

Take 1 Week 2023

Muinín Catalyst Sustainable STEAM Education for Sustainable Development Lesson Packet



Lessons

Monday: Climate Change Engage Lesson 2, Micro-Lesson: What is Climate Change?

Tuesday: The Future of Food, the Food We Eat Lesson 7: Food Trends

Wednesday: Future of Fashion, Fashion Design Skills Lesson 3: Skills for Maintaining, Mending and Customizing my Garments

Thursday: The Future of the Ocean, Offshore Renewable Energy Lesson 8: Learners Design Wind Turbine Foundations

Friday: Seeding Sustainability, Secrets of Soil Lesson 2: Soil and Ecosystems

Introduction to Game Design - Lesson 2



Climate Change Engage

Lesson 2

Micro-lesson: What is Climate Change?

4 QUALITY EDUCATION



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



Lesson Title and Summary: What is Climate Change?

In this lesson, learners are introduced to the foundational concepts of Climate Change. This will enable them to understand more about Climate Change and its impacts and gain knowledge that they can include within their game design.

Learners will be introduced to the difference between weather and climate, begin to understand the changes in patterns and recognise the impacts that this can have.

Vocabulary: Average Conditions; Climate Change; Extreme Weather Events; Weather

In this lesson, the learner will:

- learn foundational concepts of climate change
- understand the difference between weather and climate
- gain insight into changing weather patterns over time
- understand the scale of the problem of climate change
- understand the importance of keeping climate warming at 1.5 degrees C
- understand the impact of 2 degrees C warming

Materials

- Video: What is climate change? Part 1 and 2
- Worksheet: Activity Question
- Worksheet: Discussion Questions and Infographic: Impact of 2C vs 1.5C
- Lesson 2-4 Teacher's Guide
- Internet access
- Pens, pencils
- paper
- Blackboard / Whiteboard

Introduction to Game Design - Lesson 2



Activity Instructions

Activity 1 Understanding Climate Change (20 mins)

1. Ask learners if they can describe the difference between weather and climate. They can share ideas with a partner before a whole class share.
2. Put the following questions on the board and read through as a whole class.
 - How would you describe climate?
 - How would you describe climate change?
 - How do you think climate has changed in Ireland?
 - How would you describe weather?
 - What is an extreme weather event?
 - How are extreme weather events related to climate change, what are the impacts?
 - Have you recently experienced an extreme weather event? What were the impacts on houses, streets, agriculture, etc.? How was human health affected?
3. Play the Video: What is climate change? (Part 1), asking learners add to their answers.
4. Divide learners into pairs to share answers before discussing as a whole class.

Activity 2 How hot is the new climate? (20 mins)

1. Watch Video: What is climate change? (Part 2) and make notes under the following headings:
 - Global climate changes
 - Changes in nature (melting ice - species migration - species disruption)
 - Paris Agreement
2. Working in the same groups, compare notes and use the Infographic to discuss the worksheet questions.

Activity 3 What are you willing to do? (10 mins)

1. In pairs, discuss what you would be willing to do to keep the temperature from reaching 2 degrees Celsius). Would you eat less meat? Would you not fly for vacation? Would you buy less clothing/ second-hand clothing? Would you turn down the heat in your home?

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One opinion they have about the tasks

Introduction to Game Design - Lesson 2



EXTENSION / REDUCTION ACTIVITIES

Reduction: for a shorter lesson, only complete Activity 1 & 3.

Extension: For a longer lesson, ask learners to reflect on how a changing climate makes them feel. Discuss what someone can do to handle fear of something that seems out of one's control. Refer to the Force of Nature discussion guide on eco-anxiety- see Media Box.

Option B: Brainstorming for game design - In small groups, brainstorm things that will be more difficult to access as it gets warmer - how might this inform their game design? Share ideas as a whole class.

Option C: Mini research task, research the effects of climate change on local flora and fauna.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Activity 1 Video: What is Climate Change? Part 1 <https://youtu.be/t4csCQuzDf0>

Activity 1 Video: What is Climate Change? Part 2 <https://youtu.be/0NbmJOhKpMY>

Infographic: Comparing 2C to 1.5C <https://www.climatecouncil.org.au/resources/infographic-the-difference-between-1-5-and-2-degrees-warming/>

Force of Nature Discussion Guide <https://www.forceofnature.xyz/discussion-guide>

Walsh, S. (2012). A summary of climate averages for Ireland, 1981-2010. Climatological note no. 14. Met Éireann. Retrieved from <http://hdl.handle.net/2262/70490>

