RESOURCE PACK FOR EDUCATORS

BeMED

A COMMITMENT FOR A PLASTIC-FREE MEDITERRANEAN SEA

Nature Trust – FEE Malta

2021

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Project Coordinator: Marvic Refalo

Education consultant in Education for Sustainable Development: Prof Paul Pace

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Introduction

Caring for the sea – Caring for our wellbeing

Covering more than 70% of our planet the sea is all around us. It is the place where millions of years ago the first lifeforms appeared and from where they eventually colonised the land. The wide range of marine habitats and ecosystems it offers are home for billions of creatures ranging from the smallest organisms to the largest animals to ever inhabit the Earth.

The sea moderates our planet's climate and plays an important role in supporting the cycles that maintain life … particularly the water cycle that ensures that life sustaining water flows through the various ecosystems and the atmosphere. It also provides us with considerable supplies of food and is indispensable for the fishing industry. Humans have learned to use the sea for leisure, travelling, trading, warfare, mineral extraction and to generate power.

The Mediterranean is a sea that is almost completely enclosed by land. Being at the crossroads of three continents, it has always been a theatre for various forms of human interactions: languages, cultures, religions, politics, conflicts, trade and migration. The history of the Mediterranean region played a central role in determining western civilization and is crucial to understanding the origins and development of many modern societies. Specific environmental issues together with the varied socio-economic conditions that characterise the Mediterranean had – and are still having – a significant impact on sustainable development in the region.

All the activity – from land and sea – has made the Mediterranean Sea the most polluted sea in the world. It is subjected to all forms of pollution that, together with overfishing, are drastically decreasing marine biodiversity. One of the greatest culprits is plastic pollution that, besides taking ages to decompose, it is killing millions of creatures who either by ingesting plastic objects mistaking it for food or by getting entangled and suffocating in drifting waste. However, the damage doesn't end there: the sun breaks down plastic into tiny fragments called micro-plastics that find their way into food-chains gradually unleashing poison in the bodies of the fish that ingest them … and finally ending up in our plates.

The Beyond Plastic Med initiative (BeMed) was set up to support and bring together whoever is committed towards halting plastic pollution by coming up with and implementing innovative, effective and sustainable solutions. Besides being committed towards disseminating best practices BeMed is committed towards raising public awareness about the issue and, most importantly, empowering citizens to take action.

In line with this goal, Nature Trust – FEE Malta has embarked in this project, Clean Seas by Eco-Schools Malta, aiming to develop an educational pack for educators to teach about marine pollution and biodiversity. The pack seeks to adapt to the various needs of learners in different school realities. Consequently, the pack provides a set of activities and resources that span various ages, learning abilities and curriculum subjects, while addressing the cross-curricular theme of Education for Sustainable Development. The pack was developed by teachers for teachers and is therefore sensitive to the needs and resources available at the grassroots hence improving the pack's chances of implementation. The pack will be disseminated among all schools in Malta and Gozo and through the Eco-Schools global network.

Prof Paul Pace

Eco-Schools National Operator

Contributors

Samantha Abela
Maria Baldacchino
Saviour Bonnici
Cynthia Caruana
Valeria Caruana
Neville Dimech
Johann Gatt
Audrey Gauci
Sharon Giordimaina
Mariella Grech
Melissa Grima
Ramona Mercieca
Anita Muscat
Amanda Pace
Anthea Pisani
Christian Saliba
Esther Sammut Carbone
Lino Xerri

Age guide

KG1 (Kindergarten): 3–4 years
KG2 (Kindergarten): 4–5 years
Year 1: 5-6 years
Year 2: 6-7 years
Year 3: 7-8 years
Year 4: 8-9 years
Year 5: 9-10 years
Year 6: 10-11 years
Year 7 (Form 1): 11-12 years
Year 8 (Form 2): 12-13 years
Year 9 (Form 3): 13-14 years
Year 10 (Form 4): 14-15 years
Year 11 (Form 5): 15-16 years

The Sustainable Development Goals

Each of the lessons/activities within this educational resource pack are linked to the Sustainable Development Goals (https://en.unesco.org/sustainabledevelopmentgoals).

Title	**1. Save the Sea**
Author	Valeria Caruana
Age Guide	KG1-Year 1
Subject Area	Environmental Education; Personal, Social and Emotional Development
Preparation Time	5 minutes
Estimated Duration	45 minutes
Site	Classroom
Educational objectives	To learn how important it is to keep the sea clean and also to learn that plastic in the sea can do a lot of harm for underwater sea life.
Learning Outcomes	- I approach new situations positively and with confidence. - I show interest in my immediate and wider environment. - I am confident in taking up opportunities to be creative and imaginative. - I am competent and confident to ask questions and make discoveries. - I am motivated to engage with a range of learning opportunities present in my environment. - I can use the natural, social and built environment that surrounds me, as a context and source of learning. - I can involve myself and others in real-world issues to bring about a positive difference.
Link to SDGs	SDG 14: Life below water
Educational resources required	Appendix 1.1 – Handout - Save the Sea Appendix 1.2 – Flipchart - interactive game Appendix 1.3 – Powerpoint - interactive game colours interactive whiteboard internet connection
Remote preparation	A video will be shown in the beginning of the lesson so the children will learn about the features of the sea turtle.
Planning Considerations	It is important to help children develop a sense of awe about life below the sea to heighten their motivation to protect this life.
Method	**Introduction** Introduce the turtle character to the children. Loggerhead turtles are the most common turtles in Malta. They like to eat shrimps, jellyfish, horseshoe crabs, sponges, small fish and others. They can live up to 50 or more years. These turtles are known for their big head and strong jaws. Their reddish-brown shell is heart shaped.

	This video will help: https://www.yout-ube.com/watch?v=EIffdbFZMPQ **Development** Show the worksheet (Appendix 1.1) to the children and explain what they have to do. They need to choose the correct food for the sea turtle and cross out the plastic objects that will harm the turtle. Then they can colour the pictures they have chosen as food for the turtle. **Conclusion** This video is a good example of the damage done by throwing plastic in the sea https://www.yout-ube.com/watch?v=xFPoIU5iiYQ&t=2s. Explain how sad the sea creatures are because there home is full of plastic.
Follow-up activities	As a follow up they can play the interactive game (Appendix 1.2/1.3) where they have to choose the turtle's friends and put them in the sea next to the turtle and put the trash in the bin. If they choose the wrong objects (plastic objects) they will hear a buzzer sound. If they choose the correct sea creature they hear a 'yeah' sound. (When using the presentation instead of the flipchart the educator will have to press the buzzer/yeah sound)
Background information for educators	https://www.nationalgeographic.com/animals/reptiles/l/loggerhead-sea-turtle/#:~:text=The%20largest%20of%20all%20hard,feet%20stabilize%20and%20steer%20them.
Adaptations	Prepare individual flash cards of the objects found on the handout to make it easier for the students to choose the food from the plastic objects.

Title	**2. Looking after Sea Animals**
Author	Anthea Pisani
Age Guide	KG1-Year 1
Subject Area	Communication and Language; Understanding the World; Personal, Social and Emotional Development
Preparation Time	60 minutes (go through the script, prepare 2 felt charts: happy and a sad sea turtle, colour and laminate the pictures of the objects or cut the pictures for each individual student).
Estimated Duration	30 - 40 minutes
Site	Classroom
Educational objectives	The students will go through the importance of disposing of waste properly. There will also be an emphasis on the importance of reducing waste mainly by using alternative materials instead of plastic and depending less on crude oil.
Learning Outcomes	*Children who have a positive self-image.* Children who believe in themselves fully aware of their potential and capabilities. - I show interest in my immediate and wider environment *Children are socially adept.* Children who develop empathy, respect and acceptance of different points of view. - I am caring and show concern towards others *Children who are effective communicators.* Children who are aware of different language systems, notably Maltese and English. - I listen to and understand simple stories in my language. Children who are versatile with the use of numbers, data handling, shapes and measurement and print in context as a means of production of knowledge and information as well as meaning making and comprehension. - I sort objects into simple categories. *Children who nurture positive attitudes towards learning and become engaged and confident learners.* Children who develop a range of cognitive skills to include labelling/identifying, recognition, sorting, hypothesising, predicting, comparing, sequencing and grouping. - I explore associations and cause-and-effect - I classify and sort objects by size, shape, texture and function

Link to SDGs	SDG 11: Sustainable Cities and Communities SDG 12: Responsible Consumption and Production SDG 14: Life Below Water
Educational resources required	The video ' A wonderful memory of the last nest of the season in Ghadira' produced by Nature Trust - FEE Malta that can be accessed through this link: https://youtu.be/H5VFMu1B8rQ Two felt charts (ideally in different colours) Sea turtle hand puppet or soft toy Appendix 2.1 – Script: Sea Turtles; Appendix 2.2 – Template: Happy Sea Turtle Appendix 2.3 – Template: Sad Sea Turtle Appendix 2.4 – Template: Sea Creatures and Objects Game Internet connection
Remote preparation	The learners ideally already separate waste in the classroom and they are involved in school programmes which deal with the protection of wild animals like the hedgehog (Eco-Schools, etc.). For students whose school is situated near the sea, a clean up activity can be organized prior to this lesson so the KGE will prepare pictures related to the items found on the beach.
Planning Considerations	During the discussion at the beginning of the lesson reference is made to the fact that sea turtles live in the sea, they eat what they can find that is edible for example jellyfish, small crabs, shrimp, etc. However they are not able to digest objects made from plastic, oil, etc. So if these objects are swallowed by the sea turtle they will harm the sea turtle.
Method	**Introduction** The educator tells the students that on that day they have a special visitor in the classroom. The educator gestures that she/he can hear someone knocking on the door, she/he opens the door and fetches the sea turtle soft toy/hand puppet. The educator introduces the sea turtle (most of the children would know that it is a sea turtle) and the educator has to provide a 'voice' for the sea turtle. **Development** The educator uses the script (Appendix 2.1 – Sea Turtles Script). The children are shown the video 'A wonderful memory of the last nest of the season in Ghadira' (https://youtu.be/H5VFMu1B8rQ). The sea turtle explains that when the hatchlings hatch they encounter a number of dangers. Some are natural like sea birds or big fish that eat the hatchlings while other dangers are man-made like waste from plastic, oil, discarded fishing nets. These end up in the sea on purpose or by accident, for example, a plastic bag can be thrown in the blue bin but for some reason

	it flies away and still ends up in the sea. So it is best that we reduce the use of plastic bags, plastic bottles, etc. The educator introduces the game to the students. The teacher has two pieces of felt, one with a happy sea turtle at the top (Appendix 2.2 – Happy Sea Turtle) and the other with a sad sea turtle at the top (Appendix 2.3 – Sad Sea Turtle). The teacher has prepared a box with flashcards (Appendix 2.4 – Sea Creatures and Objects Game) that have velcro attached to them. The children will be called one by one randomly, pick an item from the box, say what it is and paste it on the correct piece of felt according to if the object harms the sea turtle or not.* The game can also be played by each child separately. The teacher presents every student with two A4 papers or preferably two pieces of cardboard from reused cereal boxes which have been painted by the students beforehand, one with a happy sea turtle and the other with a sad sea turtle at the top. Every student has the pictures cut out in a small container and chooses which are harmful or not for the sea turtle. **Conclusion** The educator tells the students that now that they know how we can help sea turtles, it is important that we tell other people too. So the educator will record a message from individual students giving advice to people as to how we can help sea turtles. The messages will be shown on the school's Facebook page. The educator will make sure that the students whose video clip will be shown have consent by their parents that such material can appear on the school's Facebook page/website/social media.
Follow-up activities	If a students' committee/older students organise the Upcycled Bag Activity the students will work with the older students to see how one can make bags by reusing material and not harming the environment.
Background information for educators	Information about the Loggerhead Turtle https://en.wikipedia.org/wiki/Loggerhead_sea_turtle 'A wonderful memory of the last nest of the season in Ghadira' https://youtu.be/H5VFMu1B8rQ.
Adaptations	For students with learning difficulties the game can consist of less objects and the learning support educator prepares some objects the student can touch eg. a piece of net, an empty plastic bottle, a feather, etc.
Extensions	As these are infants, gifted children can draw a picture showing a message they would like to pass to others.

Title	**3. Our Sea**
Author	Amanda Pace, Mariella Grech & Melissa Grima
Age Guide	KG2
Subject Area	Music, ICT, Arts & Crafts, Numeracy Skills (Sorting), Knowledge & Understanding of the World
Preparation Time	Approximately 2 hours (over a period of 2 days in which during this time the students paint the scene and the frame using paint, enhancing interaction and socialisation and colour a Picture of a fish with crayons.)
Estimated Duration	60 minutes + a day outing
Site	School & a preferred sandy beach
Educational objectives	The aim of this activity is to raise awareness and enhance our students' knowledge – from an early age - of the beauty of our environment, particularly marine life, what we can do to keep it clean (especially from plastic). During this activity, students will enrich their learning through multisensory approaches, increase their listening and communication skills as well as develop socially.
Learning Outcomes	*Children who have a positive self-image.* Children who develop positive attitudes which enable them to take the initiative and become risk- takers. - I am able to ask questions in order to learn new things. - I am motivated to engage with a range of learning opportunities present in my environment. *Children are socially adept.* Children who learn to collaborate with peers and adults. *Children who are effective communicators.* Children who are versatile and skilled with knowledge and information as well as meaning making and comprehension. - I sort objects into simple categories.
Link to SDGs	SDG 14: Life Below Water
Educational resources required	Sea Animals Colouring Pages (colouring book style pictures of a crab, jelly fish, seaweed, fish, turtle, etc. especially those found locally) such as can be found here: https://www.firstpalette.com/printable/sea-animals.html , https://www.pngwing.com/en/free-png-nwnxw, https://www.vecteezy.com/vector-art/127843-free-sea-creatures-vectors Video clips on You Tube: A whale's tale: https://www.youtube.com/watch?v=ZgLa7bPB6DA Animals in the Ocean Action Song: https://www.youtube.com/watch?v=gGz176Oz4TY

Save the Sea Animals: https://www.youtube.com/watch?v=ogtvFbBfPEA
Sea Life Frame and Scene (as in photos): paint, large cardboard box, glue, googly eyes, recycled foam, scissors and wall nut shells.
Trash
Items for Recycling Trash Game
Internet connection

Remote preparation

Learners are asked about the sea creatures and how we should take care of them when they have to draw them in preparation for this activity. The teacher will also explain what she intends to carry out when painting the scene, the frame and the sea creatures so that they know the reason why they are going to take part in this activity that is: to save our seas.

Planning Considerations

Student misconceptions: Learners may think that ALL sea creatures are being killed because of plastic pollution, however the teacher must explain that we should learn how to reduce plastic waste and recycle it so that we protect sea life from further harm.

Safety Precautions: During the sorting activity the teacher must be very careful so that children would not hurt themselves with any sharp materials or glass that they can break easily.

Tips: When painting the scene, it is best if it is done in the yard so that children have enough space where to stay around the cardboard so that they can help each other.

