

# Fishable and Swimmable in 7 Years

## Lesson 5 - Evaluate 1 - Home

### Overview

To demonstrate and assess understanding of bioremediation and the Ala Wai Canal, the next lessons will focus on the 5 pillars of STEMS<sup>2</sup>, which is:

- A`o - teaching and learning is reciprocal.
- Makawalu - seeing the world through different perspectives
- Mo`olelo - talking between one another (stories, traditions, etc.)
- Sense of place - how people see themselves and how others see them
- Advocacy - supporting a cause

Students will be making take home kits, as well as a set of instructions. Their task is to teach someone at home to make a Genki Ball, and answer any questions they may have. Though not exclusive to these examples, students are advocating for the clean up of the Ala Wai Canal, by teaching (a`o) others through their experiences (mo`olelo) of making the ball, while experiencing the reaction of the person (makawalu) at "home" (sense of place).

### Goal

Students experience teaching as one way to show understanding.  
Students start to recognize that involving others could encourage them to care

### Essential Question

How can we encourage others to care?

### Enduring Understanding

Problems can have more than one solution.

- There are multiple ways to address the Ala Wai Canal's pollution
- There are multiple ways to encourage people to care.

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Materials	
Materials for 60 Balls	Per student
<ul style="list-style-type: none"> <li>● <a href="#">Topsoil (½ cubic ft)</a></li> <li>● Rice Bran, 1 pound</li> <li>● Molasses</li> <li>● Water</li> <li>● EM solution, 1 liter               <ul style="list-style-type: none"> <li>○ See note on next page.</li> </ul> </li> <li>● Plastic bags, quart</li> <li>● Plastic bags, snack</li> <li>● Rubber bands</li> <li>● Index cards</li> <li>● Tape</li> <li>● <a href="#">Aluminum Pans (9" x 13")</a>, 5 pans</li> <li>● <a href="#">Underbed container</a>, 1 container</li> <li>● <a href="#">Sifting pans ¼"</a></li> <li>● Container(s) to scoop soil</li> <li>● Graduated cylinder</li> <li>● Beaker</li> <li>● <a href="#">5 gallon bucket</a></li> <li>● Newspaper</li> </ul>	<ul style="list-style-type: none"> <li>● Sifted soil - 125 mL</li> <li>● Rice bran - 30 mL</li> <li>● EM solution - 30 mL</li> <li>● Plastic bag, quart - 1</li> <li>● Plastic bag, snack - 1</li> <li>● Rubber band - 1</li> <li>● Index card - 1</li> </ul>
<p><b>Considerations:</b></p> <ul style="list-style-type: none"> <li>● You will need to multiply the supplies in the left column depending on how many Genki Balls you want to make in total.</li> </ul>	

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## Notes on the EM Solution

### Materials:

- 1 bottle of EM
- Water
- Molasses
- 7 one-gallon containers.
- 1000 mL beaker
- Chopstick to stir with

### Procedure:

1. Pour 850 mL of water into the beaker.
2. Add 150 mL of molasses into the same beaker.
3. Use the chopstick to stir.
4. Pour this solution into an empty 1-gallon container.
5. There will still be some molasses stuck to the beaker.
6. Add 1000 mL of water into the beaker.
7. Use the chopstick to stir. This will remove more molasses from the beaker.
8. Pour this 1000 mL solution into the same 1-gallon container.
9. Pour 850 mL of water into the beaker.
10. Pour 150 mL of the EM solution into the same beaker.
11. Use the chopstick to stir.
12. Pour this solution into the same 1-gallon container.
13. Close the 1-gallon container, and shake the mixture.
14. This is 3 liters of activated EM.
15. Repeat for the other empty 1-gallon containers.

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Lesson Time = 40 minutes

### Introduction (10 minutes)

1. You can preface that one way to have people care is to get them involved. Mention that they will be making an individual take home kit, and they need to teach someone how to make the Genki Ball.

**Insight:** Students may not come from typical households - they may not be able to teach a parent/guardian. You can suggest teaching a sibling or cousin. Have them try asking someone at home first, but make it clear that they will not be punished for not being able to do so. If students return without being able to teach someone, have them teach someone on campus - a teacher, faculty member, or a friend. Emphasize that the point is not to come back with a ball, but to teach someone - discourage them from making the Genki Ball themselves.

2. For time management, you can give instructions for the second part, which is creating the instructions for the Genki Ball on an index card.
3. Distribute 1 index card per person
4. For the front:
  - a. Have the students design a logo for the Genki Ball
  - b. Also have them include their name.
5. In the back the students will write product information for the Genki Ball:
  - a. This will help test their knowledge of the Genki Ball.
  - b. This will allow opportunities for students to check with one another.
  - c. They can also use this as a cheat sheet when teaching.
  - d. Helpful information is on the next page.

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6. The students should include general instructions on how to make the Genki Ball.
7. For the ingredients, you can ask the students to share what they remember - the ingredient and its function. You can then list the product info on the board:
  - a. Sifted soil - holds the Genki Ball together
  - b. Rice bran - houses the microorganisms
  - c. Molasses - food for the microorganisms
  - d. Yeast - helps the lactic acid bacteria
  - e. Lactic acid bacteria - kills off pathogens
  - f. Photosynthetic bacteria - digests sludge
8. Students can also mention that the ingredients are non-toxic - they are on the FDA's GRAS list (Generally Recognized As Safe).
9. Students should mention the purpose of the Genki Ball as well.

### **Making the Genki Ball Kits (30 minutes)**

1. Depending on the amount of resources you have, you will probably only be able to work with a few students at a time. Meanwhile, the other students should be working on the index card independently.
2. Provide a quart-sized plastic bag per student you are working with.
3. Have the students measure 30 mL of rice bran, and place it into the plastic bag.
4. Provide the students with rubber bands.
5. Using the rubber band, the students should figure out a way to isolate the rice bran into a corner of the plastic bag.
6. Students should sift the soil, and place 100 mL of it in their plastic bag.
7. Due to the rubber band, most of the rice bran should be separated from the soil.
8. Students can place this bag on the side.

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9. Provide the students with a snack-sized plastic bag.
10. Measure and pour 30 mL of the EM solution into the snack-sized bag.
11. Make sure that the snack-sized bag is sealed.
12. Place the snack-sized bag into the bag with the rice bran and soil.
13. Make sure that the quart-sized bag is now sealed.
14. Students can take their finished kit back to their seat.
15. Once they are done with the index card, they can tape it, logo-side up, onto the plastic bag.

### Homework

1. Students should take their kits home and teach someone, if possible.
2. Students can give the index card to the person they taught.
3. The Genki Ball should be brought back during the next class session.
4. The Genki Ball will need to be stored in an aluminum pan as in the previous lesson.
5. You may have to switch out the newspaper the next day if it's too wet.
6. Check the balls in a few days, some white fuzzy stuff may be growing.
  - a. It is not toxic.
  - b. Have the students rub that into the Genki Balls' surface to prevent black mold from growing.

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## Student Reflection (Next class session)

1. Create a reflection form, and have the students share:
  - a. How did your teaching experience go?
  - b. What did you learn about yourself from this activity?
  - c. If you were to teach again, what would you do differently?
2. If students could not teach anyone at home, have them answer a different form:
  - a. If you could teach someone from school, who would you teach?
  - b. When would you be able to teach this person?
  - c. Based on your experience from making Genki Balls, what tips would you give to the person you would teach?