Met Éireann's role in climate change <https://www.met.ie/climate/climate-change>

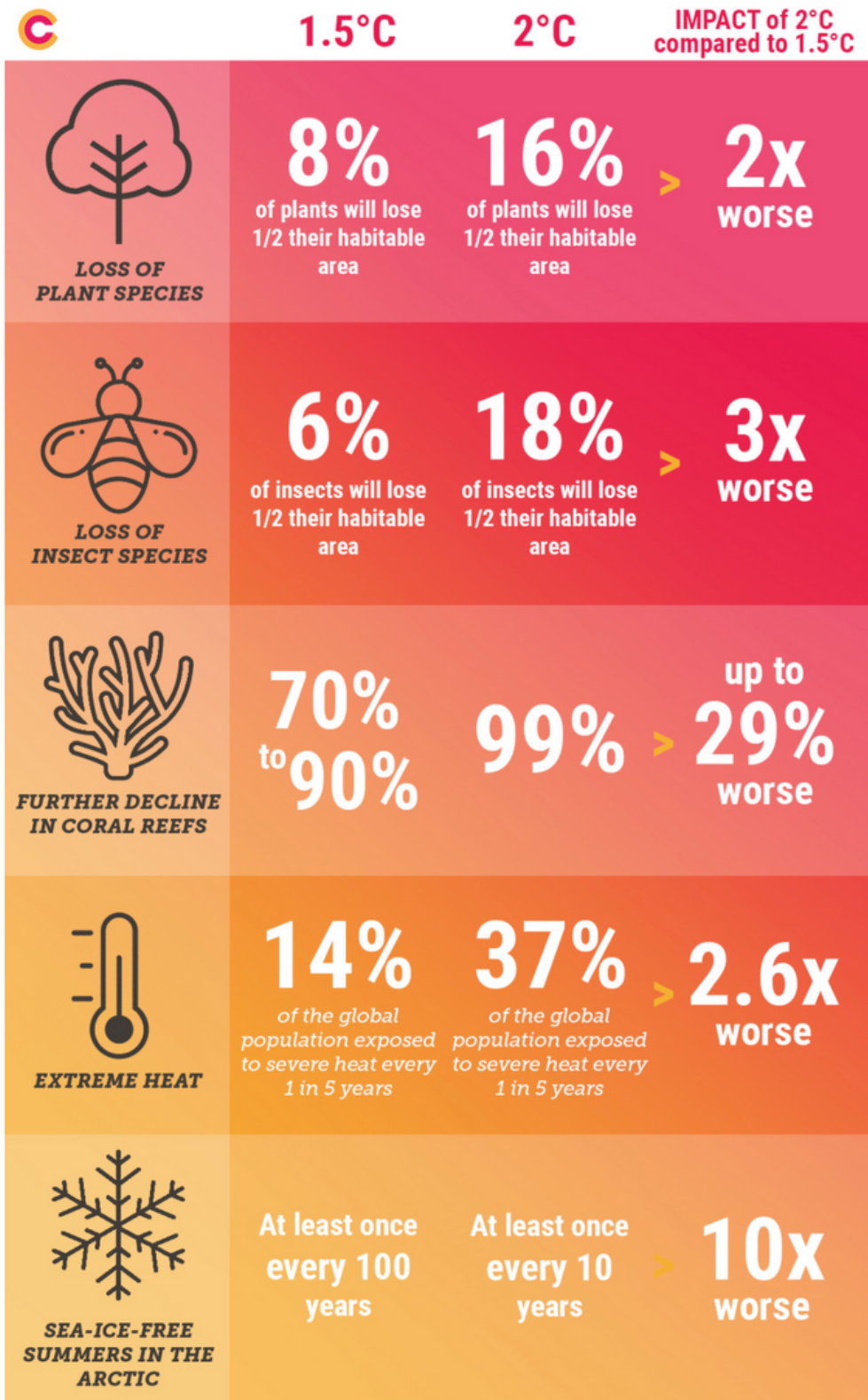
Before the Flood Documentary (95:00min) Available for online non-commercial rental approx: \$3.99 <https://www.beforetheflood.com/screenings/> there's also a free discussion guide for teachers to use if watching the film in class

Local Trip / Expertise / Additional Work and Assessments

Ask learners to calculate the average temperature/ rainfall from their nearest weather station. You could also discuss extreme weather events that recently have happened locally/ elsewhere. Weather Observation Website: <https://wow.met.ie/>

Find out and organise a visit and talk to your local weather station, or invite them to link with the learners.

LESSON 2 ACTIVITY 2 QUESTIONS



 CLIMATECOUNCIL.ORG.AU | crowd-funded science information

Adapted from **WRI (07/10/18)** based on data from **IPCC (10/2018)**.

<https://www.climatecouncil.org.au/resources/infographic-the-difference-between-1-5-and-2-degrees-warming/>

LESSON 2 - 4 THEMES AND EXTRA REFERENCES



LESSONS 2 - 4 ARE THREE INTERLINKED LESSONS AROUND THE FUNDAMENTAL CONCEPTS OF CLIMATE CHANGE :

- **WHAT IS CLIMATE CHANGE?**
- **THE CAUSE OF CURRENT CLIMATE CHANGE**
- **CLIMATE ACTION: ADAPTATION AND MITIGATION**

LESSON 2 - WHAT IS CLIMATE CHANGE?

Climate is the long-term average weather conditions over time and their variation. When we change the climate, we are changing this average weather pattern. With current climate change, the earth is getting rapidly warmer.

We are experiencing sea level rise, higher, more intense rainfall, and more extreme weather events like heat waves, droughts, flooding, wildfires and storms with high winds. These events make it more difficult to farm, which may impact food supplies.

Changing the climate displaces plants and animals from places that they used to live in and may expose them to novel disease. The adverse effects of climate change can make us anxious as we are not sure what is to come and how we will deal with these changes. Talking about these feelings and finding community in living through and adapting to the change is very important.

The media box resources also contains a link to the film 'Before the Flood' which is a useful background summary. This is available for renting so maybe something that is integrated into TY as a general all pupil activity it looks at the sources, techniques, media and impact with a mostly American perspective but does include China, India, Indonesia, and the Pacific islands.

LESSON 3 - WHAT IS THE CAUSE OF CURRENT CLIMATE CHANGE?

The climate is driven by the amount of energy that drives the climate system. Energy is transported from the sun mainly in the form of visible light, whereas once this energy is absorbed at the Earth's surface it is transported from object to object in the form of infrared radiation.

The climate can be changed for two reasons; either there is more solar radiation received on Earth and/or there are more greenhouse gases in the atmosphere that keep infrared radiation in the atmosphere.

Changes in greenhouse gas concentrations in the atmosphere are due to human activities such as burning of fossil fuels, but also land use changes such as deforestation, soil degradation, draining of peatlands, and livestock agriculture as well as natural processes such as volcanic eruptions and meteorite impacts.

Changes in solar radiation are mostly due to changes in the distance of the earth to the sun, which happens on a geologic time scale. However, some variation is due to changes in solar activity and now the melting of snow and ice on Earth, as this decreases the amount of sunlight reflected.

LESSON 2-4 THEMES AND EXTRA REFERENCES

13 CLIMATE ACTION



LESSON 4 - CLIMATE ACTION- MITIGATION AND ADAPTATION?

Climate action is twofold, we have to reduce greenhouse gas emissions but we also have to adapt to the new climate that we have created by our greenhouse gas emissions. Our greenhouse gas emissions per person are higher in Ireland than elsewhere in the EU and much higher than elsewhere in the world. We are emitting more than our fair share. We are emitting more than our fair share. To cut our greenhouse gas emissions we need to measure our carbon footprint, so we know what activities emit them.

Generally, everybody can help reduce greenhouse gas emissions by organising for climate action, choosing green transport, saving energy consuming less, helping nature and eating less meat and dairy products. This lesson introduces learners to the concepts of mitigation and adaptation, as well as encouraging climate action.