Method

Introduction

The activity will be introduced with the story on a You Tube video named: A whale's tale. Children are given time to watch it and afterwards they are asked several open-ended questions to check for understanding and whether they know what to do in order to start conserving and sustainably use the sea. Examples of the open-ended questions asked:

What can you see in the video?

What happened to the whale?

What could be the issue that the whale had in the ocean?

What can we do to avoid the sea creatures from dying?

Learners are also encouraged to dance with the action song named Animals in the Ocean Action Song (link in the educational resources) so that they will imagine themselves in the sea like the sea creatures.

Development

As a development of the activity, learners are going to carry out a hands-on multi-sensory activity by creating a sea turtle with the use of natural objects such as walnut's shell. First, the children need to draw the turtle template, then glue the shell and put on two googly eyes to represent the turtle's eyes. These sea turtles can also be glued to the scene and the frame in order to add more sea animals to them while also adding different textures. In order to create the scene and the frame, educators and learners will recycle a huge cardboard box and learners have to paint it using the blue paint for sea and sky, white for clouds and yellow paint for the sun. Children will then colour the sea creatures using crayons and decorate them. Educators will then cut around the sea creatures and stick them either on the scene or the frame. Afterwards, the learners are going to participate in a Recycling Sorting Activity but it is best if they go out in the yard to have more space (if the weather permits).

The teacher should explain to the learners how we sort our trash in different bins so that they can be recycled and by also giving them an example or two so that they won't get confused what they should do when it is their turn to sort out the trash.

Give several turns to all learners until all the trash is sorted in the right bins and all of the 'sandy beach' is clean. Explain to the learners that they should always keep the beach clean like they did in the sorting activity as otherwise it would end up in the sea.

Conclusion

Extension of this Activity: Outing – Clean Up the Beach and sorting the trash in the correct bin (on the beach).

To conclude the activity the teacher should take the opportunity to take a photo of all the learners with the frame created prior to the activity to create awareness to save our seas, while also singing to a song named: Save the Sea Animals (link in the Educational Resources). The song should be repeated more than once so that children are encouraged to sing along.

Follow-up activities	During Outing – Cleanup of beach
Background information for educators	Useful Links related to saving our ocean: 10 things you can do to save the ocean - https://www.nationalgeographic.com/environment/article/10-things-you-can-do-to-save-the-ocean

	Saving Earth One Craft at a time - https://oceanconservancy.org/blog/2018/04/20/saving-earth-one-craft-time/
Adaptations	Learners with difficulties should be helped so that they will be able to carry out the sea turtle craft and also take part in the sorting activity of trash.
Extensions	On the other hand, for gifted students, teacher should challenge them by asking them questions which require more thinking and reasoning skills – thinking outside the box.

Titles	**4. Oh No! Plastic in my food! Plastic everywhere!**
Author	Anita Muscat
Age Guide	Year 1-3 with adaptations for Year 6
Subject Area	English, Science, Fine motor skills when colouring and handling scissors for the younger students.
Preparation Time	Depends on what activity is chosen and how it is carried out
Estimated Duration	30 to 45 minutes
Site	Classroom and/or school hall / yard
Educational objectives	Students will learn that all creatures living in the sea are interconnected and that anything which affects one of them will probably affect others further up the chain as well. Students will become aware of what micro-plastics are, where they come from and the harm they cause. Students will learn that our plastic consumption has somewhat spiralled out of control but this trend can be reversed if we all do our part. Students will learn that many countries around the world are aware of the harm caused by plastics and what they are doing to address the problem.
Learning Outcomes	*Year 1 and 2* Understand that planet Earth supports life and therefore we must take care of Earth's resources. - Identify practical ways of reducing, reusing, recycling and repairing waste as well as refusing items and rethinking everyday practices to safeguard planet Earth. - I can handle scissors safely to cut freely, along straight and curved lines. *Year 3* - I can ask questions about the world around me. - I can carry out a simple practical investigation with the teacher's support. - I can make simple conclusions from my direct observations. *Year 6* - I can access information from a range of sources with ability and efficiency. - I can write for an audience and with a purpose. - I can create and write my own book/s experimenting with different genres. - I can find answers to simple questions on a scientific topic. - I can identify simple cause and effect relationships.

	- I can explain that the environment is an ecosystem that can be harmed through pollution, destruction of the natural environment, acid rain, overfishing and overpopulation. - I can observe and describe how the sea is becoming polluted and its effect on marine life.
Link to SDGs	SDG 14: Life below water
Educational resources required	Posters, pictures, books and videos containing information about the different forms of life in the sea. Appendix 4.1 - Template: How to draw a fish (1) Appendix 4.2 - Template: How to draw a fish (2) Appendix 4.3 - Template: How to draw a fish (3) Appendix 4.4 - Photos: 3D Fish Appendix 4.5 - Poster: Lifecycle of a plastic water bottle Appendix 4.6 - Poster: How long does it take for trash to decompose Appendix 4.7 - Powerpoint: Can we end plastic pollution Appendix 4.8 - Powerpoint: Plastics and the environment Appendix 4.9 - Poster: Food chains Cereal boxes, coloured paper, paper puncher/scissors Internet connection
Remote preparation	Year 1 – 3 : Prepare various different sized, rectangular pieces of cardboard (used cereal boxes). Sizes can be 25cm by 13cm, 20cm by 10cm, 15cm by 8cm, 10cm by 5cm, 8cm by 4 cm, at least two identical pieces for each student. The teacher decides whether to ask the students to draw the biggest fish they can on the given cardboards at school or at home the day before. Prepare various small pieces of coloured paper or plastic. They can be circles which are produced by paper punchers. Year 6 students are asked (a week before) to do web-based research about micro-plastics or sea pollution. – Questions could include: What are micro-plastics? Where do they come from? How big or how small are they? Are they dangerous? Why? Where do these micro-plastics end up? What are their effects? What can we do to reduce their amount? and What causes sea pollution? What are its effects on marine life? Does it affect humans? How? What can we do to reduce sea pollution? (For example: use local products, use products with less packaging, refuse single use products, apply the 3Rs)

Planning Considerations	Highlight of lesson: One should stress that plastic which is thrown away and finds its way in the countryside and the sea does not disappear. It takes a very, very long time to decompose and then the very small pieces just become smaller but are still there. In the meantime, it causes a lot of damage to the environment and subsequently to all forms of life.
Method	**Summary** Years 1 – 3 Role play - Different sizes of fish which have ingested micro-plastics are represented by coloured circles inside their tummies. The amount of micro-plastics accumulates the higher one moves up the food chain. The coloured circles are removed from the tummy of one fish and emptied into that of a bigger one which has eaten them. This repeats itself until someone catches the biggest fish which has ended up with the largest concentration and then that ends up on our plate with humans who end up eating these tiny plastic particles. And nobody wants to eat plastics! **Introduction** The teacher starts to ask the students whether they have ever seen films of life in the sea and shows some videos to demonstrate what a wonderful world exists in the sea level. Reference can be made to children's films which depict such life –such as Finding Nemo and The Little Mermaid. *(Links to trailers: Videos 1 and 2 below).* The students are encouraged to name living creatures which they know live in the sea. Guide the students to name both 'animals' and 'plants' even if they do not move. Pictures of these creatures and/or videos 3 and 4 can be shown on the interactive board. The beauty of this habitat is discussed. Video 1: https://youtu.be/GC_mV1IpjWA - Under the Sea – song and trailer from The Little Mermaid Video 2: https://youtu.be/wZdpNglLbt8 - Finding Nemo trailer and song Video 3: https://youtu.be/Fn4bQI6yiTk - Sea animals for kids by All Things Animal Video 4: https://youtu.be/7pMEQsk3c5Y - Down In The Deep Blue Sea - Super Simple Songs The enemy: Fish and other sea creatures have a relatively new enemy: plastic. Plastic used by people sometimes ends up in the sea, it breaks into smaller pieces and the fish and other creatures swallow it, sometimes thinking that it is food. Is this good? What do you think happens to the fish when they eat plastic? The very small pieces of plastic look very much like the food small fish normally eat. What happens then? The teacher explains/leads the discussion so that the students understand that the big fish eat the smaller ones and this repeats itself until who ends up eating the big fish? Try to elicit where humans come in the picture...

Development

For Years 1-3 students:

The students are given pieces of cardboard of different sizes and colours. They are encouraged to draw fish of different sizes. Ideas/Templates showing how to draw a fish can be found in the following Appendices: Appendix 4.1(https://onelittleproject.com/fish-outlines)

Appendix 4.2 (https://i.ytimg.com/vi/Hf-9L4UdhKo/maxresdefault.jpg)

Appendix 4.3 (https://www.momjunction.com/articles/how-to-draw-a-fish-step-by-step-for-kids_00371861/).

Each student would need to cut out two similar fish shapes. These should be stuck or stapled together save for a small opening where the micro-plastics (pieces of paper) would be inserted and removed (Appendix 4.4). Thus a 3D fish would be created. Small pieces of paper are put inside each fish's stomach.

A role play for all 3 classes follows with the bigger fish eating the smaller ones. Every time this happens, the 'micro-plastics' inside the stomach would move from one fish to the other and accumulate along the way. Finally, these would end up on our plate.

Each child holds his/her fish up high and starts to walk around in the school hall or yard. That way all the fish start to 'swim' in the area provided. The teacher explains that the small fish are the most in danger and the students holding the bigger fish are to try and catch a smaller fish to eat. The teacher could ask the students to indicate which is the small, the big and the bigger fish to check whether they understsand these terms. Big fish start to 'eat' the little fish. However they would not just be eating the fish. They would also be eating the plastics the smaller fish had swallowed. Once a small fish is caught that cardboard fish is put inside the larger one and all the small coloured pieces emptied into the larger fish. The two students stay together and try to escape a larger fish from eating them. By the time the largest fish has eaten the smaller ones the largest fish should have quite a few coloured pieces of plastic inside its stomach. The teacher then 'catches' all the remaining big fish representing the fisherman who catches the fish to sell them for people to eat.

The following videos can be shown either before or after the activity.

Plastic Planet - https://www.youtube.com/watch?v=73sGgmZoMBQ

A whale's tale - https://youtu.be/xFPoIU5iiYQ

What Is Plastic Pollution – Dr Binocs Show –

https://www.youtube.com/watch?v=ODni_Bey154

Conclusion

At the end of the chain, fishermen catch the fish. These fish end up on our plates. And would we be eating just the fish or would we be eating the plastic as well? Is plastic good for our health? Should we eat it? What can we do to avoid this happening?

Adaptation for Year 6 Students: How could this be possible? Humans eating small pieces of plastic when eating fish?

The teacher can ask some of the questions below to gauge the students' knowledge on the topic.

- How big are micro-plastics? Where can they end up? Why are micro-plastics harmful? How do they effect marine life? What happens to creatures which end up eating plastic? Is it true that they starve? Can these plastics effect our health? How? How widespread are they? Are micro-plastics found only in the sea? Can we get rid of them? How?
- What are the pros and cons of plastic?

Pros: They are cheap to produce. They are light and strong. They can be either flexible or rigid, opaque or transparent They can be made into every imaginable type of product.

Cons: Most plastics have short lifespans. Most plastics which are used as packaging will be thrown away immediately. Other plastics are single-use ones so they are discarded after that particular use. If they are not collected and recycled, plastics systematically end their lives abandoned in nature, particularly in the sea. So they remain in the environment for a very long time.

- Will our seas become an ocean of plastic? Is there anything we can do to avoid this happening? What can we do so that waste plastic does not end up in the sea anymore?

The teacher should then point out that the solution to this problem lies on land. People need to change their behaviour, avoid single-use plastics and reduce, reuse and recycle.

The teacher needs to point out that some micro-plastics may come from cleaning and/or personal care products where they are put intentionally to 'improve' the product and not only as a result of larger plastic products breaking down. Also some micro-plastics are ending in our food from the packaging used to pack the same food.

Work for home:

Once the students' curiousity is aroused students are guided to research further about micro-plastics to try find how micro-plastics are formed. Each student is expected to share his/her findings with the rest of the class. Ideally the information collected is transformed in either of the following which are writing genres expected for Year 6 students:

report for a magazine or newspaper,

an interview/dialogue between a reporter and a marine biologist

or

a narrative from the perspective of a turtle or a fish.

Further resources for year 6:

The videos below demonstrate answers to some of the questions posed.
#BreakFreeFromPlastic - Why We Need to Stop Plastic Pollution in Our Oceans FOR GOOD | Oceana https://youtu.be/Yomf5pBN8dY
Micro-plastics explained - https://youtu.be/49OJoTsZYO0

Follow-up activities	A simple diagram of a plastic cycle/map can be presented. *(Refer to links below +.)* This could start from the raw material to its processing and use as packaging or production of other objects, distribution in shops and making its way to our homes, its multiple uses and to the end of its life which is either followed by the plastic item being thrown away as litter/waste or deposited for recycling. The latter two options are presented and followed separately by the students to see possible conclusions. These could end up written as the story of a plastic bag or plastic bottle by Year 6 students. Reference to appendices and links below: Appendix 4.5 (https://learn.coolaustralia.org/wp-content/uploads/Life-Cycle-Assessment-of-a-Plastic-Water-Bottle-sml.png) Appendix 4.6 - How long does it take for trash to decompose.pdf (www.facebook.com/scinotech) Weblinks about the life of a plastic bottle: https://youtu.be/3uruGdzkduE https://angelwater.com/blog/life-cycle-plastic-water-bottle/ https://www.wwf.org.au/news/blogs/the-lifecycle-of-plastics#gs.qohq9e https://youtu.be/nCkUEu5zwZg
Background information for educators	Material from the Twinkl website (twinkl.com.mt) "Plastics and the Environment" and "Can we stop Plastic Pollution" - Appendices 4.7 and 4.8. There is a wealth of information on the sources on marine litter and plastic pollution and what is being done around the world to tackle it. One example is: https://www.unenvironment.org/cobsea/what-we-do/marine-litter-and-plastic-pollution by the United Nations Environmental Programme.
Adaptations	Students with learning difficulties could pair up with another student and do the task together. As follow up for gifted students: explore different food chains which demonstrate the interdependence. See Food webs and food chains - kids do ecology (weebly.com) and Appendix 4.9 - Food Chains.pdf (www.teachoo.com). Extra task: Students can be asked to draw a poster about the Life of a Plastic Bottle – from its 'birth' up to when it ends up floating in the water to 'its death' when it ends up as micro-plastics.

