Figure 5.17. ***Are You an Environmentalist and Change Agent?*** **Adapted Task, Grades 9–12**

Are You an Environmentalist and Change Agent?

Overview: Teacher Notes

Students will use iteration, recursion and algebra to model and analyze changing populations.

Prerequisite Understandings

- Rate of change
- Predicting patterns in real-life situations with conditions and modeling data with tables
- Regressions

Cognitively Relevant and Culturally Demanding Framework Connection (Figure 1.8)

Visit www.mathedleadership.org/EAresources to download a free reproducible version of this figure.

Task Rating

Developing aspects

- The task is connected to cultural/self/community inquiry and activity not necessarily embedded.
- The task is centered in real-world situations requiring students to inquire about themselves, their communities, and the world about them.

Exemplary aspects

- The task requires students to examine structure and assumptions of self, community, the world, and its relations in considerations of solutions and strategy limits.
- Task requires students to examine conditions of opportunity, justice, suffering, and inequity that arise in their communities, schools, and the world around them.
- Task utilizes mathematical sense-making and the solution processes to help students to develop informed perspectives and take action on real-world issues.

Task Rating Reflection

The task is connected to a real-world situation in the launch which is overfishing. Students will look at the graph and make some connections to the effects of overfishing on the fish populations.

The task then goes on to have students reflect on a population of wildlife or environmental issues in the community that is increasing or decreasing. They will conduct their own research, collect data in a table and use it to look for solutions. The task ends with students either writing a letter or preparing a presentation for community stakeholders to share what they learned from this task.

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Are You an Environmentalist and Change Agent? (continued)

Curriculum Content	
Content Standards	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key gestures given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* Write a function that describes a relationship between two quantities. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
Mathematical Process Standards	**Make sense of problems and persevere in solving them:** Students must make sense of the problem by drawing pictures, sketching graphs, looking for patterns and completing tables. **Model with mathematics:** Students are creating a recursive formula, table, and graph as mathematical models to represent the fish population in the trout pond. **Look for and express regularity in repeated reasoning:** Students will notice if calculations are repeated, and look both for general methods and for shortcuts.
Task	
Supplies • Computers to research topics and collect data • Graph paper • Paper to create tables • Graphing calculator	**Core Activity** Students create a class action plan, write a letter, or create a presentation including data that could be shared with town officials or a local board explaining their findings. Students will include some possible next steps to resolve the issue within their community.
Launch A notice and wonder routine begins the discussion about fish populations using a real-world graph. Students will explore two ends of the environmental perspective on fishing and then consider a wildlife or environmental issue in their own town that can be controversial.	**Extension(s)** Students can create a class action plan or write a letter including data that could be shared with town officials or a local board showing the finding of their data collections and some possible next steps to resolve the issue within their community.

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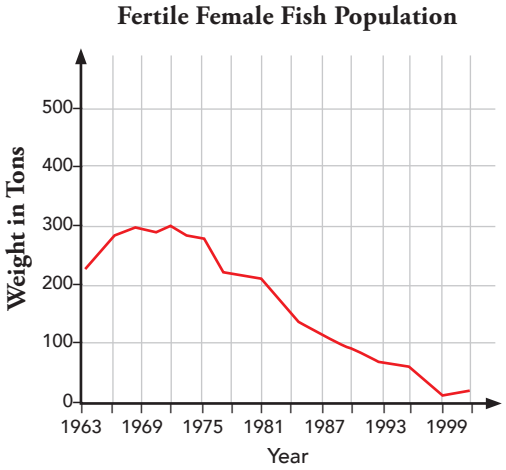
Are You an Environmentalist and Change Agent? (continued)

Launch



1. What do you notice and wonder about the graph above?
2. What are some benefits of fishing? What may be some problems of overfishing (fishing a certain type of fish too much) that affect our environment?
3. Place yourself on the scale below and explain why.

Where do you stand in relation to fishing?		
I do not support any type of fishing.	I support fishing but not overfishing.	I support fishing with no limits, there are always enough fish.

4. After taking a stand, get into groups of three with students that are not the same number as you. Share where you fall on the scale and explain why to your group. After your small group discussion is done, the teacher will have groups share out.

Activity

Students (individually or with a partner) search for data on an environmental or wildlife issue in their own community. Students gather data and use it to explain an issue in the community, record their findings and determine patterns. Students can use graphs, tables and/or equations to help explain their findings. When they have come to their conclusions, they will begin to develop possible solutions. Here are some guiding questions to get you started:

- *What in our environment or wildlife population is increasing or decreasing significantly?*
- *Where can we find data on your chosen issue?*

1. Let's Predict!
   a. *In the fish problem, we realized we wanted to slow down the overfishing in the pond. For your environmental or wildlife issue, is it better to speed up or slow down what is increasing or decreasing?*
   b. *What are future implications and effects on the environment?*
   c. *What two quantities do you need to look at to investigate your issue?*
   d. *What is the relationship between those two quantities?*

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Are You an Environmentalist and Change Agent? (continued)

2. Complete the table below to collect 10 years of historical data on your issue. Record the year and the quantity in the top part of the table.

Year (Historical)	Data on Problem/Issue to Solve
Future Predictions	
Year	**Data on Problem/Issue to Solve**
+1	
+2	
+3	
+4	
+5	
+6	
+7	
+8	
+9	
+10	

3. Using graphing technology, predict what your problem/issue will look like after 10 years. Complete the *Future Predictions* portion of the table.
4. Create a graph of the long-term behavior of this function.
5. Discuss the model. What limitations do these models have? What function represents your model?

Extension(s)

Students create a class action plan, write a letter, or create a presentation including data that could be shared with town officials or a local board explaining their findings. Students will include some possible next steps to resolve the issue within their community.

Scaffolds

- Directions on inputting the data into a graphing calculator in order to create a linear or exponential regression equation.
- Sample data set to practice before tackling their own issue and collecting data.
- List of potential community environmental or wildlife issues that may be new to the community.
- Students new to the community could investigate an issue in their home country. (Access for multi-language learners.)

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