Mitigation: Mitigation: In order to reduce greenhouse gas emissions, we need to become aware as to where these emissions come from. The most abundant greenhouse gas that is contributing the most to global heating is carbon dioxide (CO₂). CO₂ is a gas we breathe out after we produce metabolic energy in our bodies. It is produced when we burn wood or fossil fuels, like oil, coal and gas, so it is produced when heating our homes and in transport and energy systems. Drained (and harvested) peatlands also emit large amounts of CO₂.

Methane (CH₄) is the second most abundant greenhouse gas. It is an important contributor to greenhouse gas emissions in Ireland as livestock agriculture produces a lot of methane (CH₄) through digestion (cows burping it out of their stomach) and from manure.

Adaptation: we need to live with higher sea levels and more extreme weather events, so we need to prepare for this. Ideally, we would do so by helping nature to help us, e.g. giving more space for nature in coastal ecosystems or flood plains.

Lesson 4 Case Study support:

Case study 1: Seagrass: restoring seagrass in Kilmore Quay, County Wexford (interview with a 7-year old boy and other participants in seagrass restoration project by Coastwatch (the Irish Coastal Environmental Group): <https://fb.watch/eb---r3uy7/> (RTE news, September 2021).

In this project, volunteers removed the invasive seaweed *Sargassum muticum* from seagrass meadows to allow light onto the seagrass). Coastwatch relies on volunteers to survey the coasts for seagrass presence, for seagrass restoration and for picking up litter around the coast. Benefits in terms of climate mitigation: seagrass is very efficient at capturing CO₂ from the atmosphere. Benefits in terms of climate adaptation: seagrass slows the action of waves and reduces coastal erosion.

Case study 2: Coastal dune: the Inchydoney Dune Conservation Project, Cork is educating the public about the impact of walking in the dunes can lead to erosion of the dunes. They are taking measures to recover eroded dunes and protect existing dunes from further erosion and organising beach clean ups. Benefits in terms of climate mitigation: some

LESSON 2-4 THEMES AND EXTRA REFERENCES



carbon capture by dune grass. Benefits in terms of climate adaptation: dunes provide a natural barrier against coastal flooding and erosion.

- <https://www.southernstar.ie/news/our-dunes-are-dying-but-if-we-move-quickly-we-can-save-them-4218106>
- <https://www.facebook.com/Inchydoney-Dunes-Conservation-Group-101291461965770/>

References:

Blondel, J. (2019). How do birds adapt to a changing climate? Encyclopedia of the Environment. Institute de France, Académie des Sciences, University Grenoble Alpes. This webpage <https://www.encyclopedie-environnement.org/en/life/how-birds-adapt-changing-climate/> explains in detail how birds will be affected by climate change. Last accessed: June 2022.

Climate change post (2022). Ireland. <https://www.climatechangepost.com/ireland/>
The Ireland page contains links to footages of floods in Ireland on YouTube. There is also a specific write-up of coastal flood risks: <https://www.climatechangepost.com/ireland/coastal-floods/>

Devictor, V., Van Swaay, C., Brereton, T., Brotons, L. s., Chamberlain, D., Heliölä, J., . . . Jiguet, F. (2012). Differences in the climatic debts of birds and butterflies at a continental scale. *Nature Climate Change*, 2(2), 121-124. doi:10.1038/nclimate1347

Friedlander, B. (2021). Seven years of agricultural productivity growth lost due to climate change. Stanford Woods Institute for the Environment adapted from Cornell Chronicle. This website <https://woods.stanford.edu/news/seven-years-agricultural-productivity-growth-lost-due-climate-change> summarises the agriculture losses observed over the period 1961-2020 Last accessed: June 2022.

Maynooth University (2022). Press release: <https://www.maynoothuniversity.ie/news-events/maynooth-university-research-confirms-elevated-rates-sea-level-rise-dublin>

NOAA (2021). How does climate change affect coral reefs? National Ocean Service website, This website <https://oceanservice.noaa.gov/facts/coralreef-climate.html> contains an infographic that explains the impact of climate change and other human activities on coral reefs. Last accessed: June 2022.

Ortiz-Bobea, A., Ault, T. R., Carrillo, C. M., Chambers, R. G., & Lobell, D. B. (2021). Anthropogenic climate change has slowed global agricultural productivity growth. *Nature Climate Change*, 11(4), 306-312. There is also a short video where Ariel Ortiz-Bobea explains his research <https://news.cornell.edu/stories/2021/04/climate-change-has-cost-7-years-ag-productivity-growth>

Walsh, S. (2012). A summary of climate averages for Ireland, 1981-2010. Climatological note no. 14. Met Éireann. Retrieved from <http://hdl.handle.net/2262/70490>

SDG2: Future of Food

MM5: The Food We Eat



Micro-Module 5: The Food We Eat

Exploration and Experimentation

Lesson 7: Food Trends

Subjects: Art and Design, Agricultural Science, CPSE, Home Economics, SPHE

Lesson Title and Summary: Food Trends

Learners will begin to explore the future of food in this lesson by investigating current food trends. Trends help us understand how behaviors are changing, what people want, and what the future might look like.

Vocabulary: Cultivated, Entomophagy, Forage, Future, Plant-based, Trends, Technology, Veganism, Viral

In this lesson, the learner will:

- Research local and global food trends
- Learn about behavior change and patterns
- Discover novel terms and products
- Work with peers to conduct research
- Consider what the future might look like

Materials

- Worksheet: What's Trending
- Internet access
- Markers/pens/pencils
- Paper



MM5: The Food We Eat

Lesson 7: Food Trends

11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



15 LIFE ON LAND



ACTIVITY INSTRUCTIONS

Activity 1: What's Trending? (35 minutes)

1. Divide the class into pairs.
2. Distribute the worksheet: What's Trending.
3. Assign one food trend from the following list to each pair of learners:
 - a. Cultivated Meat
 - b. Entomophagy
 - c. Fake Meat
 - d. Foraged Food
 - e. Veganism
4. Learners should work together to learn about the food trend assigned to them. They will need access to the internet to conduct the research and complete the worksheet.

Activity 2: Playback (15 minutes)

1. Each pair should prepare to share what they've learned with the rest of the class.
2. When everyone is ready, allow each pair to talk about their assigned food trend. They can simply read from their worksheet or pin their worksheet on the classroom board/wall for everyone to see and follow along.
3. Encourage the class to ask questions and share their own thoughts in response to each trend. Use these prompts to guide the conversation:
 - a. What do you all think about this trend?
 - b. Was anyone surprised to learn about it?
 - c. Has anyone tried these kinds of foods before?