Title	**5. Uncontrollable** Activity 1 of 3 about plastic pollution
Author	Saviour Bonnici
Age Guide	Year 1-8
Subject Area	Physical Education
Preparation Time	3 minutes
Estimated Duration	30 to 45 minutes
Site	Gym/ Yard / Outdoor space
No. of participants	Whole class
Educational objectives	Students will learn about the negative impacts of using a lot of plastic while engaging in physical activity. Learning while moving, and having fun, greatly improves the long-term memory of the learnt material. Students will understand that less plastic = healthier oceans = healthier fish, Earth and humans. Students will acknowledge that as long as humans continue to use huge amounts of plastic, the waste problem continues to be *uncontrollable* – it is up to us to reduce the consumption. Students will realise how wind and storms aggravate the plastic pollution in the sea.
Learning Outcomes	- I am able to throw an implement from a standing and moving position using the correct technique (alternate limbs) and correct grip. - I can identify the root causes of injustice *(plastic rubbish)* and can take actions that lead to a better quality of life and environmental sustainability. - I understand that I am responsible for my actions and capable of anticipating the problems of consuming plastic and adapt to reduce it. - I can involve myself and others (*family and friends*) in real-world issues (*plastic rubbish*) to bring about a positive difference (*reduce single-use plastic consumption*). - I am now equipped with a future-oriented perspective for how I live my life as a citizen in my country and in the world.
Link to SDGs	SDG 12: Responsible consumption SDG 14: Life below water SDG 15: Life on Land
Equipment needed	The teacher will need to mark the areas (diagram below) by either: Mark the midline and rubbish bin area with markers or cones. OR If equipment isn't available improvise by using either 2 chairs or 2 bottles to mark the midline peripheries. Same goes for the rubbish bin area.

The teacher will also need safe throwable material by either using:
Bibs, markers and/or soft balls (at least 10 pieces but the more the better)
OR
If this is not available any other plastic material such as plastic bottles, caps & wrapping.

Internet connection is needed to watch the video links provided in the background information.

Safety Precautions

Use soft objects to throw that do not have a sharp edge – markers and softballs are great.

Method

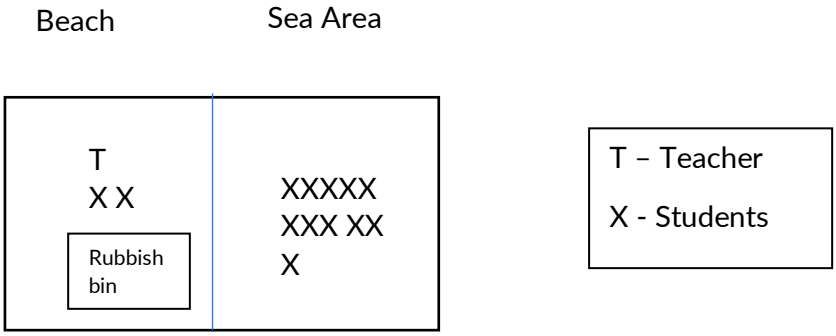
Objective: The team with least amount of plastic before time expires wins the game.

The game

Part 1: *Introducing Plastic in the Sea*

Playing area is divided in 2 sections (diagram above) – Beach and Sea.

The Beach is occupied by the Teacher and 2 other students. These are the *bad guys*. The rest of the students are on the 'Sea' area – the *good guys*.



The bad guys have a few markers/bibs/ or any other type of safe throwable equipment – *representing the plastic*. They will be throwing the plastic in the sea. It is important to use only a few of the equipment for this introductory part.

The good guys need to remove all the plastic that falls in the sea area and put it in the 'Rubbish Bin' area (see diagram). The team with the least amount of plastic in its area after time expires (decided beforehand) wins the game.

Part 2: *The plastic problem grows bigger – Uncontrollable*

Same organization as in 1st part, but the equipment (plastic material) starts increasing until the good guys cannot keep up with the rubbish thrown in the sea.

Part 3: *The Wind factor*

Five other students representing the 'Wind' join the three bad guys.

The 'Wind' help the bad guys throw the plastic in the sea and therefore showcase how the plastic problem is truly uncontrollable.

Recap

When the game is over the teacher explains about our negative impacts related to the sea pollution and how the problem is nowadays uncontrollable because there is too much plastic.

Video 1 below clearly explains these negative impacts.

Furthermore, the issue is aggravated by the wind, which blows rubbish in the sea even when rubbish is disposed of properly. The real practical solution is to reduce our plastic consumption.

Questions for students:

Why is plastic bad?

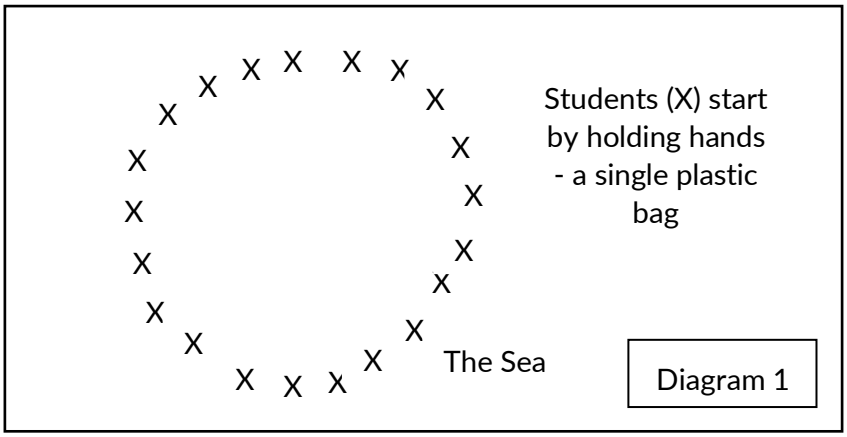
Natural materials decompose and are naturally recycled. Plastic is an artificial material that humans invented which no living creature is used to, thus causing great harm to many animals and the Earth. It takes very long to decompose and accumulates in huge amounts.

What are the solutions to reducing plastics?

Nowadays it is very difficult to eliminate plastic, but reusing materials, fixing, finding natural alternatives, and eventually recycling them are some of the solutions.

Follow-up activities	Next step is for students to experience the negative impacts of plastic by playing the next 2 follow-up lessons – Plastic Breakdown and Accumulation. These complete a series of physically active lessons about plastic pollution.
Background information for educators	Video 1: What really happens to the plastic you throw away - Emma Bryce https://www.youtube.com/watch?v=_6xlNyWPpB8 (Suitable for students of all ages.) Video 2: Plastic Pollution: How Humans are turning the World into Plastic https://www.youtube.com/watch?v=RS7IzU2VJIQ (Can be used with older students to get in-depth about the plastic issue.) The UN links below are a great source to learn more about plastic problems: SDG 12 - Responsible consumption: https://www.un.org/sustainabledevelopment/sustainable-consumption-production/ SDG 14 – Life below water: https://www.un.org/sustainabledevelopment/oceans/

Title	**6. Plastic Breakdown**
	Activity 2 of 3 about plastic pollution
Author	Saviour Bonnici
Age Guide	Year 1-8
Subject Area	Physical Education
Preparation Time	3 minutes
Estimated Duration	30 to 45 minutes
Site	Gym/ Yard / Outdoor space
No. of participants	Whole class
Educational objectives	Through this interactive activity students learn how plastic breaks into microplastic. It is important for students to conceptualize the *process* of plastic breakdown, for them to act against the effects of micro-plastics. Additionally, this is a great activity to work on teamwork and improve their physical abilities mostly by responding to quick stimulus, running and agility.
Learning Outcomes	- I am able to react to acoustic and visual stimuli through a change in speed while running, and at the same time changing direction quickly and effectively. - I am able to understand that I am responsible for my actions and capable of anticipating the problems of consuming plastic and adapt to reduce it.
Link to SDGs	SDG 12: Responsible consumption SDG 14: Life below water SDG 15: Life on Land
Remote preparation	Playing 'Uncontrollable' (lesson plan 5 in this resource pack) before this activity will help students to better conceptualize micro-plastics. But this is optional.
Equipment needed	4 Bibs Internet connection is needed to watch the video links provided in the background information.
Method	*Objective:* Students must quickly react to form new groups otherwise they risk being left behind. Part 1: *Familiarize With The Game* A class of say 25 students, hold hands - representing a plastic bag floating in the sea, the playing area (Diagram 1). The teacher calls out a smaller number. Students must quickly form new groups consisting of the mentioned number. This represents the plastic bag disintegrating into smaller pieces.



Smaller numbers are called in sequence, each time forming new groups until eventually the number 1 is called out and students are now single individuals - this is the micro-plastic. The single plastic bag problem has now multiplied into unmanageable micro-plastics.

The teacher explains about the process of plastic breakdown. Check the *Recap* section below for information.

Part 2: *Introducing Marine Life*

Restart the game.

Same as part 1 but this time 4 students wearing a bib represent marine life. These will be roaming around the playing area (diagram 2). All the other students representing the plastic bag try to catch the marine life.

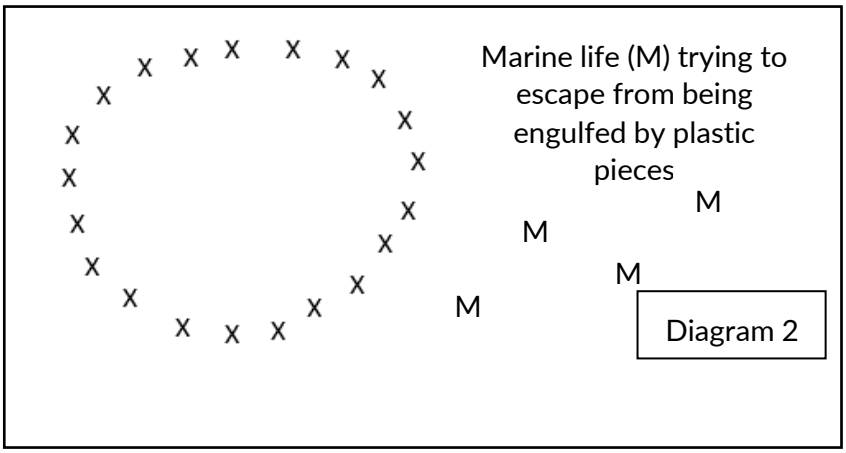


Diagram 2

Rule: A catch is valid if the plastic group has the correct amount of members last called by the teacher. If for some reason the group splits while catching, this does not count.

Being large the plastic will not be able to catch marine life at first. The situation turns when there are too many plastic pieces engulfing marine life.

Recap

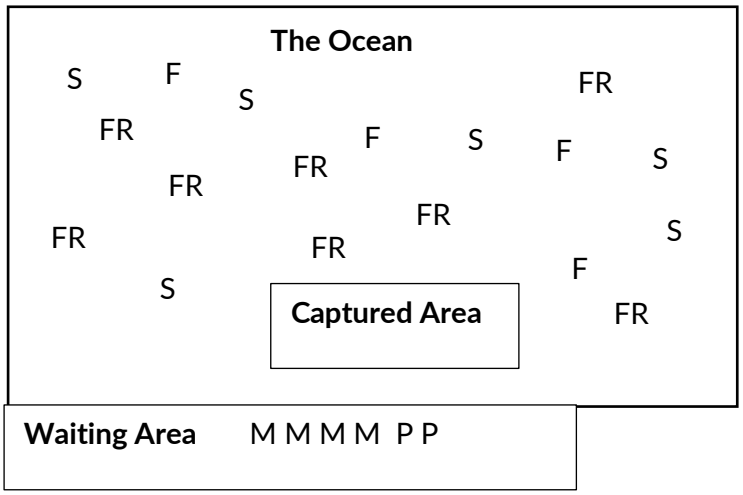
When *Part 1* is over the teacher explains about disintegration of plastic.

Environmental factors such as the sun and salt, breakdown the plastic bag into very small pieces which are impossible to collect. The video link given below in the section *Background information for educators* provides further detailed information and can be shown to the class after the activity.

	For Part 2: Teacher should explain that in reality micro-plastic does not catch fish, but the other way round. The more micro-plastics accumulate, the worse the situation for marine life becomes. There are billions of these micro-plastics circulating in the sea. If you go in any local beach you will certainly find small micro-plastics mixed into the sand. Marine life will not be able to differentiate between food and micro-plastics, ending up consuming it and cause great harm. In some localities around the world these particles, and all kind of human rubbish gather in huge amounts. It is calculated that in these places there is more plastic than marine life.
Follow-up activities	The previous activity – Uncontrollable (Lesson plan 5) - was an introduction to plastic pollution. Next step is for students to experience how micro-plastics accumulate into the food chain and our bodies. The next follow-up lesson – Accumulation - will complete a series of 3 activities based around plastic pollution while engaging in physical activity.
Background information for educators	Video: Micro-plastics explained (explainity® explainer video) https://www.youtube.com/watch?v=49OJoTsZYO0&t=23s (Provides a holistic analysis about plastic-breakdown.)

Title	**7. Accumulation** Activity 3 of 3 about plastic pollution
Author	Saviour Bonnici
Age Guide	Year 4-8
Subject Area	Physical Education
Preparation Time	3 minutes
Estimated Duration	30 to 45 minutes
Site	Gym/ Yard / Outdoor space
No. of participants	Whole class
Educational objectives	This is a fun physical education activity with the aim of teaching students about micro-plastics and our impact on the sea, fish life and our health. This activity provides a realistic and practical example of how micro-plastic accumulates in the food web.
Learning Outcomes	- Speed. Agility. Stamina. Quick reactions. - I understand that I am responsible for my actions and am capable of anticipating the problems of consuming plastic and adapt to reduce it.
Link to SDGs	SDG 12: Responsible consumption SDG 14: Life below water SDG 15: Life on Land
Remote preparation	Playing 'Uncontrollable' (Lesson plan 5) and 'Plastic Breakdown' (Lesson plan 6) before this activity will prepare students for this activity, however this is optional.
Equipment needed	Three types of coloured bibs • 6 green bibs • 4 yellow bibs • the rest (according to number of participants) red bibs Internet connection is needed to watch the video links provided in the background information.
Method	*Objective:* Catch your food *Student Organization:* Small Fish (S) - 6 students wearing green bib (or any other colour) *Medium Fish (M)* – 4 students wearing yellow bib *Top Predator Fish (P)* – 2 students *Fish Food (F) / Plankton* – The majority of the remaining students wearing a red bib *(FR)*. It is VERY IMPORTANT to leave only a few without bibs *(F)*.

