. Add in additional information or teaching if you wish.  <https://www.youtube.com/watch?v=Vh8XVkzsn1Y> 0:00-5:33  <https://www.youtube.com/watch?v=RHrFBOUl6-8> use this one, but not whole  thing 0:49-1:30, 3:09-7:31  -Pause and discuss throughout the video as you see fit  Ask the class to list or draw the causes of global warming. Do this in the following way:  -Have kids get in pairs  -Give them a 11x14 paper  -Have them draw a quick globe  -Have them draw global warming causes adding to the greenhouse “blanket” around the earth, making sure they include the thickening “blanket”  -Have pairs share out their ideas and discuss  Ask: What are some ways we can reduce global warming?  Possible answers:  -plant trees, they breathe in the CO2 (make sure to discuss this, it will help with their solutions later)  -Green energy  -bike more, drive less  -Turn out the lights!  Etc.  Ask the class: How do you think global warming affects our oceans?  Effect on oceans.  <https://www.youtube.com/watch?v=EtW2rrLHs08&t=151s> Bill Nye- brushes over climate change, more about the effects. Has some ocean  -If start at 1:38, tell students its talking about the #1 victim of global warming  -pause as necessary for discussion.  -start from beginning if wish to review global warming  Explain to students the following about global warming:  Global warming has one very important effect on oceans and lakes   1. Because the air is warmer from global warming, the water gets warmer   “These effects are not always good for the animals and plants that live in the ocean. Let’s think about why.”  Read the following stories to the kids about animals.  \*If you wish, you can read (or find on youtube) page 25 of “A Warmer World” by Caroline Arnold instead for story 1.  Story 1:  Salmon live in the lakes and the ocean. The **King** salmon like to live in ocean, lake and river waters that are 50-64 degrees. However, as the ocean warms many Largemouth bass fish can now live in the same ocean waters as the salmon. They usually live in water that is cooler than the salmon, but as the ocean has warmed they have expanded their range. They could not live there before because it was too cold, but now it is warm enough. Largemouth bass and salmon eat the same fish. Now that there are trout in the salmon’s environment, they must compete for food.  Ask: “What do you think will happen to the salmon if the trout move in to their environment?”  Story 2:  There is a plant that lives in Lake Washington. Usually, it likes water that is 55 degrees, so not much grows in 50 degree Lake Washington. However, with the increased temperature more and more the plant has been growing on the surface of the lake. This is good news for the plant, but bad news for some underwater plants. These underwater plants need sun to live, but the duckweed is blocking out the sun. Ask: “What do you think will happen to other under water plants if the plant continues to grow?  Tell the students that as we have seen, global warming can change the types of organisms that can live in the lake. This is not good for the Lake’s ecosystem, because if one organism’s population changes, then it will affect others.  They will need to think of how to fix this when addressing the lake washington problem!  Give exit ticket.  Take notes on how this could affect lake washington and how they can help lake washington in Water Quality Science Journal. | Listening to problem statement.  Pair, share.  Working on poster with partner  Share out ideas  Brainstorm ideas  Have the class brainstorm ideas, add to KLEWS chart  Watch video, takes notes in journal  After each story, take notes on the effects of global warming on organisms  Students can brainstorm as a class, or in groups (that share out to the class)  (They should arrive at this answer: There will be less salmon because the trout are eating all of their food. They will have less to eat and many will starve.)  Students can brainstorm as a class, or in groups (that share out to the class)  (They should arrive at this answer: Many underwater plants may die due to lack of sunlight.) |

**Accommodations:**

\*Form mixed ability groups, so higher students can help lower students understand the concepts

\*Draw a pre-formed diagram of the nutrient pollution where students fill in the names for each step, or add to it with writing and drawing

**Extensions:**

\*Read or watch on youtube the book *A Warmer World* by Caroline Arnold to learn about how else global warming is changing the planet

**Assessment**:

Exit Ticket 6

**References/Resources:**

YouTube videos listed in lesson instruction (also listed here):

Global Warming for Kids - Effects Explained

<https://www.youtube.com/watch?v=Vh8XVkzsn1Y>

Teachers TV - Climate Change - The Causes

<https://www.youtube.com/watch?v=RHrFBOUl6-8>

Climate Change 101 with Bill Nye

<https://www.youtube.com/watch?v=EtW2rrLHs08&t=151s>