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks.
- Two things they found most interesting and would like to explore more.
- One – their opinion they have about the tasks.

MM5: The Food We Eat

Lesson 7: Food Trends



EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, run this lesson as a flipped classroom.

Extension: For a longer lesson, assign more than one food trend to each pair of learners.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Article: 10 Key Trends in Food, Nutrition & Health 2013 (Bord Bia)

<https://www.bordbia.ie/industry/news/insightful-articles/2021/10-key-trends-in-food-nutrition--health-2023/>

Article: Deliveroo Reveals Future Food Trends in 2040

<https://www.hospitalityireland.com/features/deliveroo-reveals-future-food-trends-in-2040-199338>

Article: 5 latest tech trends in food and drink manufacturing

<https://www.foodmanufacture.co.uk/Article/2023/07/06/food-technology-trends-2023>

Article: Food Trends (Failte Ireland)

<https://www.failteireland.ie/Product-development/taste-the-island/Archived-content-2020/Food-knowledge-library/Food-trends-in-Ireland.aspx>

Interview: Darina Allen: Here are the 28 food trends I think will become popular in 2023

<https://www.irishexaminer.com/food/arid-41050631.html>

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Visit some of your local restaurants or takeaways and look at their menu – do you notice any changes or new additions? Do they offer vegan options, for example?

Talk to older community or family members and ask them about food trends. Have they noticed any changes in the type of food available today in comparison to when they were young? Can they tell you about it?

LESSON 7 WORKSHEET

2 ZERO HUNGER



WHAT'S TRENDING

Food trends are changes in food preferences that have become popular over a certain amount of time. Just like other trends, food trends often go viral and usually last for a long time. Food trends are important because they indicate a change in how and what people eat and give us a glimpse into the future.

Use this worksheet to learn about the food trend assigned to you.

PART 1

Our food trend is:

Have you heard of this trend before?

In your own opinion, what do you think it involves?

PART 2: Use the internet to learn more about this food trend.

List your sources below i.e. websites, articles, videos etc. as you conduct your research:

1. _____
2. _____
3. _____
4. _____
5. _____

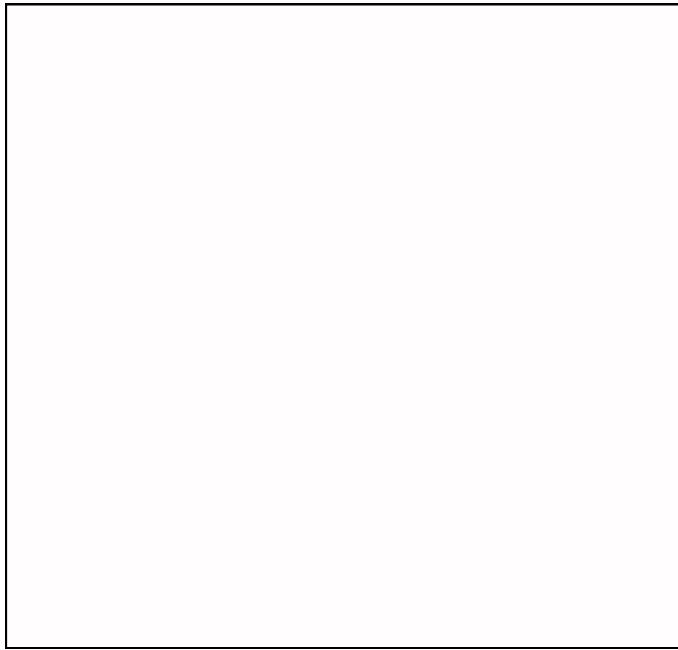
LESSON 7 WORKSHEET



WHAT'S TRENDING

Where is this food trend most popular? e.g. Ireland, Asia, Everywhere

What does this food look like? Draw it below or add a photo from the internet.



What is the official definition of this trend?

Does it rely on technology? If yes, explain how:

LESSON 7 WORKSHEET

2 ZERO HUNGER



WHAT'S TRENDING

Do you think it is expensive or cheap to eat this kind of food?

What type of food would you associate with this trend? e.g. meat, flowers, grain

1. _____
2. _____
3. _____

How is this food made? e.g. is it raw or cooked? Is it ultra-processed?

Could you make this type of food at home?

In your own opinion, do you think this a positive or negative trend?

Do you think it will become a popular food in the future?

Do you think people in Ireland will like it?

Explain your answer.

SDG8 Future of Fashion

MM4 My Fashion: The Big Picture



MM4 My Fashion: The Big Picture

Exploration and Experimentation

Lesson 3. Skills for Maintaining, Mending and Customizing my Garments

Subjects: Art, Climate Action and Sustainable Development, Design, Enterprise, Home Economics, Maths, Science

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



10 REDUCED INEQUALITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



17 PARTNERSHIPS FOR THE GOALS



Lesson Title and Summary: Skills for Maintaining, Mending and Customizing my Garments

Learners will explore simple methods and techniques for customising garments, enabling the garments to take a journey into another way of being. Through care, mending, maintaining and customisation, we enable our garments to live in a way that exists outside the fast fashion paradigm. Caring for our clothing is a slow process and can often take time over a few weeks. Time and user agency through skill can bring our garments into a cherished place where large fashion companies cannot enter. Garments are not static objects. They are places where lived experience happens.

Vocabulary: Care, Co-creation, Maintenance, Mending, Skill, Thrift

In this lesson, the learner will:

- learn through practice the basic skills needed for mending, sewing, customising and maintaining our garments.
- learn to use and up-skill with a basic set of tools and sewing skills.
- be introduced to creative ways of approaching mending and customising
- give the learners the agency to develop a new relationship with their garments and through this understand the power of cherishability through value.
- explore the community of care that emerges when people gather to make together.

Materials

- Teacher's Notes: List of materials needed and short instructional videos for Activity 2
- Notebook/paper for glossary and note-taking
- Internet access



SDG8 My Fashion: The Big Picture

L3 Skills for Maintaining, Mending and Customising Garments



ACTIVITY INSTRUCTIONS

Activity 1: Creative mending (10min)

1. Watch the video 'Visible mending brings new life to old damaged clothes'   | Everyday | ABC Australia on mending to see some ideas on visible mending [8:29min].