Playing the Game



Part 1: *Fish food is eaten by small fish*

The playing area represents the Ocean

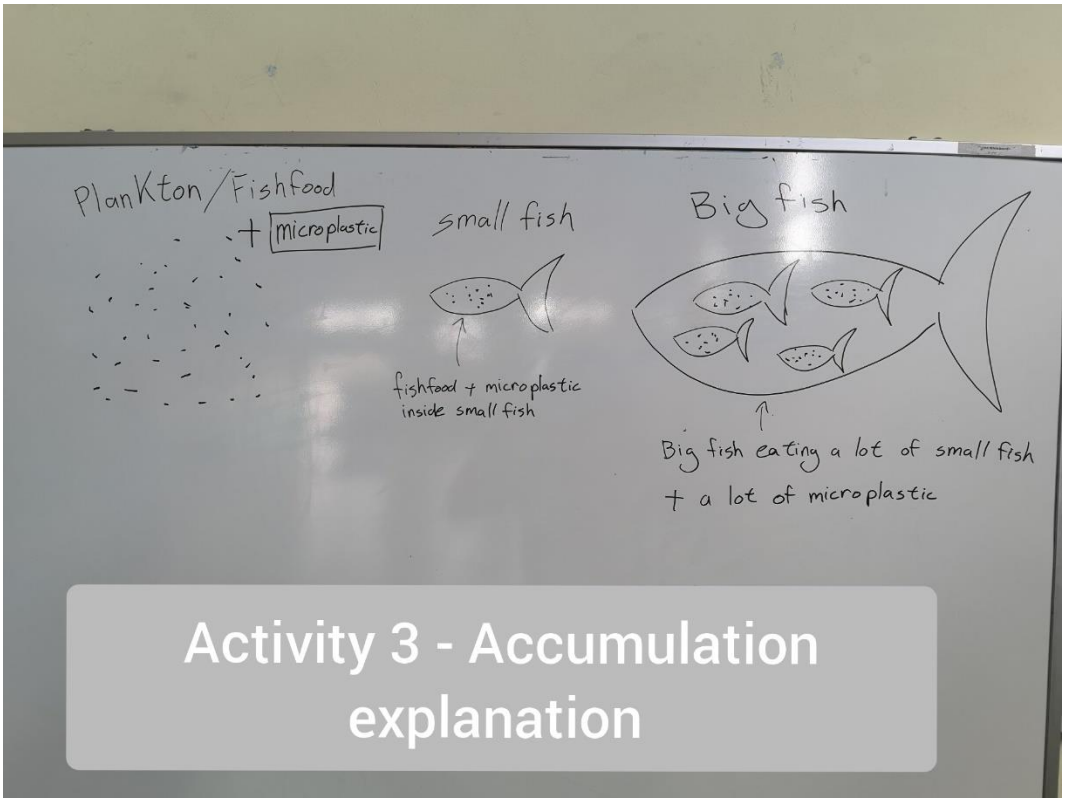
The fish food run in the Ocean

Instruct the small fish to go and eat (catch) all the fish food.

For now, the other fish are waiting.

Whenever a fish food is caught, he/she is transported to a designated captured area where they will remain. Everyone keeps a record of how many fish food they captured.

Game is paused when all fish food is caught.



Part 2: *Small fish eaten by Medium fish*
Medium Fish introduced. Now the small fish will be eaten by the medium fish and transported to the captured area.
Part 3: *Medium fish eaten by the Top Predator fish*
Top Predator Fish introduced. Same as part 2 and the game ends here.
Part 4: *Explanation*
See Recap section below

Recap

The reason for the fish food with the red bib (FR) is now revealed. They are the micro-plastic. The others are the actual fish food (F). The small fish do not know the difference so when they eat, micro-plastics enter the food web. The higher the food web hierarchy, the more micro-plastic accumulation. Apart from killing marine life, when we humans eat fish especially the top fish, we inevitably also ingest the micro-plastics.

Actions students can take:

When encountering plastic rubbish, try to dispose of it properly, if this is safe to do so.

Refuse unnecessary plastic

Follow-up activities

This is the last of 3 activities, the previous being 'Uncontrollable' and 'Accumulation', covering the plastic pollution topic which integrates PE and ESD subjects.

Background information for educators	Video link to understand the science behind micro-plastic accumulation: How Much Plastic Do You Eat? #OurBluePlanet | Earth Lab https://www.youtube.com/watch?v=veMdowmPSbw Video clip from 'BluePlanet 2' documentary showing the effects of micro-plastics on marine life: https://www.youtube.com/watch?v=0a8HGJid-Jo

Title	**8. A Turtle's Life**
Author	Esther Sammut Carbone
Age Guide	Year 2–6
Subject Area	Social Studies, Science
Preparation Time	Viewing and discussing the 3 video clips (links provided): 45 minutes Optional - Making cardboard turtles or origami: 30 minutes
Estimated Duration	2 hours in total Introduction: 30 minutes; Development: 55 minutes; Conclusion: 30 minutes.
Site	On a sandy beach
Educational objectives	To understand that marine litter affects wildlife, through the lifecycle of a turtle and the threats it encounters until it reaches maturity and beyond. To understand that marine litter affects us and future generations through its durability, spreading and accumulation in food chains. To raise awareness of the nature and magnitude of the marine litter matters with reference to the dominance of *land based* sources of marine litter, dominance of *plastic* among the marine litter items, the *top ten items* in marine litter, the *lifetime* of different waste materials especially plastic objects, the *micro-plastics* issue and sources, the *5 garbage patches*, the spread of litter from source countries. To understand that action is needed by everyone in everyday life to tackle the marine litter matters. To identify some of these actions with emphasis on *daily waste minimisation efforts* besides wildlife rescues and to encourage to start taking action.
Learning Outcomes	- I can recognise the relationship between understanding others and the wellbeing of all in the present and the future. - I can identify the root causes of inequality and injustice and actions that lead to a better quality of life, equity, solidarity and environmental sustainability. - I can use the natural, social and built environment that surrounds me, as a context and source of learning. - I can involve myself and others in real-world issues to bring about a positive difference. - I can reflect upon the consequences of my actions on present and future generations. - I can live in harmony with myself, others and the natural world at a range of levels from the local to the global.

	- I can identify the root causes of inequality and injustice and actions that lead to a better quality of life, equity, solidarity and environmental sustainability. - I can use the natural, social and built environment that surrounds me, as a context and source of learning. - I can involve myself and others in real-world issues to bring about a positive difference. - I can reflect upon the consequences of my actions on present and future generations. - I can live in harmony with myself, others and the natural world at a range of levels from the local to the global. Yr 2: - Identify practical ways of reducing, reusing, recycling, and repairing waste as well as refusing items and rethinking everyday practices to safeguard planet Earth. - Ask questions about the environment around them. - Work individually and in groups, share and discuss ideas and listen to other ideas Make connections to everyday life situations Yr 3-6: - I can ask questions about the world around me. - I can explain the importance of the 4Rs: reduce, reuse, recycle and repair. - I can ask questions about the world around me. - I can classify materials as natural or man-made. - I can find out about the effects human intervention can have on natural habitats and the organisms that live there. - Discover that things are manufactured using materials. - Know that the environment is a system which can be harmed. - Know that some materials occur naturally, and others do not. - Identify the main problems related to waste management and suggesting sustainable solutions.
Link to SDGs	SDG 3: Good Health and well-being SDG 14: Life below water
Educational resources required	For role play, per small group: a turtle soft toy and 7 table tennis balls. Appendix 8.1 & 8.2: Quiz questions and accompanying visual aids - Yr2-3/ Older students with learning difficulties. Appendix 8.3 & 8.4: Quiz questions and accompanying visual aids – Yr4–5/ Older students with learning difficulties Appendix 8.5 & 8.6: Quiz questions and accompanying visual aids – Yr6 / Younger Gifted Students

	(to print Appendices 8.2 or 8.4 or 8.6 according to student abilities, if it is not possible to show on screen) Appendix 8.7: Questions for the Introductory Brainstorming Appendix 8.8: Questions for the Preparatory Circle Time Appendix 8.9: Turtle Craft and Turtle Origami Appendix 8.10: Choice of news (as additional resources for quiz) Appendix 8.11: Background information Internet connection
Remote preparation	*View* the following video clips and *follow with circle time* to raise the points specified in the objectives through questioning that faciliate discussion (Appendix 8.8). 3 Minute Into My Turtle Journey (a turtle life cycle presented as a story). https://www.facebook.com/Naturee.jellysmack/videos/1038397429881010 Il-Ħajja fil-Baħar u Jien https://www.facebook.com/1453654901539856/videos/2373918726234898 *and/or* Marine Life and Me (features marine wildlife rescues, connection of wildlife casualties to waste, some waste facts and numbers, need for action). https://www.facebook.com/1453654901539856/videos/182362609839413 What does the inside of a turtle's mouth look like? (to understand why waste is highly dangerous for turtles). https://www.youtube.com/watch?v=xOBbkLltlgE Recommended especially with older students: Viewing Appendix 8.10 - presentation "A Choice of News – Issues & Acitons" for a mind-set towards taking action. Optional/ needed *if opting to "hatch turtles" for correct answers (instead of replacing eggs in the nest) during the quiz:* EITHER make a *turtle craft* OR a *turtle origami* from a used paper or magazine sheet (as in Appendix 8.9).
Planning Considerations	*Tips:* Group size recommended – one class divided into smaller groups of up to 5 students. Keep the number of small groups up to 4 unless the class is larger than 20. Things to bring with them: a beach towel to dry and clean their feet from sand before boarding back on the coach or minibus; caps, sunblock, packed lunch and drinking water.

By the end of the activity it is likely that they start spotting waste they were not aware of earlier and are eager to collect it to the point it is difficult to convince them to stop. Consider a longer stay to include a short beach clean-up and upload waste data in the Clean Swell app by Ocean Conservancy.

Clean Swell App

Download Clean Swell app from google play and create an account as instructed.

For info about the app:

https://oceanconservancy.org/trash-free-seas/international-coastal-cleanup/

Download a simple How-To-Use Clean Swell poster here.

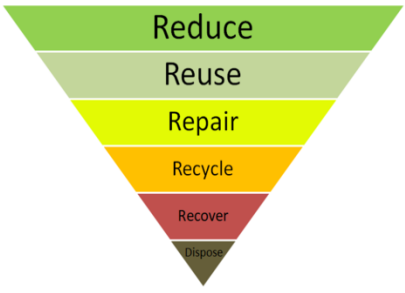
Safety:

Have a portable first aid kit with you.

Give clear instructions before the activity and repeat once on site, about:

the boundary up to where they can roam around during the whole activity including breaks - you can mark with traffic cones.
the limit up to where they can go down into the sea if you are allowing them to wet their feet, e.g., up to their knees. Instruct clearly to remove the shorts, shoes, and socks according to the set limits.
picking up any waste safely if you are to allow it - provide gloves or hand-pickers and ask to get your permission before doing so.
to never throw sand at each other and handle sand with caution while playing during breaks especially if it is windy.

Common misconceptions:



Source: https://whatplastic.co.uk/blogs/blog/the-waste-hierarchy

Recycling confused with reducing and reusing. For instance, making crafts from used material is an example of reusing not recycling.

Recycling is the primary solution to solve waste management issues – NOT TRUE. Avoiding production of waste should always be the top priority. That's why waste reduction is higher than recycling in the 4Rs hierarchy.

Waste has decomposed completely if it is no longer visible – NOT TRUE. Mussels are an example in which microscopic micro-plastics accumulate by filter feeding.

The best way to help injured wildlife is to provide first aid yourself – NOT TRUE. Our intervention can cause further injury unintentionally. For example, if we pull a fishing line out of a turtle's mouth, there might be the fishing hook inside and this tears the gut. Always call Wildlife Rescue Team and wait till they arrive. Number: 99999505.

Method

Introduction

Role play: turtle laying eggs (15 minutes)

Class is split into 2 or more groups. A turtle soft toy is given to each group. A representative from each group uses the soft toy to imitate a turtle coming up on the beach to lay eggs. While they are crawling, digging and laying eggs, brainstorm turtle fact by questioning (Appendix 8.7)
The chosen student makes the soft toy turtle crawl up from the water edge pushing the sand using its flippers, digging the hole using the soft toys's flippers and gets the soft toy turtle ready in a position to lay eggs. Another student quickly places table tennis balls under the soft toy and uses the fingers to roll the balls one be one into the hole. The turtle covers the balls using its hind flippers and moves back towards the sea.



Each student in the group (includng the student who was moving the soft toy) pretends to be a ghost crab, comes moving sideways and steal the eggs (they take at least one each) from the nest.

Development

Quiz and saving eggs/hatchlings (40 minutes)
Having several groups will require the presence of two or more adults. It is advisable to carry out the activity as a whole class if not enough adult assistants are available. This will also limit the possibility of materials getting lost in the sand.
Refer to the appendices for the quiz questions. Have a print-out of the presentation "Quiz visual aids Yr2-3 / Yr4–5/ Yr6" to show with respective questions.
The quiz starts. Each small group answers questions in turns. For each correct answer an egg is saved – the ghost crabs put the eggs back in the hole in turns.
If all availablle eggs/hatchlings of a group are used up, a student from the group is given a picture of a hatchling to wear around the neck, stands next to the group's nest and and for correct answer makes a step forward towards the sea.
Alternatively, for each correct answer:
For correct answers, eggs are laid by the turtle - omit the ghost crabs part from the introductory role play.
For correct answer, eggs are hatched - omit the ghost crab part from the introductory role play. Instead, hide baby turtle toys in the sand after the

	turtle covers the nest, and a student from each group is chosen to push up a hatchling out of the sand for each correct answer. (If baby turtle toys are not available they can use cardboard or origami turtles prepared in class before the activity.) For wrong answers, eggs / hatchlings – omit the ghost crab part from the introductory role play and have eggs/hatchlings caught by ghost crabs, birds or large fish (pictures worn around the neck help them to get into the role). **Conclusion** The winning team is awarded a symbolic certificate of wildlife rescuers per student. Gather the class sitting down on the sand in a circle and ask them to think about one action they would like to take to prevent litter from entering the oceans. Encourage them to share it with the class.
Follow-up activities	Optional, in class after the activity: Wordsearches for further familiarisation with the marine wildlife literacy. Pledging and/or making a promise to the Blue Planet Earth, and following the commitment. Pledge example: "I pledge to start using cloth bags and refuse plastic bags offered at shops."
Background information for educators	Appendix 8.11
Adaptations	For students with learning difficulties: Use the quiz version in Appendix 8.1. Opt for the cardboard Turtle Craft if "hatching turtles" for correct answers. Refer to the links for the Wordsearches, gradually increasing in difficulty level respectively: https://www.educaplay.com/learning-resources/5826309-under_the_sea.htmarine litter https://www.educaplay.com/learning-resources/5827210-under_the_sea.htmarine litter
Extensions	For gifted students: Use the quiz version in Appendix 8.5. Opt for the turtle origami craft if "hatching turtles" for correct answers. Refer to the links for the Wordsearches, gradually increasing in difficulty level respectively: https://www.educaplay.com/learning-resources/5826477-life_below_water_juniors.htmarine litter https://www.educaplay.com/learning-resources/5826675-life_below_water_juniors_adv.htmarine litter

Title	**9. Largest to smallest - the story of a plastic particle**
Author	Neville Dimech
Age Guide	Year 4
Subject Area	Science, Geography, English language
Preparation Time	10 minutes to collect resources needed. 5 minutes to familiarise oneself with the PowerPoint presentation.
Estimated Duration	45 minutes
Site	Classroom with interactive board.
Educational objectives	To create awareness of the issue of plastic litter which ends up in the seas, oceans, seabed and ocean floors as well as sandy beaches.
Learning Outcomes	- I can classify materials as natural or man-made.
Link to SDGs	SDG 12: Responsible consumption and production SDG 14: Life below water
Educational resources required	plastic items such as a plastic cup, a plastic straw, a small plastic toys used on the beach, balls, buckets, spade, plastic water bottles, empty sun cream bottles, empty yogurt cups, plastic and cotton ear buds, cigarette butts, and more. Appendix 9.1 – Powerpoint PLASTY Interactive whiteboard Internet Connection
Planning Considerations	At the end of the lesson the students are told that the resources used in this lesson will be stored and reused by other students/during other lessons.
Method	**Introduction** Engage (10 minutes) The teacher places on the table some plastic items such as a plastic cup, a plastic straw, small plastic toys used on the beach: balls, buckets, spade, plastic water bottles, empty sun cream bottles, empty yogurt cups, plastic and cotton ear buds, cigarette - butts, and more. The teacher asks the students to look carefully at the items. Ask: Where do we find these? A round of ideas and opinion is taken. These can be written on the interactive or white board or on a large flip chart. **Development** Inquire (25 minutes) Ask: What happens to plastic when it is out in the natural environment?

