

Bioaccumulation (Grades 4-5)

Objective: Students will demonstrate the concept of bioaccumulation through a hands-on activity.

California State Standards:

Science: 4th: 2b. 5th: 2c.

English-Language Arts:

- **Listening & Speaking:** 4th: 1.1, 1.2. 5th: 1.1.

Background: Just because water is clear does not mean that it is clean. Pesticides and fertilizers could be dissolved in the water. Many of these dissolved pollutants can have a severe negative impact on the environment. Bioaccumulation is the absorption and accumulation of toxic chemicals in living organisms. Toxins can be stored in fatty tissues of animals and passed along to their predators. As larger animals consume smaller animals in the food chain, the amount of harmful chemicals accumulates in their bodies. This continues up the food chain to the top predator, which accumulates the largest amount of harmful chemicals.

Materials:

- One case of poker 36 chips

Procedure:

1. Please note that poker chips are designated as follows:

24 white chips

8 blue chips

3 green chips

1 red chip

(Modify the number of chips to fit your class size, but the ratio of colored chips should stay the same.)

2. Pass out one poker chip to each student. Each of them is an ocean creature that has taken in one piece of pollution. Ask the students if they think that one piece of pollution will affect them.
3. Have all white chips stand up. They represent plankton at the bottom of the food chain. Ask the students what types of ocean animals eat plankton (anchovies, other small fish, etc.).
4. Have all blue chips stand up. They represent anchovies, the next link in the food chain. Have the anchovies “eat” the plankton by taking their poker chips (pollution). Ask the students if they think this much pollution will affect them. Ask students what might eat anchovies (larger fish).
5. Have all green chips stand up. They represent yellowtail fish higher up in the food chain. Have the larger fish “eat” the anchovies and consequently “eat” their pollution. Ask the students if that much pollution will affect them.
6. Have the single red chip stand up. S/he represents the apex predator, the shark or sea lion at the top of the food chain. Have her/him “eat” the larger fish and their

pollution. Ask the students if this much pollution will affect her/him. If it does not affect the animal directly, it will certainly affect the animal's young.

Further Investigation:

Have teams research the effects of toxins on animals. There are some very famous examples of toxin build up in animals, such as the brown pelican. Since these animals store toxins in their fat, what affect might this have on marine mammals that nurse their young? Look up these examples and start a class discussion. How could this have been prevented? Are these toxins necessary or are there alternatives?