Activity 2: My new skills (40min)

1. Divide the room into small work tables in a circle with 2-4 learners working on each table
2. In the middle of the room create 2 tables of tools and materials keeping them close to the learners tables to encourage the learners to meander between the tables and interact with one another.
3. Invite the learners to gather around the tool and materials tables and take a needle, thread, buttons, some squares of cloth each (cotton and wool) and a pair of scissors and needle felting kit for each table.
4. Start with an introduction to the tools presented and demonstrate how they are used to affect garments through maintaining, mending and customising garments.
5. Use the videos listed in the Teacher's Notes: Activity 2 Videos on basic sewing, mending and cutting methods.
6. Play each video and have the learners follow in real-time to learn and practice the skills

Ongoing lessons: Simple Fabric Skills Building

1. Before moving onto the next formal lesson, a number of lessons can be undertaken to develop skills using the additional videos in the teachers' notes to learn new methods and techniques of fabric manipulation and making patterns.
2. Learners can use these lessons to build up a 'sampler portfolio'. This can be a simple set of stitched squares and techniques or can be a stitched project to create and 'image sampler' - see the 'Winging it' video, Teachers notes

REFLECTIVE EXERCISE: 3-2-1

- Three things they feel they have learnt from the exercise
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the site / exercises

This activity can also be undertaken using a mentimeter survey www.mentimeter.com rather than paper or post-its.

SDG8 My Fashion: The Big Picture

L3 Skills for Maintaining, Mending and Customising Garments



EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, omit the blanket stitch video and omit the Invisible stitch video.


Extension: For a longer lesson, introduce the learners to these 2 basic embroidery stitches

Seed stitch https://www.youtube.com/watch?v=zd7WhNgV1yQ&ab_channel=Penguin%26Fish (55 seconds). Practice for 5 mins.

Satin stitch <https://www.youtube.com/watch?v=NGPqSY2vJn8> (1 min 30). Practice for 5 mins.

See also ongoing lessons and skill-building videos on Teachers' notes to develop simple stitched techniques and simple pattern making. These can be undertaken over a number of weeks as required.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Visible mending brings new life to old damaged clothes  | Everyday | ABC Australia [8:29min]
https://www.youtube.com/watch?v=Xaq3kwHGbDk&ab_channel=ABCAustralia

See teacher's notes: Activity 2 Videos

See Ongoing Lessons: Skills building video list for fabric manipulation and using your own clothes to cut patterns.

Local Trip / Expertise / Additional Work and Assessments

Bring your samples home and look through your wardrobe for anything that needs fixing. Practice the sewing skills you have learnt. Visit your local sewing shop or charity shop and search out trims and accessories that appeal to you.

Learners can create an Image Sampler showing a range of techniques to give their sampler different textures.

Continue to build the textile lived experience glossary, giving each learner one or two words/phrases to research and define in one sentence:

- Care, Co-creation, Maintenance, Mending, Thrift, Skill



MATERIALS NEEDED

You will need to provide the following for this lesson:

- Needles of different sizes
- Pins
- Pincushions
- Thimbles
- Needle threader
- Fabric ripper
- Threads
- Embroidery threads
- Tailors chalk
- Raw wool
- Spun wool fibre
- Velcro
- Fabric remnants: To maximise skill learning time in the lesson. Precut some cotton squares for practising sewing . Also find remnants of denim, cotton (old t-shirts, vests, sweatshirts), wool fabric (old jumpers, scarves, mittens, socks, felt)
- Iron and ironing board
- Scissors for cutting fabric
- Measuring tape
- Needle felting kit (Bifurcated needles, raw wool in different colours, sponges to felt on)
- Bondaweb
- A couple of embroidery rings
- Dry nailbrush (for brushing off dirt)
- Ribbons, jar of buttons, trims, different shaped sequins, small beads and other craft accessories
- Fabric glue

ACTIVITY 2 STITCHING SKILLS VIDEOS TO WATCH

Learners should follow along in real time with the videos to practice these basic skills

1. Simple knotting of thread <https://www.youtube.com/shorts/Lbi1zn4c3sE> Practice for 1 min
2. Running stitch <https://www.youtube.com/watch?v=i1-B01FB56s> [2:30 min] Practice for 2 min
3. Sew a hem. <https://www.youtube.com/shorts/uy0Vfvw84ao> (20s) Practice for 4 mins.
4. Blanket stitch https://www.youtube.com/watch?v=S9zegUYdPmg_ [3:50 min] Practice for 4 mins
5. Invisible stitch <https://www.youtube.com/shorts/pedFjq5IEI0?feature=share> (20s) Practice for 5 mins
6. Sew on a button <https://youtu.be/8mlGGn3AS1E> (4 mins) Practice for 10 mins
7. Needle felting <https://www.youtube.com/shorts/zmZSmAyKIJ4> (45s) Practice for 4 mins.



ONGOING LESSONS: MATERIALS NEEDED

- Needles of different sizes
- Pins / Pin cushion
- Thimbles
- Needle threader
- Scissors
- Thread / Embroidery threads
- Filling
- Fabric remnants: To maximise skill learning time in the lesson. Pre-cut some cotton squares for practising sewing.
- Remnants of denim, cotton (old t-shirts, vests, sweatshirts), wool fabric (old jumpers, scarves, mittens, socks, felt) and trims e.g. lace, jewellery

BUILDING FABRIC MANIPULATION SKILLS

Additional decorative fabric manipulation skills

- Spiralling [6:24 min] <https://www.youtube.com/watch?v=2iFGsdNYDYk>
- Boiled Shibori using a vegetable steamer and synthetic fabric [8:12 min] <https://www.youtube.com/watch?v=e6QPesSzxm74>
- Boro Textiles Sustainable Aesthetics Parts 1 - 4. Part 1 [3:37 min] <https://www.youtube.com/watch?v=DnQd5qFrUGM>
- Boro Patchwork with Sashiko [8:55 min] <https://www.youtube.com/watch?v=Px5um1WbNFU>
- Basics of Sashiko [5:20 min] <https://www.youtube.com/watch?v=M-5RXN6Tk4M>
- Top 5 Sashiko Tips [https://www.youtube.com/watch?v=H464u4q_JGk
- DIY Sashiko Visible Mending Style [13:55 min] <https://www.youtube.com/watch?v=bj2eZcMWSNo>
- 14 ways to repair holes using embroidery thread [5:51 min] <https://www.youtube.com/watch?v=WkJJZDsnCNg>
- 8 Sewing tips and tricks [3:44 min] <https://www.youtube.com/watch?v=76Gtqe7tEnE>