A round of ideas and opinion is taken. These can be written on the interactive or white board or on a large flip chart.

Where does plastic come from?

A round of ideas and opinion is taken. These can be written on the interactive or white board or on a large flip chart.

Watch the interactive Power Point (Appendix 9.1). Largest to smallest – the story of a life particle.
The Story of the life of a plastic particle, "Plasty" from its birth in a plastic manufacturing factory to microplastic fragments ending at the bottom of the ocean floor. The learners will direct the story of "Plasty" and note that from whichever route and life-story they choose, "Plasty" will still end up at the bottom the sea. As they trace the life of the plastic particle they realize that it is not on its own in the end...
The students choose what the plastic raw material will become.
They follow what happens to the plastic.
They conclude that many different plastic items eventually find their way to the sea.
The plastic items end up as very small pieces – "micro-plastics."

Conclusion
Evaluate (10 minutes)
The students come to the conclusion that plastic materials will end up in the sea, seabed, and sandy beaches. The students are shown pictures of "plastic islands" and are encouraged to look up pictures and videos about them using their tablets or as a class using the interactive whiteboard to enhance further learning. (Search for pictures - Plastic in the sea, Plastic islands)

Background information for educators

The following weblinks explain the real life issue of plastic islands which deteriorate into small particles which end up in the sea, seabed, and sandy beaches.
https://oceanservice.noaa.gov/facts/microplastics.html
https://www.euractiv.com/section/climate-environment/opinion/clearing-up-the-confusion-around-marine-plastics/
Clearing up the confusion around marine plastics – EURACTIV.com
The Great Pacific Garbage Patch Is Not What You Think It Is | The Swim - YouTube

Title	**10. *Posidonia oceanica* – litter within and without**
Author	Johann Gatt
Age Guide	Year 4-8
Subject Area	Science, Mathematics, Arts and crafts, Languages, ESD
Estimated Duration	2½ hours – an outdoor session on a sandy beach.
Site	Any sandy beach ideally with visible posedonia banquettes. Also ideally there is a wooden ramp that extends as close as possible to the shoreline to render access to learners using mobility assistive devices.
Educational objectives	To identify from drawings plant parts of the seagrass *Posidonia oceanica* and outline the life cycle in simple words. To mention two marine species that live and thrive within the posedonia meadows. To list key benefits of the seagrass *Posidonia oceanica*. To mention threats leading to the potential loss of posedonia meadows. To discuss solutions that could help protect the existing meadows and prevent further loss of *Posidonia oceanica*. To propose some possible non-conventional methods to protect the species.
Learning Outcomes	- I am able to creatively and innovatively take considered action and challenge assumptions underlying unsustainable practice. - I am sensitive to divergent disciplines and perspectives, cultures and minority groups without prejudices and preconceptions. - I can justify the importance of identifying problems, reflecting critically, thinking creatively and having a wider vision in order to plan for the future and become an effective agent of change. - I can reflect upon the consequences of my actions on present and future generations. - I am able to collaborate with other learners and the educators facilitating the session.
Link to SDGs	SDG 14: Life below water
Educational resources required	Appendix 10.1 - details of Game a set of printed photos in display file to be used during game and explanation – Appendices 10.2 to 10.9: Appendix 10.2 - Benefits Appendix 10.3 - Distribution Appendix 10.4 - Life Cycle Appendix 10.5 - Parts Appendix 10.6 - Protection

	Appendix 10.7 - Species living in it Appendix 10.8 - Threats Appendix 10.9 - Uses 2 small dice: one red, one green A cup or non transparent holder for dice Deep tray, dish or flat surface to throw dice on (at the beach) Timer/alarm (optional) Internet Connection for remote preparation
Remote preparation	For Year 4 - 6 students: Video to be used as a discussion primer in class https://www.youtube.com/watch?v=TPCgLonKaf0 For Year 7 - 8 Learners: Video *Importance of Posidonia Oceanica* as an introductory tool to the outdoor session https://www.youtube.com/watch?v=3-X8VX_sK1Y
Planning Considerations	Check if ERA/Local Council permits are a pre-requisite before visiting site. Clearance from the respective Health and Safety body overseeing outdoor site assessment. Pre-visit to the site to check for health hazards or potential threats and basic amenities. Re-visiting again a few hours before the activity. Look for ideal spots and resources in situ. Ideally many of the resources are to be sourced from the site to avoid carrying a lot of material, but in full respect and senstivity to the site being used. Strict adherence to ERA permit at all times to avoid disturbing the site. Reminders for appropriate footware, safety gear, clothing.
Method	**Introduction** Ideally the students watch the video/s suggested in Remote Preparation before they actually venture out on site for this session. The idea is to use these as discussion primers and as a means to assess prior knowledge. Alternatively the teacher might decide to show a series of pictures related to the beach such as a sand castle, deckchairs, goggles, turtles, starfish, crabs, seahorse, etc including also a picture of the dead seagrass leaves strewn on a beach and ask the kids to place them in order of preference. - Leading questions might include; - *Do you love to go to the beach? Why?* - *Do you prefer sandy beaches or rocky ones? Why?* - *What kind of activities do you usually do at the beach? Snorkeling, fishing, swimming..?* - *Do you have a favorite beach?* - *What makes it so special?* The teacher records these answers for future reference.

Development

Drawing on the main points of the short documentary *The Importance of Posidonia Oceanica* https://www.youtube.com/watch?v=3-X8VX_sK1Y
The teacher walks slowly along the splash zone to explain some key points about the life cycle of *Posidonia oceanica*.
The teacher may collect seagrass parts that have been washed ashore to help the students identify specific plant parts and their function.
Through a series of pictures (taken on site in a display file) and referring to specific items on site (and the extensive references indicated hereunder in the respective section) the teacher elaborates on the following;
Life-cycle and plant parts
Photosynthesis and carbon sequestration
Flowering and fruiting bodies
Benefits and uses
Threats
Possible solutions (eliciting also some from the learners)
A game is then used as a consolidation exercise. The game is quite simple and straightforward. Two-thirds of the students are asked to distribute themselves randomly across a stretch of sand with 1.5 m away from each other. They are asked to imagine that each one of them is a *Posidonia oceanica* leaf.

All the leaves are rooted to the seabed forming a meadow and swaying along the ocean currents. Whilst the rest of the learners are testing out the swaying motions. The challenge of the game is to avoid as many threats as possible. Threats will come in all forms and sizes as indicated in Appendix 10.1 (red column).

How to play?

You need two small dice. One red and one green.
Players are to keep swaying in a wavelike motion ALL the time. Any players that are spotted not swaying will be eliminated.
The dice are placed in a cup and one of the players must take a dice without looking and throws the dice.
Read the 'news' in Appendix 10.1 according to the colour of the dice and number thrown.

The 'news is discussed and action taken. Eliminate/reintroduce students according to the number shown on the dice. Each time explain why the players are either being eliminated or re-introduced to refer to the threats and solutions that determine the fate of the posedonia meadows. The person who throws the dice and classmates around are eliminated if a red dice is picked according to the number on the dice.

The students eliminated/not forming part of the posedonia patch can mime the action related to the news (eg. slime on the posedonia grass, Patrol, ...)

There are two extra benefits and threats actions should one want to vary a bit the game to make it more exciting instead of repeating the same choices.

You can time the game and use an alarm to end the game, otherwise it can go on for quite some time.

When the time is up the surviving posedonia players win whereas the eliminated ones lose.

Conclusion

Refer back to the preference list and ask them if they think they would re-arrange it and justify their reasoning.

The idea is to make them aware that even the sand castle and much of the beach life ultimately depends on the seagrass that attenuates the wave ocean and the same banquettes that prevent coastal erosion.

It would be interesting to check if in the absence of *Posidonia oceanica* their favourite beach would remain such.

The lesson will ideally end with a series of questions;

Do you think there is enough awareness about Posidonia oceanica?

Do you think it needs to be protected?

What makes you think so?

Are we doing enough to protect it?

	Is there anything more you would do? *Can you do this as a student?* *If you had to be given the opportunity to be a beach manager what is the first decision you would take?* *Why do you feel it is so important?* *From all the SDGs to which are the issues we mentioned today mostly related?* The follow up activities (some of which can also be carried on site) will include several possibilities to help students take informed decisions.
Follow-up activities	An organised clean up of the area to collect waste items along the shore. Learners are then asked to get creative by using the debris collected to come up with a strong message for the general public Make sure that whatever craft they create can be easily dismantled and disposed of separately to be properly recycled. Students discuss to decide on the craft item to be made or else they can draw a picture story by scribbling on the sand to show how the micro-plastic fibres can eventually end up on our plates. They can use the same debris that is lying around to compose their story on the sand. The teacher might want to show them some pictures of plastic fibres that were lodged in fish stomachs from the display file or else if there is not enough time left on the beach, they can watch the video in class; https://www.youtube.com/watch?v=_6xlNyWPpB8&feature=emb_logo Role play – boat owners vs enforcement officers: A team of 5 students taking the role of boat owners and a team of 5 students taking the role of environmental officers engage in a debate with an appointed moderator. Ideally if you intend to have 3 debates, all the boat owners meet in one group and all the environment officers meet in another to work before the actual debates. The idea is to prepare the salient points of the arguments they intend to put forward during the debate.
Background information for educators	Background knowledge for the educator from reliable sources: https://era.org.mt/wp-content/uploads/2019/09/BioSnippet_19-Neptune_Seagrass.pdf https://medwet.org/2017/10/mediterranean-posidonia/ https://kids.frontiersin.org/article/10.3389/frym.2018.00002 https://timesofmalta.com/articles/view/sea-grass-should-be-left-on-the-beach-as-long-as-possible-era.660738 https://era.org.mt/operating-procedures-on-beach-cleaning/ http://www.marinespecies.org/introduced/wiki/Mediterranean_seagrass_ecosystem
Adaptations	For students with learning difficulties A printout of the species that live in the seagrass to colour in. A diorama which would include a shoe box with the coloured seagrass marine animals to create a model representing a scene with three-dimensional figures. A set of photos used by the teacher (during the outdoor session) is printed and placed face down. They each choose one photo. Back home they

	write a couple of sentences about the photo depending on their age and ability.
Extensions	For gifted students: To propose some non-conventional ways to protect the posedonia meadows – policy document preparation to be presented at parliament like an MOU with the boat owners' association. One idea could include writing officially to the Malta Cruising Club - http://maltacruisingclub.org/wp/?page_id=214 for example. Write to Transport Malta:_https://www.transport.gov.mt/maritime/local-waters/maritime-leisure-activities-89 Further reading: an article about the effect of plastic micro-fibres in seagrasses. http://www.bu.edu/articles/2019/microplastic-pollution-in-ocean-seagrasses/

Title	**11. Single–Use Plastic Hunt**
Author	Ms Maria Baldacchino
Age Guide	Year 5-8
Subject Area	Environmental Studies
Preparation Time	15 minutes
Estimated Duration	3 lessons of 45 minutes each
Site	School/Home: Students may spread the knowledge to the family and become the owners of positive change.
Educational objectives	To reduce / eliminate the use of single-use plastics from our daily usage.
Learning Outcomes	- I can justify the importance of identifying problems, reflecting critically, thinking creatively and having a wider vision in order to plan for the future and become an effective agent of change. - I can critically assess processes of change in society and envision a more equitable and sustainable world. - I can identify priorities and evaluate potential consequences of different decisions and actions. - I can involve myself and others in real-world issues to bring about a positive difference. - I am a critically reflective person and am able to evaluate decisions, choices and actions. - I am responsible for my actions and capable of anticipating, adapting to and facing change. - I can reflect upon the consequences of my actions on present and future generations. - I am motivated to make a positive contribution to other people and their social and natural environment, locally and globally. - I can live in harmony with myself, others and the natural world at a range of levels from the local to the global. - I have a future-oriented perspective for how I live my life as a citizen of the world.
Link to SDGs	SDG 6: Clean Water and Sanitation SDG 12: Responsible Consumption and Production SDG 14: Life Below Water
Educational resources required	Internet connection Appendix 11.1 - Activity Sheet – Word Search: Ways to reduce your single-use plastic

Appendix 11.2 - Activity Sheet 2 – Single-Use Plastic Lifecycle

Appendix 11.3 - Activity Sheet 3 – Single-Use Plastic Hunt

Appendix 11.4 - Activity Sheet 4 – Ways to Reduce your Single-Use Plastic

Remote preparation

Teachers may assign research on what are single-use plastics and brainstorm with the students on ideas to reduce these single-use plastics.

Method

Introduction

The activity is to convey the message and instill the correct mentality of protecting our marine life, by outlining the basic items we use on a daily basis that may seem innocent but create a big negative impact on the marine environment, once disposed of.

The first activity is a word search, Appendix 11.1. The words are based on the information provided in Appendix 11.2 – Single-Use Plastic Lifecycle, which shows information on common plastic items used on a daily basis such as straws, coffee pods, plastic bottles, and the like.
At the end of this activity the following video link may be accessed:
How plastic hurts the world:
https://www.youtube.com/watch?v=VUUUxOl715s

Development

The next step is for the students to go on a Single-Use Plastic Hunt, using Appendix 11.3, of plastic household items which they will colour in and strike off by using the famous X marks the spot.

They will assign a numerical score to every item they find, based on the Single-Use Plastic Lifecycle, Appendix 11.2. These items which are on the list are common household items which end up in the sea.

At the end of the hunt the student will add up the scores that the items have been assigned. The total score will then be translated into a statement: Eco-friendly, Attention required, Alarming - High Usage. This table is provided in Appendix 11.3.

Conclusion

After this Plastic Hunt activity, the students will explore Appendix 11.4 – Ways to Reduce your Single-Use Plastic, where the students will see the alternatives to reduce and replace single-use plastic items.

This will create awareness in the students' household.

Follow-up activities

Students can be encouraged to use social media platforms such as Tik-Tok, Instagram, Facebook, YouTube, and the like, provided by the school, family or eNGO (as long as they are approved/given permission) to create a message that outlines the importance of marine life conservation in the form of a slogan, monologue, dance, script or anything that captures the student's imagination.

