OVERFISHING

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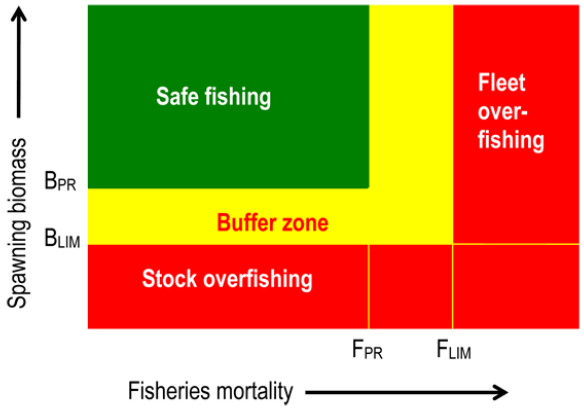
Overview:
Overfishing is fairly easy to define. If you think about the two words that make up overfishing, it's over and fish. In general terms it means to catch fish that cause the species stock below the average levels. Although this is generally thought of to occur in the ocean, overfishing can happen in any body of water. This can be done through commercial or recreational fishing.

Since the beginning of hunters and gatherers, humans have fished to create a steady source of food. Although over time it has become more commercialized, fishing remains to be a good source of food.

The acceptable level of fishes before it become overfishing can be figured out two different ways. They are:

- **Biological overfishing** occurs when fishing mortality has reached a level where the stock biomass has negative marginal growth (slowing down biomass growth), as indicated by the red area in the figure. (Fish are being taken out of the water so quickly that the replenishment of stock by breeding slows down. If the replenishment continues to slow down for long enough, replenishment will go into reverse and the population will decrease.)



- **Economic** or **bioeconomic overfishing** additionally considers the cost of fishing and defines overfishing as a situation of negative marginal growth of resource rent. (Fish are being taken out of the water so quickly that the growth in the profitability of fishing slows down. If this continues for long enough, profitability will decrease.)

Purpose:
The purpose of this lesson is to help the students understand the impact of overfishing and the affects it has on the world. Students will learn how the decrease of fish populations will not only effect ecosystems but the food supply of the entire world.

Standards:
Arizona Science Standards: 7th grade.
Strand 1; Concept 4; PO 1. *Choose an appropriate graphic representation for collected data:*

- *line graph*
- *double bar graph*
- *stem and leaf plot*
- *histogram*

Strand 3; Concept 1; P.O. 1 – Analyze environmental risks (e.g. pollution, destruction of habitat) caused by human interaction with biological or geological systems.

Strand 3; Concept 1; PO 3. Propose possible solutions to address the environmental risks in biological or geological systems.

Suggested Grade Levels:
4^{th} – 8^{th}

Lesson Times:
1 class periods for the overview of overfishing and the effects is has on the environment. 1 class period for the execution of the exercise on overfishing.

Materials:
Computer with internet, materials created by teacher, workbook, worksheet with definitions and background of the experiment.

Learning Objectives:

- Students will be able to understand the relationship between food supply (fish) and the rest of the world.
- Students will be able to understand the importance of fish within the ecosystem and the world.
- Students will be able to understand the different impacts human factors will have on fish.
- Students will use communication, organization, and identification to understand biodiversity.

Suggested Procedure:
Share the overview and background data on what biodiversity is. Inform the students of key terminology like:

- overfishing
- commercial fishing
- biological overfishing
- mortality
- marginal growth

Begin by having the students look up the words above and come to the discussion with a small definition of the words and an understanding of what overfishing is. Discuss in detail the importance of fish. During this discussion, students must understand the importance of fish not only in the ocean ecosystem, but also in the world as a whole. Once the discussion is over follow the steps below:

1. Divide the class up into even groups of 3 or 4.

2. Have the students set up the materials at their table (package already created that includes small, medium and large fish with different types of magnets on them, a rope with a very small magnet on the end (a fishing pole)).

3. Once the materials are set out, give the students an explanation that the fishing pole they currently have would be one of the first interments used to fish.

4. Have the students try and fish for roughly 10 seconds and see how many different kinds of fish they can get.

5. Once this is over, have the students record the amount that was caught.

6. Hand the students out a second pole, representing more advancement in fishing. This one will have a stronger magnet on it.

7. Have the students repeat steps 4 and 5.

8. Once they have recorded, have a brief discussion with the children on how the "advancement" in fishing has helped the students catch greater amounts of fish.

9. Had out one final fishing pole with the strongest magnet. Have the students repeat steps 4 and 5. Once this is complete, talk about how this would impact the amount of fish caught over a certain time. Also at this point the teacher should begin to tie in the importance of conserving our fish.

10. Now have the students take away ½ of their fish and have them repeat steps 4 and 5.

11. Have the children take an additional ½ of their remaining fish, a total of ¾ of the overall amount and have them repeat steps 4 and 5 again.

12. Open up a discussion of how this would represent the idea of overfishing and how having a very limited supply effects the overall amount the fisherman can catch.

13. Once the discussion is over, the students should create a graph of their choice to display their data they have collected.

Assessment:

1. Understanding of the importance of overfishing.
2. Written work in the work journal.
3. Involvement and key points in the discussions.
4. Neatness and clearness of their graph.

Extensions:

1. Using the knowledge gained from the exercise, have the students come up with an example of how we can reduce overfishing.
2. Have students come up with the impacts overfishing has on humans
3. Have the students come up with questions to ask the class about overfishing and the impact is has on the world as a whole.
4. Have the students create a map of the world and within it color code it for the parts of the world that are overfished.

Sources:

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http://en.wikipedia.org/wiki/Overfishing

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http://overfishing.org/pages/what_is_overfishing.php

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http://www.mbayaq.org/cr/cr_seafoodwatch/sfw_of.asp

Grinning Planet
http://www.grinningplanet.com/2005/06-07/overfishing-article.htm