Image Sampler: Winging it Week 22: Fabric Manipulation: <https://www.youtube.com/watch?v=5BBFhoNTk8k>

- Introduction: Image Sampler [3:34 - 5:02min]
- Trapping [5:03 - 11.43 min]
- **Melting Synthetic fabric, a candle or lighter. NB: We do not recommend this as it needs monitoring and could also give off toxic fumes. [11.43 - 17.14 min]**
- Padding [17:16 - 27.06 min]
- Gathering [27:40 - 31:37 min]
- Pleating [31:38 - 46:02 min]
- Twisted Strips [46:04 - 51:27 min]
- Folded Circles [51:28 - 57:06 min]
- Smocking [57:18 - 1:09:00 min]
- Bubbles [1:09:02 - 1:19:00 min]
- Trapunto [1:19:00 - 1:25:10 min]
- Ruffles [1:25:08 - 1:30:49 min]



CREATING SIMPLE PATTERNS

Materials:

- Paper - any of the following, butcher paper, brown wrapping paper or tracing paper
- Pens
- Pins / pin cushions
- Scissors
- Tailor's chalk
- Own clothes or other clothes you like and that fit you e.g. from a charity shop

Instruction Videos

- How to Make a Pattern from Clothing without taking it apart [9:44 min] <https://www.youtube.com/watch?v=jdYPWHsgVAg>
- How to trace your clothes and turn them into patterns (shorts, t-shirt and shirt) [15:00 min] <https://www.youtube.com/watch?v=baqA9jhZRVs>
- Copying my favourite leggings [12:17 min] <https://www.youtube.com/watch?v=9K45Vfeq-Gg>
- Create the perfect pair of Jeans cloning an old pair of jeans [21:46 min] https://www.youtube.com/watch?v=_jfKXW0-pk8 This requires attention to detail, particularly when measuring. It is more complicated but it is not unachievable and the instructions are clear.

UPCYCLING

- Using Old Socks [33:34 min] <https://www.youtube.com/watch?v=y-JtcPFwUcE>
- 3 ideas from old umbrellas [29:30 min] <https://www.youtube.com/watch?v=gyPM5KwJizA>
- 3 new Ideas from one old umbrella [10:30 min] <https://www.youtube.com/watch?v=JMioaj5F3u8>
- 5 ideas for plain t-shirts [14:02 min] <https://www.youtube.com/watch?v=y0fKd6dGI-o>

JUNK KOUTURE

Junk Kouture is open to 12-19 year-olds and challenges young people to design, upcycle and create high end Kouture from recycled Junk, before showcasing their design and representing their school on stages across the world!

- Junk Kouture main website <https://junkkouture.com/>
- Resources for educators <https://junkkouture.com/educator/>
- Visit the Regional Finals 2023 for inspiration Powered By RTÉ <https://www.youtube.com/watch?v=4FvNc8ZciWA>
- Taking Action against Climate Change Junk Kouture <https://www.youtube.com/watch?v=tEkMhi7IDfw&t=1s>

Marine Plastic Waste - Problem to Pitch

Our Marine Plastic Waste Problem to Pitch TY unit www.muninincatalyst.com/oceanliteracy has many lesson plans that could support a 'Junk Kouture' project focused on Marine Plastic Waste

SDG14 Future of the Ocean

MM3: Offshore Renewable Energy



Micro-Module 3: Offshore Renewable Energy

Research and Development

Lesson 8: Learners Design Wind Turbine Foundations

Subjects: Climate Action and Sustainable Development, Design, English, Engineering Science

7 AFFORDABLE AND CLEAN ENERGY



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



11 SUSTAINABLE CITIES AND COMMUNITIES



13 CLIMATE ACTION



Lesson Title and Summary: Learners Design Wind Turbine Foundations

In this lesson, learners become offshore wind turbine engineers who design and construct strong and stable foundations for wind turbines at sea. Working in small groups, they are provided with materials to create their turbine foundations. The learners are challenged to think critically about stability, the weight of the turbine, the depth in the sand that their foundation will be buried, and the ability to withstand waves and strong winds. After a brief building time, the groups present their designs.

Vocabulary: Prototype, Design and Build, Offshore Wind Turbine, Stability, Foundation

In this lesson, the learner will:

- Develop hands-on prototyping skills
- Environmental awareness and responsibility
- Basic engineering concepts, adaptability and refinement
- Critical thinking and problem-solving

Materials

- Worksheet: Turbine Foundation Options
- Straws
- Match sticks/ lollipop sticks
- Markers/ stickers,
- Playdough or clay
- Tape
- String
- Cardboard
- Scissors
- Rulers/ measuring tapes
- Mini-turbines (in any form – could be some lollipop sticks stuck together)

SDG14 Offshore Renewable Energy

L8 Learners Design Wind Turbine Foundations



ACTIVITY INSTRUCTIONS

Activity 1: Introduction (10 minutes)

1. Use the image provided in the worksheet and have learners brainstorm the pros and cons of each design.
2. Have learners discuss what the qualities of a strong offshore wind turbine might be, and what they need to consider (i.e. wind, tide, waves) when building a wind turbine. Remind learners of their last two lessons as the information discussed may be useful.
3. Share as a class.

Activity 2: Group Formation and Materials (5 minutes)

1. Divide the class into small groups of 3-4 learners.
2. Provide each group with the materials, including straws/matchsticks/lollipop sticks, playdough or clay, tape, string/cardboard, scissors, mini-turbines (e.g., lollipop sticks), a large plastic crate filled with water, and sand.

Activity 3: Design and Construction (25 minutes)

1. Instruct the learners to collaboratively design and construct their wind turbine foundations using the provided materials. They may refer to their brainstorming from the previous lesson.
2. Encourage them to consider stability, weight distribution, and the foundation's ability to withstand waves and strong winds.

Activity 4: Presentation (10 minutes)

1. Give each group a few minutes to present their foundation designs to the class.
2. During the presentation, have the other learners ask questions or provide feedback on each design.

