

Macro to Micro – Lesson Plans and Activities for Teachers

SEA-ing the Problem of Marine Litter

Introduction:

This lesson plans set is a series of activities aimed to raise awareness and help students learn about the effects of marine litter. They intend to show students how plastic breaks down, why, what becomes of it and its effect on the environment. The aim is to provide a range of engaging and hands-on activities They are intended for students around the age of 12 but can easily be adapted to various ages. The setting is prepared on Ramla Bay in Gozo as an example.

Aims:

- Understand the definition of marine litter, where it is found, and the impact it can have on the marine environment.
- To raise awareness of issues concerning marine litter and to encourage participants to act constructively to make a real difference.

Objectives:

- Describe the common types of litter found in the sea.
- To develop fieldwork skills such as collecting and recording data.
- To learn more about their local area and describe how litter makes them feel.
- Explain that litter has a social and economic impact on a community.

Learning Outcomes:

Participants can

- justify the importance of identifying problems, reflecting critically, thinking creatively, and having a wider vision to become effective agents of change.
- use the natural, social, and built environment that surrounds them, as a context and source of learning.
- reflect upon the consequences of their actions on present and future generations.

Participants are

- motivated to make a positive contribution to other people and their social and natural environment, locally and globally.

Time required:

- A total of 4 hours minimum is required to do all the suggested activities (refer to plan)

Resources/Material required:

- Resource 1 – presentation (based on Ramla Bay in Gozo)
- Resource 2 - Team cards displaying plant species found growing around the beach being investigated with string/tag(three of each species, depending on number of students)
- Resource 3 - Exploring the Bay - Data Recording Sheets (one per group)
- Resource 4 - Litter Survey Sheet (one per group)
- pens and pencils
- paper
- clipboard per group
- small containers (one per group)
- digital microscopes + viewing devices (one per group)
- metre squared quadrant (one per group)

- garbage bags
- reusable gloves and litter pickers
- wooden sticks (one per participant)
- coloured wool
- scissors
- Resource 5 - fish cut-outs (one per participant)

Planning Considerations

Healthy and Safety information (stay in groups, stay away from the sea, hazards of roads and weather). Risk assessment/participants list/medication/first aid kits.

Sustainable Development Goals:



Plan:

Time	Phase	Action	Resources
5 minutes	Grouping	Participants randomly select a card from a set of cards. The cards display plant species found growing around the beach being investigated. To form teams, participants must group together with others who have the same plant species on their cards. Groups of three participants are suggested - participants who have the same plant species on their respective cards.	Team cards
10minutes	Introduction	Brief introduction <ul style="list-style-type: none"> • outline the aims and objectives of the learning sessions/activity, • broad implications of marine litter and how it aligns with global sustainability goals, • brief information about the beach being investigated. 	slides 1 & 2
25 minutes	Ice-breaking activity - setting the scene	Ice-breaking activity linked to the theme of the session - "Trash Timeline" In this activity, the participants will be invited to: <ul style="list-style-type: none"> • write down the last four items they threw away. • Then, they will have to place those items in order on a timeline, starting with the most recent item at the top. • Once everyone has completed their timeline, each participant shares their timeline with the group, explaining each 	pencils and paper

		<p>item, why they threw it away, and how they disposed of it.</p> <p>Afterward, there will be a group discussion about what happens to waste, how long it takes to degrade, and the impact waste can have on the environment. After listening to their responses, show chart showing the time needed for waste to degrade depending on what material the item is made from. This activity will be a great way to get participants thinking about their own waste and how it affects the environment around them. This is intended to make the topic relatable to their everyday lives.</p>	slide 3
10 minutes	What is happening to our oceans?	<p>The participants will be invited to watch a short video. The video highlights the diverse marine creatures that inhabit our oceans, and how their ecosystem is being threatened by the presence of marine debris, adversely impacting their well-being. Afterwards, there will be a discussion, reviewing the main issues raised and why the ocean should be kept clean and healthy.</p> <p>To initiate a meaningful discussion about the detrimental effects of marine litter on the environment and marine life, I plan to ask the following questions:</p> <ul style="list-style-type: none"> • What observations did you make during the initial part of the video? • What distinguishes the second part of the video from the first? • In your opinion, how are the marine organisms featured in the second part of the video impacted by the marine litter? • Which types of marine litter were evident in the video? • Have you encountered any of these kinds of litter in your local surroundings? <p>These questions aim to encourage an interactive dialogue and raise awareness about the repercussions of marine litter on marine life.</p>	slide 4 – video Source: https://youtu.be/71f_uFm9S7g
20 minutes	From Source to Sea	<p>To begin the group discussion, participants will be prompted to elicit what they already know about marine litter. They will be encouraged to share their own experiences and observations, as well as any prior knowledge they have. This will be facilitate the discussion by showing a poster asking open-ended questions (see below) and providing clarifying information as needed.</p>	slide 5