Title	**12. Persuasive Writing Task**
Author	Ms. Samantha Abela
Age Guide	Year 5-11
Subject Area	English, Maltese, Geography, Social Studies, ICT, Environmental Studies
Preparation Time	Nil
Estimated Duration	2 hours
Site	Classroom or computer lab
Educational objectives	Students understand and are empowered to address the real causes and consequences of unsustainable behaviour within the context of an interdependent and globalised world.
Learning Outcomes	- I can order ideas and describe them effectively to contribute to discussions supported by the teacher. - I can write for a stated purpose, using grammar and sentence starters. - I can gather information from long and complex articles and books.
Link to SDGs	SDG 12: Responsible Consumption and Production SDG 14: Life below water
Educational resources required	Interactive Whiteboard Appendix 12.1 - Spider diagram Appendix 12.2 - Writing frame Appendix 12.3 - Capturing your audience Appendix 12.4 - Persuasive writing vocabulary Appendix 12.5 - Writing prompts discussions Appendix 12.6 - Websites to help students with research Internet Connection
Remote preparation	The 'Fact-Finding' Task can be done before the lesson and allot more time to writing and class discussion. The links provided can be sent to the students beforehand.
Planning Considerations	The lesson can be done in class or in a Computer Lab. In case of a Lab, booking of the facility would be required. The Fact-Finding task can be done as an introduction or as a pre-task before the lesson. Students require some technological device and an internet connection during the lesson for the Fact-Finding task. Students should be warned about the huge amount of information available online. Teachers can opt to: Limit the websites they search by giving them a prescribed list or by limiting the search by geographical zone example: things related to Malta only.

Method

Introduction

5 minutes – The teacher introduces the topic of 'Persuasive Writing'. The teacher asks what is the meaning of the word 'Persuasive' and can create a spider diagram (Appendix 12.1) on the board jotting down the students' ideas before giving the following definition:

"making you want to do or believe a particular thing" – Definition by Cambridge Dictionary

"able, fitted or intended to persuade" "inducement" – Definition by Dictionary.com

Development

10 minutes -The teacher moves on to introduce the students to the main activity. The students will act as opinion writers for a local newspaper. They are concerned with the presence of plastic litter in our seas. The task is to:

Write a letter addressed to the editor in which they have to:

Outline their concern by explaining what it is about.
Provide evidence on the concern by quoting events, sources, statistics, etc.
Provide arguments about the concern, namely why this is an important issue to be tackled.
Provide ideas about possible solutions to the concern.
Conclude the letter in a positive manner, hoping that you are acknowledged.

The teacher can provide a Writing Frame (Appendix 12.2) to guide the students in their task.

20 minutes – Now that the students know what is expected from them, the teacher can guide them by providing them with the following guidelines:

Persuasive writing should be done in the Present Tense.
How to appeal to the Audience? (Appendix 12.3)
Provide a list of Persuasive Writing vocabulary (Appendix 12.4)
Discuss with students who is their audience: People who will read the newspaper and thus they might not know anything about your topic.
Topic Finder – The teacher can provide the following ideas / Writing prompts for the students to choose from. (Appendix 12.5)
Once students are given time to think which topic they wish to tackle they do research on the topic to gather the facts they need (evidence).

40 minutes – Research Task

The students use the internet to research their topic. They can start by looking up the keywords, look for statistics from reliable sources such as EU, UN websites and local NGOs. The teacher can give the students a list of websites to look up information from. (Appendix 12.6).

	Students are instructed to record information on a Document or Paper and to write down the source (website) from where they got the information. They are also to be instructed that some information may be conflicting. They need to be able to cite both sides of the story and choose which one they will promote more and why. They need to also check how sources are reliable and if the authors were commissioned to write a particular article from a particular point of view. Creating a 'For and Against' column may help the students in the research process. They need to organize ideas, collate them, sort them out and correlate them as deem fit. 40 minutes – Writing Now that the students have gathered the information, they can move on to writing their Opinion Piece for the newspaper. The teacher gives them the writing frame (Appendix 12.2) to remind them what is being asked from them. **Conclusion** 5 minutes - The teacher concludes the lesson by summarizing what is the meaning behind persuasive pieces of writing. Why these are important in society (to generate a discussion and prompt actions for example). The teacher collects the work and urges students to hand in their work (digital or physical copies).
Follow-up activities	Class Presentations – Power Point Presentations can be made using the information that the students already gathered. Newspaper publishing – Some of the best writing pieces can be shared on the school social media and local newspapers.
Background information for educators	Please refer to Appendix 12.6
Adaptations	Each writing task can be adapted to the different age group depending on the Word Count requested and the extensiveness of the vocabulary used. The teacher can create an example with slotted text for students to just write keywords. The teacher can start the paragraphs for the students. The teacher can limit the website research so that students are not overwhelmed.
Extensions	Increased word counts

Title	**13. BIDMAS with Marine Litter**
Author	Christian Saliba
Age Guide	Year 6
Subject Area	Mathematics
Preparation Time	Nil
Estimated Duration	45 - 50 minutes
Site	Classroom
Educational objectives	Through problem solving and the practice of addition, subtraction, multiplication and division, the students will learn about the harm so many items are causing on our environment when we throw them away haphazardly, regardless of the length of time they take to decompose.
Learning Outcomes	- I can select and use an appropriate operation and strategy when solving a problem. - I can rehearse adding/ subtracting ThHTU ± ThHTU using informal and standard written methods. - I can check the result of a calculation and/or real life problem by using an equivalent calculation or an inverse operation. - I can use the relationship between addition and subtraction. - I can consolidate the understanding and the usage of the four operations. - I can use written methods for: HTU × TU/U.
Link to SDGs	SDG 3: Good health and well-being SDG 11: Sustainable cities and communities SDG 13: Climate action SDG 14: Life below water
Educational resources required	Small whiteboard per group Appendix 13.1 - Fact sheet Appendix 13.2 - Flashcards with the questions (need to be printed and cut separately) Appendix 13.3 - Questions and answers for teachers Timer/alarm Internet connection
Remote preparation	The teacher will discuss with the students the damage done to marine life. The students will also be provided with a fact sheet (Appendix 13.1) which will give them information on how long it takes for different types of litter to decompose.

Planning Considerations

It would be interesting to take the students near the seashore, and see floating litter, or litter on the shore, to become more aware how serious and actual this problem is. *An alternative to the outing, one can show the following videos showing the local marine litter.*

https://www.youtube.com/watch?v=67sGc_CWkVI
https://www.youtube.com/watch?v=780hcUlJtF8

Method

Introduction

This activity is targeted for students in year 6 who already have the knowledge and ability to work out sums in addition, subtraction, multiplication and division. Marine litter will be incorporated with story sums to increase awareness regarding marine litter.

Development

The class is divided into 4 groups - A, B, C, D - at the beginning of the lesson. A small white board will be given to each group. A video (https://www.youtube.com/watch?v=Yomf5pBN8dY) related to marine litter is shown to the students, after having told them to pay attention since afterwards they will need to participate in a conversation related to what they see in the video. When the video ends, the educator will ask the students to describe what they have seen and mention some facts.

After the introductory video the competitiveness and fun will kick in. The student will be shown another video related to marine litter but this time the students will be asked to write items that contaminate marine life as shown on the video (https://www.youtube.com/watch?v=017bBeXhYz4). This video is "Sources and impacts of marine litter" by Jane Lee/ Marlisco. After the video, 3 minutes will be given to the students to write down the items they have seen in the video. When time is up students will read out the answers and be given credit.

While the students are writing the answers a fact sheet (Appendix 13.1) will be distributed to each group to be used in the main activity. Rules will be explained to the students before the start of the activity.

Starting with the first group, the group leader selects a flashcard from the desk and the teacher will read the story sum out loud. As soon as the teacher finishes reading a 2-minute timer will start. All groups have to work out the sum collaboratively. A sample question is as follows:

If plastic bottle A was thrown at sea in 2000, bottle B in 2021 and bottle C in 2030, which bottle or bottles will still be found in the sea if aliens come to visit Earth in the year 2462?

A: 2000+450=2450

B: 2021+450=2471

C: 2030+450=2480

Answer: Bottle B and C

(All questions can be found in Appendix 13.2. Questions with answers can be found in Appendix 13.3)

The students will be asked to sum up years and months or multiply, etc to give an answer. In others the students have to look up amounts from the fact sheet distributed earlier.

Notes:

- Different questions require different computations and have different weighting as regards point.
- Some of the questions require students to add up the total length of time of decomposition of different items when in reality the answer is not significant. If a student/group points out that the total does not make sense and explains correctly why, the group is given bonus points at the discretion of the teacher.
- Some of the questions are trick questions (stared*) which do not require any calculations. Refer to Appendix 13.3.

Conclusion

After settling back down in their places, the students will be asked random questions related to marine litter for instance 'How long does it take for a cigarette butt to decompose?'. This will help the students to be more aware of the impact such "insignificant" items have on marine life.

Follow-up activities

After the activity the teacher can ask the students to rank the items according to the time they take to decompose.

As a follow-up activity, maybe a week or so later, it would be interesting to ask the students at random, without any previous notice, how much time do different items take to decompose, in order to have them recall the info given in the fact sheet (Appendix 13.1) given out during the main activity.

Background information for educators

Refer to Appendix 13.1 and video links used in method.

Sheet facts data from:

https://en.wikipedia.org/wiki/Marine_debris#/media/File:How_long_until_it's_gone.jpg

Adaptations

For students with learning difficulties:

The learning support educators can help them out with the working of difficult problems (or maybe the use of a calculator will be allowed).

Extensions

For gifted students:

Asking students to write a problem themselves and present it to the class.

Title	**14. Under-the-water Experience**
Author	Ms Sharon Giordimaina
Age Guide	Year 6
Subject Area	Science and Technology, Education for Sustainable Development
Preparation Time	15 minutes
Estimated Duration	60 minutes
Site	Just in case the school would be interested to organize a follow-up activity. A safe diving-experience site can be found in the respective country or a submarine outing organized for school children.
Educational objectives	Students will learn about some below-the-water species and plants. I can investigate and give examples of the adaptations of plants to suit their environment. I know that the environment is a system which can be harmed. I know about dangers posed to the environment such pollution and the destruction of marine life.
Learning Outcomess	- I can identify priorities and evaluate potential consequences of different decisions and actions. - I can involve myself and others in real-world issues to bring about a positive difference.
Link to SDGs	SDG 12: Responsible consumption and production. SDG 14: Life below water.
Educational resources required	Appendix 14.1 - Sea plants and animals templates plastic waste to create an under-the-water scenario. Appendix 14.2 - Handout activity with a list of species to tick the ones found in the sea. Appendix 14.3 - Handout activity – Under the sea short questions. Appendix 14.4 - A list of reflective questions. Appendix 14.5 - Flashcards - Vocabulary related to marine life. Appendix 14.6 - Video links Internet connection
Remote preparation	Introduction through a video-clip about a diving experience (https://youtu.be/isFBQFhfI_s) or part of it. Setting up a below-the-water scene, using Appendix 14.1. Students could also be invited to draw or colour in these creatures themselves during previous expressive-arts-related activities.
Planning Considerations	It might be necessary to give some basic information about marine life, marine pollution with a possible link to water pollution.

Method	**Introduction** Talk briefly about sea life and see what the students know about this ecosystem. Have they ever learnt about it in detail? How do they feel when they are at sea or dive shortly under the sea? Share a video-clip about undersea creature on earth (https://youtu.be/nvq_lvC1MRY). Invite students to observe and look closely at life under the sea. Introduce some vocabulary related to the sea plants and creatures. Discuss how these can be affected by plastic residues thrown on the ground. **Development** Invite students to talk about the under-water scenario they can see, created with the use of Appendix 14.1. Have they ever experienced an under-water observation? Are they curious to experience it? Distribute the handout with a list of species (Appendix 14.2). Go through it together. Then give some ample time for them to look around/think of sea life under water and write what they can see or be found in that habitat. Refer to the short questions in Appendix 14.3. Debate about what is proper and improper in the scenario. Speak shortly about the divers' experiences, how prepared they should be and what they would ask if they were to meet a diver. Refer to Appendix 14.4. Create a questionnaire with some questions that can be asked to a diver who experiences going under the water frequently and think of a motto designed to share it with people in public to save the ocean life. Check out together the ticking on the handout and the motto written about undersea Life. **Conclusion** Have a conversation using the list of reflective questions attached to the lesson plan. Emphasize the importance of being responsible and using environment-friendly measures to sustain natural ecosystems. Share the mottos written by the students with the school and maybe then with some environment entities.
Follow-up activities	Possibility of inviting a diver to give a presentation about diving and have an interview with him/her.
Background information for educators	Refer to the list of video-clip links in Appendix 14.6.
Adaptations	Use of pictures provided in Appendix 14.5 can be used depending on abilities of students.
Extensions	Write about an imaginary diving experience or an experience of a sea creature.

Title	**15. Creating a Collage from Plastic Waste to Reduce Plastics in the Marine Environment**
Author	Lino Xerri
Age Guide	Year 7
Subject Area	Art
Preparation Time	Preparation of a large cardboard to support the collage with the students' works.
Estimated Duration	90 minutes
Site	If lesson is held out of class, the hot glue gun is to be portable and images of marine life are to be projected in a different way instead from an interactive board.
Educational objectives	Learning to express creatively one's ideas Learn how to fight against marine pollution by reusing Develop technical skills of plastic sculpture
Learning Outcomes	- I can investigate, observe and gather data information about my environment. - I can demonstrate and discuss the developments in my work as I gain new techniques, skills and confidence with 2-Dimensional and 3-Dimensional media. - I can justify the importance of identifying problems, reflecting critically, thinking creatively and having a wider vision in order to plan for the future and become an effective agent of change. - I have a future-oriented perspective for how I live my life as a citizen of the world.
Link to SDGs	SDG 14: Life below water
Educational resources required	Plastic bottles, craft knife, permanent marker, hot glue gun, round-edged scissors, paint brushes, palettes, watercolour paints, interactive board. Appendix 15.1 – Sea Creatures
Remote preparation	Students will research and document by producing sketches and photocopies of marine creatures.
Planning Considerations	Working with plastic as a medium requires the use of round-edged scissors and a craft knife. Teacher supervision must be constant and the student per teacher ratio must be adequate.
Method	**Introduction** Discussion about the importance of keeping the sea clean, especially closed basins like the Mediterranean, is highlighted. The beauty of the sea that surrounds our islands and about the creatures that live in it must be a positive keynote to mention.

The teacher shows images of sea creatures (Appendix 15.1) and helps students observe the shapes, lines and colours perceived in the images.

Teacher gives a demonstration on how to draw a fish on a plastic bottle using a permanent marker and how to cut it out.

Development

Students are grouped in teams so that although they work on an individual piece, peer suggestions and help are still considered.

They use a permanent marker to draw fish, seahorses, shells, seaweed and other marine creatures on plastic bottles and other plastic items they have brought with them.