REFLECTIVE EXERCISE: 3-2-1

- Three things they feel they have learnt from the exercise
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the site / exercises

SDG14 Offshore Renewable Energy

L8 Learners Design Wind Turbine Foundations



EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter class, reduce the number of materials provided to the groups to simplify the activity and save time. Skip the presentation part and instead, have each group explain their foundation design briefly to the class while showing it in action during the testing phase in Lesson 5. Instead of having each group present their design choices, facilitate a brief group discussion where learners share one thing they learned from designing their turbines and foundations.

Extension: For a longer class, after the initial 25-minute building time, give groups an additional 5 minutes for modifications and improvements to their foundations based on feedback from other groups. Introduce additional variables for testing, such as varying the wind speed or changing the angle of the turbine blades to explore how these factors impact the stability and performance of the turbine and foundation. Have groups record their observations and create charts or graphs to compare to different foundation designs.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

The Foundation of Wind Turbines - IN 60 SECONDS – DOB Academy [1:22 mins]
https://www.youtube.com/watch?v=NQwuRV2MFs8&ab_channel=DOB-Academy

Watch the World's First Floating Wind Farm Ride the Waves | National Geographic [2:23 mins]
https://www.youtube.com/watch?v=sgCA5e7K7r8&ab_channel=NationalGeographic

Wind Energy Ireland wants more renewable energy targets [1:51 mins]
https://www.youtube.com/watch?v=52AR4W1vc10&ab_channel=RT%C3%89News

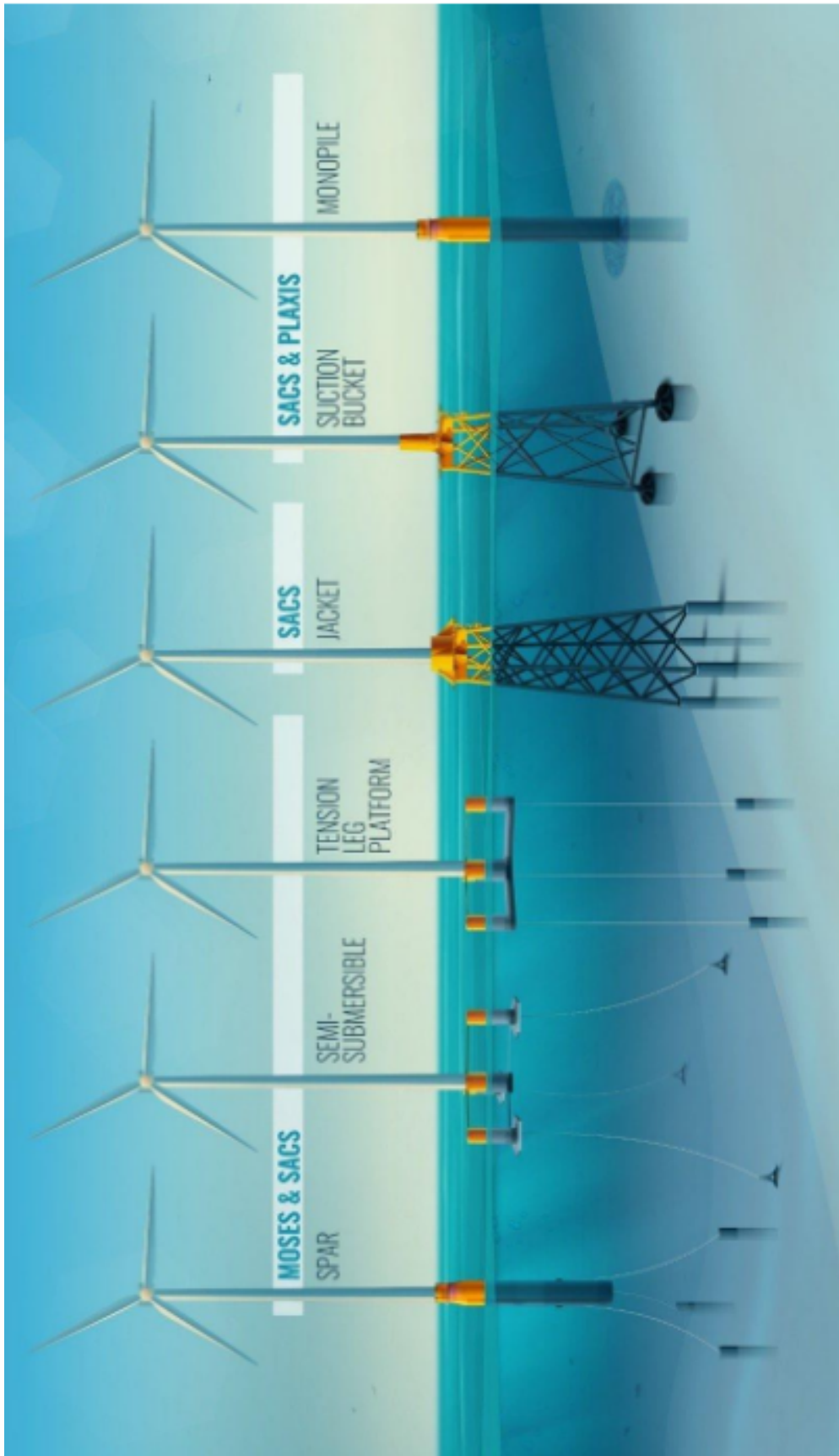
Report (22 pages): Erosion of foundations of Arklow Bank Wind Farm:
https://eprints.hrwallingford.com/595/1/HRPP320_Seabed_scour_assessment_for_offshore_windfarm.pdf

Local Trip / Expertise / Additional Work and Assessments

- Organize a trip to your local beach to see if you can pick a spot where you might construct a wind farm.
- Contact your county council and ask what their offshore plans are? Are offshore wind farms a county-level decision or a national level decision?
- If you have access to a 3D printer, have learners design and print their offshore wind turbine with the 3D printer.



TURBINE FOUNDATION OPTIONS



SDG 15 Seeding Sustainability

MM5: Dig Out the Secrets of Soil



MM5: Dig Out the Secrets of Soil

Experimentation and Exploration

Lesson 2: Soil and Ecosystems

Subjects: CSPE, English, Geography, Horticulture, Science

3 GOOD HEALTH AND WELL-BEING



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION



15 LIFE ON LAND



Lesson Title and Summary: Soil and Ecosystems

In this lesson, learners will discover the value of soil as a vital natural resource with various functions such as water regulation, supporting plant and animal life, pollutant filtration, nutrient cycling, and structural support that connect it to its surrounding ecosystems. They will explore different perspectives on the role of the ecosystem around soil to provide plentiful, nutritious and affordable food. This exploration will deepen their understanding of the importance of maintaining good soil in multiple contexts.