		<p>5. How does the accumulation of marine litter in coastal areas, such as Ramla Bay, impact local communities?</p> <p>These questions will stimulate discussion and help participants explore the complex effects of marine litter on marine ecosystems, wildlife, human health, and socio-economic aspects. Their responses given will be used to help guide the rest of the session and ensure that it is relevant and engaging for everyone.</p>	
60 minutes	Outdoor activity on the beach	<p>Participants will engage in a beach activity, which involves exploring the area and observing and documenting the weather conditions. They will also have a moment of silence to connect with the natural environment of Ramla Bay and report on the observations made, sounds, and feelings. Additionally, they will evaluate the litter situation in the area and conduct a clean-up activity using a one-meter quadrant, simultaneously completing a litter survey. Prior to going outside, instructions will be provided, explain the litter survey form, and how to use a tally chart to record litter found.</p> <p>Once on the beach, the participants will work as a team (keeping the same groups) and each team is given a pack with the data recording sheets, clipboard, gloves, garbage bags, litter pickers, and a small container. They will explore and investigate the beach site by answering the questions on the data recording sheets as follows;</p> <p>Part 1: Participants look around them and describe the situation on-site.</p> <p>Part 2: Participants observe and record weather conditions.</p> <p>Part 3: Participants carry out a silence exercise. The silence activity is an opportunity to observe and connect with the natural environment without distractions. By staying quiet, participants can hear the waves, the wind, and the animals. The silence activity can help participants develop their observational skills, noticing details they might have missed if they were chatting or distracted. The silence activity can also be a mindfulness exercise, encouraging participants to focus on the present moment and let go of other thoughts and worries.</p>	<p>litter survey form, data recording sheets, clipboard, gloves, garbage bags, litter pickers, a small container</p> <p>slides 8 and 9</p>

		<p>Part 4: Participants focus on marine litter and discuss if the site is well equipped to prevent litter.</p> <p>Part 5: Participants will carry out a litter survey and beach clean-up. The litter survey will involve collecting and analysing data on the types and amounts of litter found in the area, while the clean-up effort will give participants hands-on experience in environmental stewardship and the importance of maintaining clean public spaces.</p> <p>The participants will collect some sand in the container provided, which will then be analysed for microplastics once they return indoors.</p>	
30 minutes + 5 minutes	Sampling sand for microplastics	<p>For this hands-on activity, each team will receive a digital microscope and related viewing device. During the activity, participants will utilise the handheld digital microscope, attach it to the related viewing device and analyse sand for microplastics. To aid in their analysis, a chart displaying various types and descriptions of microplastics, including nurdles, will be shown for reference. After analysing the sand, the teams will report and provide comments on their findings referring to the litter survey sheet and sand sample. They will discuss the litter found - the most common type of litter and discuss the properties of different materials found. Each group shares ideas with the rest of the participants. It's important to note that the sand used during this activity will be returned to the beach. The goal is to collect data on microplastic pollution without causing any harm to the environment. Therefore, it's crucial that participants understand that they should put the sand back from where it was collected so that the beach is left in the same condition as when they arrived.</p>	<p>Digital microscopes and viewing devices (one per group) slide 10</p> <p>slide 11</p>
30 minutes	Review and Way Forward	<p>After actively participating in the beach clean-up activity and gaining insights into the negative impact of litter, particularly microplastics, on marine ecosystems, the learning process will continue by exploring effective strategies to reduce and prevent marine litter. Recognising that every individual effort counts and that we share a</p>	