Using scissoring skills and with the help of the teacher, they cut out the figures they drew using a rounded-edge scissors and craft knife.

Students paint the back of the plastic figures using bright watercolours to obtain a translucent effect. They are instructed to observe the shapes, lines and colours of the marine creatures they have researched and documented beforehand in the remote preparation for this lesson.

Students affix the figures using hot glue on a pre-prepared cardboard in order that all the student's creations are displayed as a large collective collage of an underwater scene.

Conclusion

Students are induced into thinking of other ways of exhibiting their works. The possibility of a mural or a mobile is elicited.

Students are encouraged to suggest other projects that can be created using plastic waste and other waste materials instead throwing them away with the possibility of marine pollution. Ideally all plastic waste is recycled.

Follow-up activities

Students are encouraged to share with their friends their experiences during this activity. Here photographs taken by the students themselves might become useful. This can be done also through social media which is a medium that the students are comfortable at using.

Note: Unfortunately the end product may not be recyclable any more. Try to think up ways how the end result can be fully recyclable. It is important to consider the number of plastic bottles used to do this lesson and to compensate it is suggested that student do a clean up in a valley or other location where they will save other plastic bottles (amongst other ways) from polluting the environment.

Background information for educators	These images are suggestions of work processes and final works. Educators are to choose according to the students' needs if they want to show these images to students before, during, or at the end of the activity, or if to be used at all.






Suggested links:

http://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-pollution

https://eco-age.com/resources/making-art-plastic-waste/

Adaptations	The lesson plan has the aim of having every student produce an individual final piece as a result of his work, however group work is still considered and particular students having difficulties at some point, can still manage by working in a group and share in the production phase.
Extensions	Students who are more technologically able can produce a video clip of the activity, underlining its educational objectives. Those students who like reporting can forward a small report of the activity to the press, school newspaper and website.

Title	**16. Outdoor Classroom Activity - Beach Fieldwork**
Author	Ramona Mercieca
Age Guide	Year 7
Subject Area	Geography
Preparation Time	1 hour
Estimated Duration	4 hours
Site	Coastal Area
Educational objectives	To further students' map reading skills. To develop fieldwork skills such as collecting and recording data. To learn more about their local area and describe how litter make them feel.
Learning Outcomes	- I can use the basic mapping skills which include a scale, a legend and compass points to plan journeys, latitudes and longitudes to locate places. - I can use appropriate sources to observe and record local weather. - I can justify the importance of identifying problems, reflecting critically, thinking creatively and having a wider vision in order to plan for the future and become an effective agent of change. - I can use the natural, social and built environment that surrounds me, as a context and source of learning. - I am motivated to make a positive contribution to other people and their social and natural environment, locally and globally. - I can reflect upon the consequences of my actions on present and future generations.
Link to SDGs	SDG 3: Good health and well-being SDG 4: Quality education for all SDG 11: Sustainable cities and communities SDG 12: Responsible consumption and production
Educational resources required	A4 map of beach site x1 (per group) Appendix 16.1 - Group Recording Sheets X5 (per group) Appendix 16.2 - Litter Survey Sheet x1 (per group) Pencils Clipboards Digital cameras Data logger Thermometer Digital pH reader GLOBE Observer App – optional Small container X1 (per group)

Remote preparation	Teacher needs to prepare the resources as indicated in the previous section. The outdoor classroom activity will be an opportunity for students to apply the knowledge and skills learned during geography lessons like using a map, observing and recording the weather, locating beach site using the coordinates. Before the outdoor classroom activity the students will do research about marine litter – its sources and effects on the marine environment.
Planning Considerations	It is very important to focus on the *FACTS*, especially when researching and collecting data re marine litter. Healthy and Safety information (stay in groups, stay away from the sea and cliffs, hazard of roads and weather). Brief outline of the day and objectives for the day. Set up the day's investigation aim and consider hypotheses. Toilet stops and time for the lunch break. Risk assessment/class list/medication/first aid kits.
Method	Activity Outline: Half the day is spent at the beach collecting field data on weather, sea water temperature, sea water pH level and doing a litter survey. **Introduction** Introduce site and locate it on the map of the Maltese Islands. Briefly introduce the history of the area (fishing and tourism and coastal erosion). The students will be split in groups and each group will select a leader and is given a pack with the group's recording sheets and a small container. **Development** Students explore and investigate the beach site by answering the questions on the group recording sheets (Appendix 16.1). There are 5 sections which can be answered in no particular order: ▪ Part 1: Students look around them and describe the situation on site. ▪ Part 2: Students observe and record weather conditions. The teacher will be going around the students to assist with data collection (question c and d). ▪ Part 3: Students measure sea water conditions with the help of the teacher. ▪ Part 4: Students carry out a silence exercise. ▪ Part 5: Students focus on marine litter and discuss if the site is well equipped to prevent litter. Using the container provided, the students will collect some sand to be sampled for micro-plastics (optional). 

Conclusion

Staying in the same group, the students will be invited to carry out a litter survey and beach clean-up. Each group is given a litter survey data sheet (Appendix 16.2) and a garbage bag. All litter collected will be taken to school to be analyzed and weighed.

Follow-up activities

Analysing sand for micro-plastics (samples of sand collected will be analysed and micro-plastics found can beanalysed at school in the science labs).

Weigh the litter collected and present litter data in graph format.

Think of ways of how to reduce marine litter and be agents of change by proposing solutions.

Background information for educators

Download the GLOBE Observer App and create an account with the GLOBE Program: https://observer.globe.gov/

Video clip on Marine Litter: https://youtu.be/71f_uFm9S7g

Marine litter and micro-plastics:

https://www.greenfacts.org/en/marine-litter/index.htm

Title	**17. Investigating the effects of marine litter on sea water temperature and pH level**
Author	Ramona Mercieca
Age Guide	Year 7-8
Subject Area	Geography, Integrated science
Preparation Time	1 hour
Estimated Duration	Data collection 10 mins daily spread over 2 months
Site	School ground
Educational objectives	To develop fieldwork skills such as collecting and recording data To learn more about the effects of marine litter
Learning Outcomes	- I can justify the importance of identifying problems, reflecting critically, thinking creatively and having a wider vision in order to plan for the future and become an effective agent of change. - I can use the natural, social and built environment that surrounds me, as a context and source of learning. - I am motivated to make a positive contribution to other people and their social and natural environment, locally and globally. - I can reflect upon the consequences of my actions on present and future generations.
Link to SDGs	SDG 3: Good health and well-being SDG 4: Quality education SDG 11: Sustainable cities and communities SDG 12: Responsible consumption and production
Educational resources required	2 big glass jars Sea water Plastic litter Digital pH reader Digital thermometer Data logger to measure air temperature, humidity and air pressure GLOBE Observer App to record cloud type and cover (optional) Appendix 17.1 - Data sheets
Remote preparation	Organize a beach clean-up event. Marine litter collected to be taken at school to be used in investigation. Collect sea water samples in a small jerry can.
Planning Considerations	Very important to focus on the *FACTS*, especially when researching and collecting data about the effects of marine litter. For beach clean-up event:

Healthy and Safety information (stay in groups, stay away from the sea and cliffs, hazard of roads and weather).
Brief outline of day and objectives for the day. Set up the day's investigation aim and consider hypotheses. Toilet stops and time for the lunch break.
Risk assessment/class list/medication/first aid kits

Method

Introduction

In this activity students will investigate the effects of plastic litter on sea water temperature and sea water pH levels. Two large glass jars are filled with the same amount of sea water. In one of the jars the students put some plastic litter collected during the beach clean-up event done beforehand. The glass jars are to be placed outside exposed to the sun and rain.

Development

Every day students will take three readings of the sea water temperature and pH level from both jars and calculate the mean of the three samples. Moreover, the students will measure the air temperature, humidity and air pressure, describe the general outlook of the weather and observe cloud cover using the GLOBE Observer App (optional). Information collected is filled in the data sheets (Appendix 17.1).

Conclusion

Once all data is collected students will present it in a graph and analyze it through mean values of repetitions (pH and temperature) by jar to both treatments (with plastics, without plastics). The mean values are to be plotted along the time to verify the changes between both treatments. The data collected will help determine whether there is an effect on the sea water temperature and sea water pH level as a result of marine litter and that there is a relationship between them.

Background information for educators

Ocean Crusaders http://oceancrusaders.org/

International Maritime Organization https://www.imo.org/

Marine Pollution Bulletin · February 2018 www.researchgate.net

Download the GLOBE Observer App and create an account with the GLOBE Program: https://observer.globe.gov/

Title	**18. Young journalists in action!**
Author	Audrey Gauci
Age Guide	Year 7-10
Subject Area	English Language (but can be adapted to other languages)
Preparation Time	Preparation of interview / questionnaires to conduct an investigation in a coastal village/town.
Estimated Duration	20 mins – reporting skills 20 mins – information session on marine litter 40 mins – discussion and creation of interview questions 40 mins – investigation outside school / online 40 mins – evaluation and reporting of investigation
Site	Any site related to the theme chosen – preferably a coastal area where marine litter is most prominent.
Educational objectives	Adhere to the requirements of the English syllabus in relation to report writing Learn how to investigate, be critical and assess comments and opinions expressed by others Express themselves in journalistic-style writing Work in teams *Report Writing* Report writing involves the production of a formal, informative and systematically presented text concerning a situation, person, place or plan. Report writing needs to evidence three clear characteristics: (a) adherence to the original request or brief; (b) a sustained perspective of who the report is supposedly being written by; and (c) an awareness of intended audience. Candidates should be able to: Select which type of report to write in response to a question. Employ a formal style of writing. State the purpose of the report in the introductory paragraph. Organise content by means of separate paragraphs clearly marked with subheadings. - Demonstrate an awareness of intended audience.
Learning Outcomes	Creative learning: - I can participate in writing for a wide range of purposes and genres.

	Expressive language: - I can report, both in speech and in writing, what others have said or written. Managing learning - I can edit and revise my own writing. - I can write appropriately for an audience and with a purpose. - I can vary what I write according to the intended reader Learning to know: - I can justify the importance of identifying problems, reflecting critically, thinking creatively and having a wider vision in order to plan for the future and become an effective agent of change. Learning to do: - I can use the natural, social and built environment that surrounds me, as a context and source of learning. Learning to be: - I am a critically reflective person and am able to evaluate decisions, choices and actions. Learning to live together: - I will challenge unsustainable practices across educational systems, including at the institutional level.
Link to SDGs	SDG 4: Quality education SDG 11: Sustainable Cities and Community* SDG 13: Climate Change SDG 14: Life below water* SDG 15: Life on land* *depends on the theme students select
Educational resources required	Video tutorials on reporting, in particular to report writing: https://www.yre.global/video-tutorials Interview guide: https://www.scholastic.com/teachers/articles/teaching-content/how-conduct-journalistic-interview/ Appendix 18.1 - Optional PowerPoint Internet connection
Remote preparation	Since both investigation and reporting are required, a session on appropriate reporting skills is carried out before the students actually go outside the school. Informative tutorials can be accessed online - Video tutorials on reporting, in particular to report writing:

https://www.yre.global/video-tutorials, but a face to face/online workshop can be requested on yre@naturetrustmalta.org, as part of the Young Reporters for the Environment programme (for schools participating in YRE in Malta).

Planning Considerations

Students need to be aware that when taking photos / interviews they need to get consent before publishing anything on the media.
Pre-visit contacts need to be made to ensure that interviewees are willing and available.
Consider transport issues to arrive on site.
Some interviews / investigations can be done online.
Students are introduced to report writing – tips and hints on how to be a good reporter: avoid essay-style writing, conducting research and investigation beforehand and compiling a good article. A tutorial highlighting hints and tips is available online
(https://www.yre.global/video-tutorials)

Main points to be highlighted:
- Think of a catchy title that will attract attention
- Include the where, when, who, why and how in the first paragraph
- Quote facts and get quotes
- Do not give your personal opinion
- Write in the third person
- Finish with the least necessary information
- Include photos or pictures

Method

Theme: Reporting on marine litter

Introduction

Students are introduced to the issue of marine litter (one or more resources can be used). They will thus be more aware of the problem of marine litter around us, and how it can be tackled. The video tutorial is shown in class, followed by a discussion on the issues presented and the solutions proposed.

Video tutorial: - *https://www.youtube.com/watch?v=E3zkJfgjC58*
PowerPoint related to marine litter: - see Appendix 18.1

Step 1

Students discuss how activities in Malta and our behaviour contribute to the problem of marine litter. They may focus on one type of litter (e.g. cigarette butts) or litter in general.

Step 2

Students investigate – through online research – what the reality is in Malta, and what solutions have already been proposed to reduce the amount of litter. (Refer to the following articles, together with any additional information that they may find)

https://timesofmalta.com/articles/view/marine-litter-sources-and-the-impact-on-our-environment.817942

https://timesofmalta.com/articles/view/action-against-marine-litter.815559

https://theshiftnews.com/2019/11/06/malta-among-four-countries-topping-list-for-marine-litter-in-the-mediterranean/

Step 3

Students discuss how to go about their personal investigation. The following are some ideas, but students should be left free to come up with their own investigation: -

Visit a beach and take a sample area of sand. Explore the amount of litter by sifting the sand, and calculate the amount that would be found on the same beach.
Interview divers who conduct regular underwater clean-ups and ask them for data on trash collected.
(https://www.projectaware.org/action/underwater-clean-malta)
Send queries to Cleansing Malta
(https://tourism.gov.mt/en/parlsec/Pages/Cleansing-and-Maintenance-Division.aspx) asking for data on the amount of waste collected weekly from beaches.
Interview / send queries to WasteServ Malta asking for data on recycled waste collected weekly, as compared to the target amount. (https://www.wasteservmalta.com/).
Students contact a sample of local councils, in particular those in beach areas, and ask the mayors what action the council is taking to reduce the amount of litter in the locality. (see Interview guide: https://www.scholastic.com/teachers/articles/teaching-content/how-conduct-journalistic-interview/ for a guide on how to conduct interviews).

Step 4

Students visit a local area and interview people / shop owners on the reality of marine litter:

Sample questions:

How would you define marine litter?
Do you think that marine litter is a serious problem? Why?
Do you think that your actions are contributing to the problem?
What is the most common type of plastic you use in your daily life? Can it be reduced?
Have you ever heard of micro-plastics? If yes – what can we do to reduce them?
What action can /do you take to reduce the amount of plastic around us?
Is the government / local council doing enough to reduce marine litter?
What do you propose can be done to target the problem?

