

What is the Solution to Ocean Pollution?

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Synopsis of the Activity:

Audience members will learn about marine debris and the impacts of improperly disposed trash on ocean life. Learners will engage with the topic by using marine debris to paint, and by playing a matching game to learn how long it takes certain trash items to decompose.



Sample layout of "What's the Solution to Ocean Pollution?" activity.

Audience:

The main target audience consists of a wide variety of people that attend the public Corvallis Saturday Farmers' Market: families and individuals of varying age ranges, professors and students, tourists, etc. Educators will need to prepare to engage with people that have never heard of trash in the ocean to people who spend countless hours studying the topic, and are currently acting as stewards of the ocean. Conversing with guests that visit the activity will help educators gauge what level of vocabulary and language to use as well as how to best engage visitors/learners.

Setting:

This activity was designed for the Corvallis Saturday Farmers' Market to target the local community. The activity may be altered for any setting.

Time Length:

1 hour preparation; 10 minute presentation

Learning Outcomes:

- Learners will be able to describe and discuss various solutions to pollution, such as prevention and doing one's part to reduce the amount of improperly disposed trash.
- Learners will be inspired to live sustainably through the six R's: rethink, refuse, reduce, reuse, repurpose, and recycle.
- Learners will become interested in the six R's framework because not only are the painting tools highlighting the "repurpose" aspect of the framework but collective efforts significantly alleviate the amount of trash that enters the ocean. This is visually represented in the finished product of the activity when learners contribute to the painting activity, resulting in a collaborative piece of art.

Guiding Concepts:

- Improperly disposed trash, or called marine debris, causes harm to marine organisms and eventually affects humans through the foods that we eat. The artificial jellyfish is an example of how marine organisms find it difficult to distinguish between trash and food.
- Prevention of marine debris starts with the individual. Local actions then have global effects. The painting portion of the activity simulates the idea that collective individual actions are instrumental to larger impacts.
- The six R's provide a framework that helps remind people of the many ways of eliminating the amount of trash that ends up in the ocean.

Ocean Literacy Principles:

- **5: The ocean supports a great diversity of life and ecosystems.**

The ocean is a habitat for many organisms and they are not able to distinguish trash from food. Polluting the ocean is essentially suffocating the wildlife and their habitat.

- **6: The ocean and humans are inextricably interconnected.**

Even landlocked regions can affect the ocean through the use of single use items and although they are not able to see the ocean from their location, they are affected by ocean pollution by means of fisheries and tourism. Pollution litters most, if not all, beaches worldwide and there's no escaping the trash seen on the sandy beaches that would ideally be a pristine area. Fisheries affect people worldwide because fish gets distributed to many parts of the world or fish is caught by communities and gets eaten

and/or distributed. It has been noted that traces of plastics are being found in the fish we eat so it's time for people to be more self aware of their decisions around single use items.

Key terms/Vocabulary

- Marine debris
- Six R's framework: Rethink, Refuse, Reduce, Reuse, Repurpose, Recycle
- Degradation
- Prevention
- Organism
- Pollution
- Habitat

Guiding Questions:

- "Have you heard of marine debris?"
- "Would you like to paint with plastic?"
- "Have you heard of the six R's?"
- "Would you like to play a matching game to see how long it takes for each item to degrade in the ocean?"
- "What match surprised you the most?"
- "How might you reduce the use of single-use materials in your everyday routine?"

Materials for activity:

- Canvas for collective mural
- Plastic materials to paint canvas with
 - disposable utensils, bottles, straws, etc.
- Acrylic paint
- Old rag for cleaning purposes
- Cards for the matching game
 - 8 object cards, 8 time cards
- Artificial jellyfish
 - plastic bag inside clear bottle
- Folding table

Procedure and Set-up:

Coordinate with the market boothing contact, or a similar person at your desired location, to arrange table placement. Arrive 30 minutes early to set up the table, place activity items, and post signage. Half the table will be dedicated to the painting activity while the other half will be for the matching game and displaying the artificial jellyfish.