		<p>collective responsibility, the drive for change begins with us - we are the catalyst for transformation.</p> <ol style="list-style-type: none"> 1. Are there any solutions or alternative practices that could help minimise the occurrence of marine litter? 2. As individuals, what actions can we take to minimise the contribution of these sources of marine litter? 3. How can we raise awareness and encourage others to change their behaviours regarding these sources of marine litter? <p>After putting forward their ideas, the learners will be presented with seven actions, each accompanied by a detailed explanation. They will have to determine the level of commitment required for each action. They will have three options to choose from: 'easy', 'make an effort', and 'do your best'.</p> <p>Following the discussion, the participants will be provided with fish-shaped cut-outs on which they can write a personal pledge. The fish-shaped cut-outs will be made from cereal boxes thus repurposing materials that would otherwise be discarded. This pledge will express their commitment to stopping marine litter, including specific actions they plan to take such as reducing their use of single-use plastics, participating in beach clean-ups, or advocating for policy changes, such as smoke-free beaches. Through sharing their pledges, participants will have the opportunity to foster a sense of community and accountability around this crucial issue. Next, participants will join the Kahoot game using their devices and compete against each other, adding a competitive and interactive element to the lesson. Kahoot is an online learning platform that offers interactive quizzes to engage participants in a fun and engaging way to assess knowledge and promote active learning. The quiz will consist of 14 multiple-choice / True or False questions displayed on a shared screen, and participants will answer using their own devices. The purpose of this activity is to</p>	<p>slide 12</p> <p>slide 13</p> <p>slide 14</p> <p>slide 15 recording of the Kahoot quiz</p>
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		provide an enjoyable opportunity for participants to recollect the main points highlighted during the session in a playful manner.	
30 minutes + 15 minutes	Reflection – creating a ‘Journey Stick’	<p>As a concluding activity, an image of a ‘Journey Stick’ is presented to the learners and instruct them to create their own version to capture their experiences of the educational sessions related to marine litter that they had had. A journey stick is a stick that is decorated with symbols, objects, and materials that represent different aspects of a journey or experience (Make a Journey Stick science-sparks.com).</p> <p>Each participant will receive a stick and coloured wool to incorporate into their journey stick, with each element symbolizing a particular aspect of the lessons and activities including the outdoor session at the beach and selecting colours that correspond with the environment’s sights, sounds, and smells. The participants will have a few minutes to reflect on their experience, incorporate items to the journey stick, and be invited to share their stories with the rest of the group. Using journey sticks as a reflection activity will allow participants to visually represent their experience in a tangible and creative way. This can help to engage the senses and stimulate memory recall, making it easier to reflect on and process the experience. Sharing their stories and connecting over shared experiences will foster a sense of community and empathy, as the participants will listen to and learn from each other’s stories.</p> <p>Throughout the sessions, a diverse range of activities, discussions, collaborative group work, data collection exercises, practical hands-on tasks, and evaluation sessions, around the theme of marine litter were included. The implementation of this transformative pedagogical approach is expected to leave a lasting impact on the participants, fostering a deep and meaningful understanding of the marine litter issue. The goal is to cultivate a ripple effect, where individuals share their new knowledge and insights, leading to a collective change toward adopting a more sustainable lifestyle.</p>	<p>slide 16</p> <p>prompts will be provided – slide 16</p>

References

European Environment Agency's home page. (n.d.). <https://www.eea.europa.eu/>

Google Maps (2023). Map of Ramla Bay. Retrieved May 6, 2023 from <https://www.google.com/maps/search/Natura+2000+site+Ramla+Gozo/@36.0622444,14.2810181,587m/data=!3m2!1e3!4b1!5m1!1e4>

Intermepa (n.d.). <http://www.intermepa.org/>

Kahoot! (n.d.). <https://www.kahoot.it/>

Marine litter - Bing. (n.d.). Bing.

https://www.bing.com/images/search?view=detailV2&ccid=oNutdWBD&id=087CFF52E833D14209C10987653307BE679F8BE7&thid=OIP.oNutdWBDOHDJok9JpkMYLgHaC9&mediurl=https%3a%2f%2fassets.unenvironment.org%2f2020-04%2fs1_0_1.jpeg%3fnull&cdnurl=https%3a%2f%2fth.bing.com%2fth%2fid%2fR.a0dbad7560433870c9a24f49a643182e%3frik%3d54ufZ74HM2WHCQ%26pid%3dImgRaw%26r%3d0&exph=638&expw=1600&q=marine+litter+&simid=608011226065871917&FORM=IRPRST&ck=D56F09235D351FB12E35B1BD6C6B0E4E&selectedIndex=7&ajaxhist=0&ajaxserp=0

Mifsud, S. (n.d.). Online flora of Malta - Home Page (by Stephen Mifsud). Stephen Mifsud (Malta) 2002-2022. <https://maltawildplants.com/>

Mottram, N. (n.d.). Journey sticks. <http://nigelwalking.blogspot.com/2010/07/journey-sticks.html>

The Globe Program Malta. (2020, November 18). Marine Litter [Video]. YouTube. https://www.youtube.com/watch?v=71f_uFm9S7g

Vanstone, E. (2022). Make a Journey Stick. Science Experiments for Kids. <https://www.science-sparks.com/make-a-journey-stick/#:~:text=The%20idea%20of%20a%20map%20stick%20or%20journey,as%20they%20tell%20the%20story%20of%20a%20journey.>

Waste: how long to decompose at sea? (2021, June 6). SPF Santé Publique. <https://www.health.belgium.be/fr/node/37388>