

Objective: Students will draw parallels between the activity and the adaptation to pollution undergone by the Elizabeth River mummichog; and understand the concept of adaptation.

Activity:

Divide the students into teams of 5-6. Students will play the role of a mummichog living in the Elizabeth River. The goal of the game is to be able to survive scenarios read off of the cards.

To start the activity, each team will begin with 3 cups in front of them (labeled Cup A, B, and C) and 5 marbles (or some other small object like beans or pennies). Explain to the students that each cup represents certain abilities of the fish so they should really think about how to place their marbles.

The first student will divide the 5 marbles among the 3 cups – he/she can place as many marbles in any of the cups – for example, all 5 marbles could be placed in Cup A; or 2 can be in Cup A, 2 in Cup B, and 1 in Cup C.

Each team will be given scenario cards (provided within this document) that tell the student they must have x-number of marbles in A/B/C-cup to “survive” or “succeed” in that scenario. The student is allowed to move 1 marble (only 1) to respond to the card and try to have enough marbles in the right cup. If, after moving 1 marble, there are still not enough marbles in the cup to satisfy the scenario card, that student, or “mummichog”, “dies” or “does not succeed” in that scenario. If the cup has enough marbles to satisfy the scenario card, then that mummichog survives.

The next student in the team will get a turn. That student represents the child of the first student. So, the student will “inherit” the marbles left in each cup by the previous student (so if there were 2 marbles in Cup A, that’s what the student has to work with). Another scenario card is read, requiring a certain number of marbles in a cup to survive. Again, the student can move only 1 marble to respond to the scenario. This continues for as many rounds as desired.

It is hard to know where to put your marbles so you (and subsequent generations) will be able to succeed in the different situations that come up. The fishes’ bodies are trying to prepare for different types of pollution (putting their marbles in Cup X), but that means they might not be as successful in or prepared for a certain scenario, which may need more marbles in Cup Y.

Scenarios

Mollie runs into a predator while she's searching for food. In order to escape her predator, she needs to have a healthy heart so she can swim fast. Mollie will need 4 or more marbles in Cup A in order to survive.

Grandmother Chog is a champion swimmer. This is an admirable quality to potential mates. If Grandmother Chog does not have 3 or more marbles in Cup A, she will not successfully reproduce.

Mollie's dad, Papa Chog, has a cold. If he doesn't have a healthy immune system, or at least 2 marbles in Cup B, he will die.

Mama Chog loves to eat tiny delicacies in the water. If she doesn't have good eyesight, or at least 1 marble in Cup C, then she will be very hungry.

Papa Chog needs to find lunch. If he has at least 2 marbles in Cup A and one marble in Cup C, he will survive at this task.

Mama Chog is feeling fatigued. If she doesn't have at least 2 marbles in Cup B, then she will have to take a nap, which would take time away from searching for food.

Mama Chog needs to be fit to keep up with Mollie and her brothers and sisters. She needs a healthy heart, or at least 2 marbles in Cup A, to satisfy her fitness needs.

Brother Chog likes to hang out in the marshes that aren't very clean. If he doesn't have at least 2 marbles in Cup B, he will get sick and not be able to successfully reproduce.

A new factory was just built on the river and is dumping dangerous chemicals right into the river. If you don't have all 5 marbles in Cup B, your offspring will be born with damaged hearts and won't survive.

Post-game discussion:

Tell me what happened if you didn't have enough marbles in the right cup or cups?

[the fish died]

[the fish wasn't able to reproduce]

...

If the fish dies or can't successfully reproduce, are the fish's genes (physical characteristics, strengths, abilities, behavior) passed on?

[no!]

What happened if you DID have enough marbles in the right cup or cups?

[live]

[reproduced]

This means that only fish adapted for the scenario are able to pass their abilities on to their children, eventually most of the surviving fish will be adapted to live successfully in their habitat.