Activity Description:

Painting with plastic

“Would you like to paint with plastic?” will ideally draw people’s attention and curiosity so they will likely interact with painting on the canvas. The presenter will then explain that this activity is to promote awareness of marine debris and how to reduce our pollution impact on the ocean.

Degradation matching game

They can play the matching game that shows an estimated time of how long it takes for daily items to degrade in the ocean. Some people might be interested in the artificial jellyfish which would then bring up the conversation of how animals are not capable of distinguishing trash and food- an increasingly major issue seen in oceans today.

Preparation Section

Making the artificial jellyfish

Using a clear plastic bag (ones that are used for grocery produce work well), place a small amount of water inside the bag and tie off to allow the jellyfish to float up and down the plastic bottle. Cut tentacles on the flared part of the plastic bag before placing inside plastic bottle. Fill the bottle with water and cap tightly to prevent leaking. The following link is another example of how to make a jellyfish in a plastic bottle.

How to make a jellyfish in a bottle

<https://www.youtube.com/watch?v=SmJk1rZ35LY>

Day prior to activity

- Collect plastic materials that will be used for painting
- Double check that cards for the matching game are all present; bring tape in case the weather is windy and cards need anchoring
- Collect all signage/props
- Have canvas and table ready to go

Assessment Plan

How will you measure the success of your activity in meeting the goal(s):

1) 90 percent of participants will play the matching card game that shows how long it takes for daily items to degrade in the ocean. The painting is optional and is more of an attraction and a hook to get people to visit the table. The matching game has more

educational impact by letting the learner engage their minds in the activity to estimate how long items break down. The educator will also ask the participants which item they find the most surprising. This ideally helps further establish the message that daily single use items take many years to break down so it's imperative that the trash doesn't get into the water system to begin with. Learners will be able to hold a discussion specifically mentioning specific terms, guiding principles, and ideas that pertain to the ocean literacy items above. A checklist of certain terms/principles may be marked as the educator listens to conversations, and a tally will be kept of how many people continue the conversation to a depth of how they can make change. Participants will leave the activity with more insight as to how they can reduce the amount of single use items in their lifestyle.

2) Data will be collected through participant observations and reaction/responses to the game. Many people have mentioned that they do not think about the degradation times for certain items, the main item being the cigarette butt. When asked how much visitors know about marine debris, their reactions are typically either hearing of it but not knowing too much or they have heard and read stories of the Great Pacific Garbage Patch and know a decent amount of the issue. Participants usually have at least heard of marine debris even if they do not know too much about it. A scale of 1-5 with predetermined levels of prior knowledge may be used to quickly gather data while talking to participants. For example, 0=no prior knowledge, 1=heard about the topic, 2=have read about the topic, 3=able to correctly identify X degradation times in the game, 4=able to correctly identify all degradation times in the game, 5=already participate in stewardship activities

3) Analyze their reactions when they participate in the matching game and engage in conversation by the time they leave the table activity. Bewilderment from the matching game would be a good indication that participants learned something new. "I had no idea that ___" and "I'm surprised that ___" are expected from learners even if they had prior knowledge of what marine debris is.

Background Research on Topic

Marine debris is any trash item that is in our oceans or Great Lakes. Whether it comes from our trash produced on land or from misplaced fishing gear, marine debris is one of the main issues that our world ocean is experiencing.

Plastic is the main material found during the International Coastal Cleanup. When plastics were made, they were praised for the durability and many uses. However, it was not known that it would so durable that it would affect our ecosystem.

In an animal's perspective, marine debris can be mistaken for food. This is detrimental to marine life because their stomachs get filled but they are left hungry without the nutrition they need to survive. Marine debris from fishing gear can catch animals without much chance for escaping. Trash also gets caught in and/or around animals in ways that affect their growth.