	Step 5 Students work individually or in groups to compile a journalistic article on their investigation, quoting sources of online research and quotes from their interviews and surveys. **Conclusion** Articles are sent to local newspapers for publication, thus raising awareness on the problem of marine litter and quoting proposals that will help reduce the problem.
Follow-up activities	Students contact authorities / local councils to follow up any action that was proposed and write a follow-up article on any achievements.
Background information for educators	Sample articles by young reporters:- https://www.yre.global/litter-less-campaign-1
Adaptations	Students can opt to focus on reporting through photography, with a title and a short description as a caption.
Extensions	Students can opt to participate in the Young Reporters for the Environment (YRE) programme with multiple articles / photos / videos, focusing on various aspects of the problems and proposed solutions More information about the YRE programme: https://www.yremalta.org/ YRE also offers the possibility for collaboration with a foreign country where articles are compared and contrasted. Contacts of foreign schools can be obtained from the YRE National coordinator (yre@naturetrustmalta.org).

Title	**19. Gathering data to measure the extent of beach litter on a beach - Biology/Science Fieldwork**
Author	Cynthia Caruana
Age Guide	Year 8–11
Subject Area	Integrated Science, Biology, Education for Sustainable Development
Preparation Time	30 minutes
Estimated Duration	120 minutes on site 60 minutes follow-up for learners (in case of report or publication)
Site	Rocky/ Sandy beach of your own choice All learning resources are being provided for: Golden Bay Sandy Beach, Għajn Tuffieħa in Malta Resources can be adapted for other beaches.
Educational objectives	- Learners will investigate the litter that may be found at the beach, including its origin and possible method of dispersal as well as identify whether litter is biodegradable and non-biodegradable. - Learners will assist in a clean-up and learn to dispose of the litter found on the beach in their appropriate waste bag. - Learners will use simple calculations to find the area studied and the percentage frequency of the litter found as well as weighing mass of micro-plastics and waste found. - Learners will use observation skills, estimation, data collection and skills of analysis together with teamwork.
Learning Outcomes	- I can describe what is littering the beach and investigate the frequency of the most common litter items. - I understand the relationship between humans and marine organisms. - I can critically assess and give a rating to the quality of a beach in terms of its litter. - I recognize the importance of taking action to reduce the impact of the beach litter problem.
Link to SDGs	SDG 14: Life below Water SDG 15: Life on Land SDG 12: Responsible Production and Consumption
Educational resources required	Appendix 19.1 - Background information Appendix 19.2 - Consent form Appendix 19.3 - Map of area under study (Golden bay, Malta) Appendix 19.4 - Traced map Appendix 19.5 - Weather forecast Appendix 19.6 - Worksheet 1

Appendix 19.7 - Adapted worksheet

Appendix 19.8 - Different origins of litter

Learners will bring their own:

Tablet/writing materials
Photo camera/mobile
Gloves
Small jar for collecting micro-plastics
Spade and bucket

Equipment needed for each working group:

Frame Quadrat
Sieve
Waste bags for collection: grey bag for plastics, black bag for general waste, white/organic waste bag and reusable container such as bucket for glass
Weighing scales (1 to share between groups)
Tape measure (1 to share between groups)




Remote preparation (if applicable)

1 week before activity day, learners' parents/guardians need to sign consent form to allow them to participate in activity (Appendix 19.2)
1 day before activity day, learners will need to download or print (depending if tablet will be used) a map of the area (Appendix 19.3), the area is to be traced on a sheet of tracing paper (Appendix 19.4)
Weather Forecast for activity day (Appendix 19.5)
Download or print-outs of worksheet for data collection (Appendix 19.6 or 19.7)
Proper attire for lesson including boots and waterproof jacket

Planning Considerations

Weather: if inclement weather is forecasted, the day of the activity might need to be changed in order to gain maximum benefit.

Gloves are to be used when collecting litter. In the case of syringes, used contraceptives and disposable face masks, these are not to be touched. Assistance of teacher/facilitator may be requested if in doubt.

Depending on the number of learners, each class can be divided into teams of a maximum of 4 learners per team. For each team, a set of equipment as explained above needs to be provided.

Method

Introduction

From a top position above site (example before going down steps at Għajn Tuffieħa Bay:

Take note of the general state of the beach as regards litter.

Mark any clumps of litter on the traced map (Appendix 19.4)
Discuss within the group what types of beach litter will be found.
Estimate your initial beach litter state. (Very poor, poor, fair, good, very good)

Development

Closer inspection of the area: The area under study is divided into sub-areas (as shown on the map in Appendix 19.4) and the learners are divided in groups of 3 or 4 learners.

Each group will take 10 random quadrat samplings in their designated area. For each quadrat there will be consideration of the (i) above sand litter (any litter on top of the sand) as well as (ii) below sand litter (in the case of a sandy beach there may be litter below the sand as well, example micro-plastics.)
List the different items of litter visible on the sand. Use Worksheet (Appendix 19.6 or 19.7) for data collection purposes. A photo of the quadrat may be taken.
Discuss the frequency of each item and count the number of each item within the quadrat area.
Discuss the possible source of origin of the litter (Refer to Appendix 19.8 for guidelines) and the possible dispersal method (example: washed ashore or dispersed from land).
Discuss whether the item is biodegradable or not and which waste bag can be used for proper disposal of the waste.
Once these items have been separated in their proper stream, with the use of a spade, bucket and sieve, 10 cm of top sand are sifted and the micro-plastics as well as any other litter is collected and also analysed following the steps above. Micro-plastics may be collected in a jar.
Estimate of area of beach being investigated, using the map and/or tape measure. Calculate the area covered by the quadrat frame.
Calculation of percentage frequency of different types of litter: (can be worked out at school)

$$\% \text{ frequency} = \frac{\text{number of quadrats in which the litter is found}}{\text{total number of quadrats}}$$

Comparison of results with all different groups in the different areas under investigation.
Each working group can weigh the different streams of wastes and sum up the final amount.

Conclusion

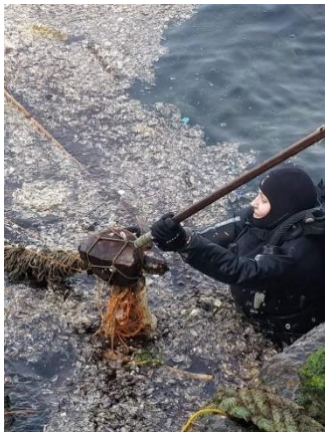
Which litter item/s has the highest frequency?
How does your group's findings compare with that of different learners in different sites in the sandy beach area?
Which area contains the highest amount of litter? (Close to the water or further away)
What is the amount of litter that was cleaned up from the beach?

Has your final rating for the beach under study changed from your initial estimate? (Very poor, poor, fair, good, very good) Give a reason for your answer.

Follow-up

What could be the possible impact/s of the litter on land/marine biota (organisms)? Example Loggerhead turtle entangled in fishing nets and other marine debris. This may cause ingestion, infection and possibly loss of flippers and death.

Sea turtle entangled in ropes



Loggerhead turtle with amputated flippers

Observe any signs of colonization on the waste found. This can give an indication of how long the litter has been present and may throw light on possible mutualistic relationships that may occur.

Background information for educators

Refer to Appendix 19.1.

Adaptations

An adapted worksheet (Appendix 19.7) may be used for data collection.

Extensions

Write an article with the findings from the investigation which would bring attention to the litter problem and involve communities to be proactive about it.

How does the findings on this beach compare to other European beaches? (Refer to: https://mcc.jrc.ec.europa.eu/documents/Marine_Litter/MarineLitterTOPitems_final_24.1.2017.pdf

Devise criteria for a beach's rating based on your findings from this fieldwork.

Example: very poor rating – a beach who contains more than 80% cigarette butts, more than 30g micro-plastics within area of investigation; and so on for each rating of poor, fair, good and very good. Area calculations can also be used. This rating may then be used with studies of different beaches.

Title	**20. Tourism and its impact on the Environment**
Author	Audrey Gauci
Age Guide	Year 10-11
Subject Area	European Studies
Preparation Time	Research on the impact of tourists on the environment – especially in relation to marine litter. Preparation of interview / questionnaires to conduct an investigation in a touristic village
Estimated Duration	40 mins – reporting skills 40 mins – creation of investigation 40 mins – evaluation and reporting of investigation
Site	Any touristic locality
Educational objectives	Develop one of the European Studies projects by investigating and reporting on tourism and its impact on marine litter. Project Titles The Impact of Tourism on the Environment Research, investigate and critically analyse themes: *Protection of the Environment* Candidates should be able to: - identify and understand the sources of air, land, water, noise and light pollution. - demonstrate some awareness of the possible environmental damage and solutions through the following case studies: the Mediterranean Sea and the Blue Plan. - identify and explain preventive measures to lessen their impact. - demonstrate an understanding of the extent to which modern farming practices, industry, tourism and transportation in Europe are responsible for environmental damage. *Sustainable Development* Candidates should be able to: - identify and understand the conflict of interest inherent between conservation and development in Europe, especially in the Mediterranean regions.
Learning Outcomes	*Information management:* - I can define the term sustainable development and its three pillars: economic, social, environmental.

	- I can analyse and explain the term biodiversity. I can discuss some of the threats it is experiencing, *e.g. urbanisation, deforestation, over hunting/fishing.* - Through examples I can identify and list conflicts of interest between economic development and environmental conservation. - I can discuss the concept of marine sustainability and pollution prevention giving examples drawn from the Mediterranean area, *e.g. fisheries policy , Blue plan, Blue flags.* - I can define and discuss the concept of Blue flag in terms of sustainable development of beaches and marinas. - I can analyse the benefits of having a sustainable fishing industry in the Mediterranean, drawing on examples of the bluefin tuna and swordfish. - I am aware of which sources I can consult to learn more about the EU's environment and fisheries policies. - I can actively participate in processes and encourage negotiations for alternative sustainable futures. - I will challenge unsustainable practices across educational systems, including at the institutional level.
Link to SDGs	SDG 4: Quality education for all SDG 11: Sustainable Cities and Community SDG 13: Climate Change SDG 14: Life below water SDG 15: Life on land
Educational resources required	Video tutorials on reporting: https://www.yre.global/video-tutorials Interview guide: https://www.scholastic.com/teachers/articles/teaching-content/how-conduct-journalistic-interview/ Case study on Sustainable tourism:- https://www.yre.global/international-collaboration-2/2020/9/23/sustainable-tourism-is-it-possible
Remote preparation	As part of their European Studies project work, student need to investigate and draw a report on one of 5 topics. One of the themes is *Tourism and its impact on the Environment.* Since both investigation and reporting are required, a session on appropriate reporting skills is carried out before the students actually go outside the school. Informative tutorials can be accessed online (Educational resources 1), but a face to face workshop can be requested on yre@naturetrustmalta.org, as part of the Young Reporters for the Environment programme.
Planning Considerations	Students need to be aware that when taking photos / interviews they need to get the consent before publishing anything on the media.

Pre-visit contacts need to be made to make sure that interviewees are willing and available.

Consider transport issues to arrive on site.

Some interviews / investigations can be done online.

Method

Introduction

The students are first introduced to the topic (tourism and its impact on the environment) by a brainstorming session.

Online videos can be used to highlight / discuss the problem of marine litter and how tourism leaves an impact:

https://www.youtube.com/watch?v=Sb5Mdz0Tw9U

Issues related to marine litter, tourism, and the different sectors that effect both:- https://www.oneplanetnetwork.org/sustainable-tourism/tourisms-plastic-pollution-problem

Discuss the presented video on the waste situation in Malta and Spain. How is tourism affecting both countries? (https://www.yre.global/international-collaboration-2/2020/9/23/sustainable-tourism-is-it-possible).

Development

Step 1

Students investigate the litter problem in Malta through online research and personal investigation such as the following articles. It is highly suggested to search for recent articles, as laws and regulations change continuously:

https://timesofmalta.com/articles/view/only-one-per-cent-of-maltas-plastic-waste-was-recycled-in-2019.848807
https://www.independent.com.mt/articles/2021-02-01/local-news/Malta-lagging-behind-in-waste-management-targets-NAO-report-finds-6736230635

Students should be allowed to experiment how to conduct their own investigation. The following are some ideas but can be adapted freely. Group work is highly encouraged.

Visit a beach, road or public garden in the locality. How much of the litter lying around is derived from tourists and tourism – related activities?

Interview divers who conduct regular underwater clean-ups and ask them for data on trash collected. Specifically ask for litter that is tourist related.

https://www.projectaware.org/action/underwater-clean-malta

Send queries to Cleansing Malta

https://tourism.gov.mt/en/parlsec/Pages/Cleansing-and-Maintenance-Division.aspx asking for data on the amount of waste collected weekly from the chosen locality.

Interview / send queries to WasteServ Malta or similar asking for data on recycled waste collected weekly, as compared to the target amount. (https://www.wasteservmalta.com/)

Step 2

A touristic location for investigation is selected. Students discuss what questions to ask and who to interview. Appointments are set with individuals to be interviewed (https://www.scholastic.com/teachers/articles/teaching-content/how-conduct-journalistic-interview/Interviewees could be a selection of the local council, restaurant / hotel owners, fishermen, locals and tourists.

Students are encouraged to design the questions themselves. Samples are provided to guide them through: -
Local council:
Do you have a litter problem in your locality?
How much of this problem is derived from tourism?
What is the local council doing to help reduce the problem?
Restaurant owners:
How does your restaurant separate waste?
Does the establishment make use of disposable material?
What can be done to help reduce the waste / litter caused by tourism?
Fishermen:
Do you think we have a litter problem in the sea? If yes - what kind of litter?
How much of it is caused by tourists, if any?
What are fishermen doing to help reduce the litter problem?
Locals:
Do you think there is a litter problem in your locality?
If yes, how much of it is caused by tourists?
What can be done to help reduce the problem?
Tourists:
Do you think there is a litter problem in Malta?
If yes – how does Malta compare to other countries?
Do you think that tourism is contributing to the litter problem in Malta?
What is the biggest issue you have noticed? What can be done to help reduce the problem?

Step 3

Students get together to analyse the results of their interviews / surveys. Results should be presented in the form of data where possible. Multiple interviews / questionnaires will help to validate the results. The option to work in groups is highly encouraged.

	Conclusion Students draw up an article / video / photos to report on their findings, including suggested solutions proposed by authorities, locals and tourists. The end product is disseminated on the local media.
Follow-up activities	Follow up from the local council, authorities, restaurant and hotel owners, and any other entity is highly encouraged. Check whether practices are being changed and follow up any implementation strategies by the government. Measures taken by any entity to reduce tourist impact on marine litter is disseminated.
Background information for educators	Examples of past work done by students: - https://www.yremalta.org/past-entries/sustainable-tourism-for-sustainable-environment/ https://www.yremalta.org/past-entries/tourism-in-malta/ https://www.yremalta.org/past-entries/the-other-side-of-tourism/
Adaptations	Students can opt to focus only on photography, with a title and a short description as caption – not necessarily as project work.
Extensions	Students can opt to participate in the Young Reporters for the Environment (YRE) programme with multiple articles / photos / videos, focusing on various aspects of the problems and proposed solutions More information about the YRE programme: https://www.yremalta.org/ YRE also offers the possibility for collaboration with a foreign country where articles are compared and contrasted. Contacts of foreign schools can be obtained from the YRE National coordinator (yre@naturetrustmalta.org).