Gyres are rotating ocean currents. There are five main gyres in the world's ocean; the North Pacific, South Pacific, North Atlantic, South Atlantic, and Indian Ocean. The largest gyre is the North Pacific gyre which also happens to be the site of the largest garbage patch called the Great Pacific Garbage Patch (GPGP). Contrary to what it may sound like, the GPGP is not a floating island of trash. In fact, it's rather a sludge of plastic and other degrading material that circulates with the ocean currents. Ultra violet rays from the sun breaks down plastic in a method called photodegradation. These smaller pieces of plastics are called microplastics and can be equally, if not more, harmful than larger pieces.

Prevention is the solution to the ocean pollution. Like most other problems, the key is to fix the source of the problem. Methods like the six R's (rethink, refuse, reduce, reuse, repurpose, recycle) can mitigate the ocean pollution. Rethinking our choice of products is the first step to preventing our potential contribution of marine debris entirely. Refusing one-time use products would be the most ideal way of preventing a wasteful routine but with our current lifestyle in this day and age, reducing the disposable items would be the next step. Reusing disposable items and repurposing them into different functions than their original is a way to keep throwing away at bay. The last "R" is recycle which would allow the disposable item to be remade into something else. Investing in reusable items is another solution.

There's a notion that one person isn't going to make a difference but that myth needs to be dispelled. The phrase "a little goes a long way" is the perfect quote to convince people that the change they make in their lives can help our future ocean pollution

issue. It is also thought that the ocean isn't in such a bad condition because we can't see the true damage. What happens locally influences global scales. What happens to oceans also affects the globe in terms of economy and health. Fisheries are affected by and affect others from ocean pollution. Additionally, traces of plastic are found in our seafood which hopefully serves as a wake up call for the urgency of preventing trash from entering the ocean.

References

https://oceantoday.noaa.gov/trashtalk_specialfeature/

Background Pedagogy for Activity

Though not necessary to have a substantial amount of knowledge, the presenter should have a sufficient knowledge of ocean pollution and general key terms. Since the audience will consist of a variety of people, it will be assumed that visitors do not know about the topic and thus, use of simple terms will be best.

Starting off with a broad question like “What do you know about marine debris” or “Have you heard of marine debris” will allow the instructor to gauge the prior knowledge of the learner so as to tailor the lesson to the specific audience. Depending how much the learner knows, the instructor could be a sage on stage to inform them what marine debris is.

Participants can start with painting the canvas with plastic pieces where the instructor can ask if they have heard of the 3 R's. They can then introduce the six R's which are rethink, refuse, reduce, reuse, repurpose, and recycle. The painting activity shows one way to reuse and repurpose single use items like disposable utensils and soda bottles. There are passerbys that are not interested in painting but are interested in what the table has to offer. They can be redirected to the matching card game.

During the matching game, the instructor can ask the participant their reasoning behind why they matched the time to the item as they go along but it could hinder the process of exploration. Thus, an alternative is to listen to their reasoning as they match the cards and bring up their thoughts as you match the cards while explaining what time goes with each item. After the cards are matched, the instructor can reveal the answer and ask the learner what item surprised them the most in terms of how long it takes for it to degrade. Though they are just estimated times, the instructor will reiterate that these items break down but do not degrade entirely so it is important for us to properly dispose of our trash and to reduce the amount of single use plastics in our lives. The instructor can discuss the harmful effects of plastics in sea life which eventually affects humans through the foods that we eat.

To conclude the conversation, the instructor can say that the solution to ocean pollution is prevention. Targeting the trash at the source before it enters the waterways is one of the most effective ways of avoiding marine debris from becoming an issue. The instructor can also bring up a common mentality that many people have which is “I'm just one person, my actions are not going to make a difference.” If everyone made even the slightest effort, it will all help in the long run.

References

Rochman, C. 2016. Strategies for reducing ocean plastic debris should be diverse and guided by science. *Environ. Res. Lett.* 11.