Vocabulary: Abiotic, Biotic, Ecosystems, Fertility, Humus, Symbiotic, Tardigrade

In this lesson, the learner will:

- understand that soil is a crucial natural resource that serves essential functions
- realise that soil health directly impacts the health of surrounding ecosystems and vice versa
- grasp the interactions between living organisms and non-living factors like minerals and climate
- understand the process of decomposition, necessary for plant growth

Materials:

- Worksheet: Living Soil
- Worksheet: Soil Organism Safari
- Teachers' Guide
- Magnifying glass
- Jars and shovels for each group
- Tweezers (for handling samples)
- White sheets of paper
- Water
- Optional: microscope, slides and coverslips (for making microscope slides)

MM5: Dig Out the Secrets of Soil

L2: Soil and Ecosystems



ACTIVITY INSTRUCTIONS

Activity 1: Active Listening (10 minutes)

1. Watch the video [The Living Soil Beneath Our Feet | California Academy of Sciences - YouTube](#) (2:50min).
2. After watching the video, have learners answer the true and false questions on [Worksheet: Living Soil](#).
3. Discuss as a class.

Activity 2: Soil Organism Safari (40 minutes)

1. Learners will collect soil samples and look at the organisms inside of the soil. Limit soil collection time to 15 minutes.
2. Have learners follow the worksheet: [Soil Organism Safari](#). See [Teachers' Guide](#).

NOTE: You may choose to use a microscope; see teachers' guide for instructions.

3. Discuss their results as a class. Use these questions to encourage discussion:
 - a. Do you know what the organisms are named?
 - b. Do they have legs?
 - c. What do they eat?
 - d. What eats them?
 - e. Did you also find organic matter (e.g. leaves)?
 - f. Did you find silt, clay, sand, and rock fragments?

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks.
- Two things they found most interesting and would like to explore more.
- One – their opinion they have about the tasks.

MM5: Dig Out the Secrets of Soil

L2: Soil and Ecosystems



EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, prepare soil samples before the class so learners do not need to prepare the samples themselves.

Extension: For a longer class, prepare microscope slides with the learners so they can have a closer look at their soil samples using a microscope (see Teacher's Notes).

Option B: Ask learners if soil may mean something different for each of us. Start with the example and let them answer the rest. What does soil mean to . . .

1. A construction worker? Soil is a building material for construction
2. A farmer?
3. A geologist?
4. An earthworm?
5. A fish?
6. A tree?
7. You?

Discuss why these answers are different (or similar)?

MEDIA BOX (materials, online video links, extra resources, case studies etc)

The Living Soil Beneath Our Feet | California Academy of Sciences - YouTube [2:50 min]

<https://www.youtube.com/watch?v=MIREaT9hFCw>

Healthy Soils are the Basis for Healthy Food Production <https://www.fao.org/3/i4405e/l4405E.pdf>

Why soil is one of the most amazing things on Earth | BBC Ideas [4:40min]

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

The Apple as Planet Earth [2:43min] <https://www.youtube.com/watch?v=mA78nPn41F4>

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Have learners collect soil samples from areas around town or from a farm. What do they see?

Ask a local farmer or grower what kinds of organisms they like to see in their soil. What kinds of organisms do they not like to see in their soil? Do they intentionally add any organisms to their soil? Why or why not?

L2: LIVING SOIL



After you watch the video, decide if the following statements are true or false:

1. Billions of organisms inhabit the upper layers of the soil, breaking down dead organic matter and releasing nutrients for plant growth.
2. The science that describes interactions among living and nonliving factors in the soil environment is soil ecology.
3. The two main types of organic matter found in soil are living organic matter and humus.
4. The process by which soil organisms “eat” organic matter and release nutrients into the soil is called recycling.
5. Soil structure refers to the arrangement of soil particles into aggregates of different sizes and shapes and soil composition to the different constituents (sand, lime, clay, humus).
6. Having a good soil structure allows water infiltration, provides spaces for air and roots, but it has no effect on habitats for soil organisms.
7. Mycorrhiza is a term used to describe the symbiotic relationship between some plants and fungi, where fungi help plants absorb water and nutrients in exchange for their food.
8. A diverse plant community in soil ecosystems can increase nutrient cycling, improve soil stability, and reduce pest and disease incidence.
9. Carbon sequestration is a natural process by which soil organisms store carbon in the soil, reducing greenhouse gas emissions and mitigating climate change.
10. Soil Management practices, such as crop rotation, cover cropping, agroforestry, and soil conservation techniques, can protect and restore soil ecosystems.

L2: SOIL ORGANISM SAFARI



You are going to go on a soil organism safari! First you will need to collect a soil sample. Your teacher will tell you which areas you are allowed to collect soil from, and will give you a time limit to be back in the classroom with your soil sample.

Group name: _____

STEP 1:

Collect at least 1 soil sample (a coffee cup equivalent of volume) with your hands or a small shovel. Each group should collect samples from different areas and should be taken from a depth of 5 to 10 cm under the ground. Please make sure there is no rubbish in your soil sample.

STEP 2:

Place the soil in a jar you can close and label the jar with: your group name, the location and collection date.

Bring your soil sample in the jar back to the classroom.

Next, look at the soil with your naked eye and answer the following questions:

What do you see?

What is the colour of your soil?

What do you expect to find in your soil samples?

Are there any organisms in the soil? If so, write down what you see:

L2: SOIL ORGANISM SAFARI

15 LIFE ON LAND



Are there any silt, clay, sand, and rock fragments? If so, write down what you see:

STEP 3:

You are now going to take a closer look at your soil sample. Spread a teaspoon of your soil sample on a white piece of paper. Use the magnifying glass to explore your soil sample.

What do you see?

Are there any organisms in the soil? If so, write down what you see:

Are there any silt, clay, sand, and rock fragments? If so, write down what you see:

STEP 4:

Write the results in the table:

Sample	Colour	Sample Location	Date	Organisms I think are present

*The colour indicates the amount of organic matter (humus), for example leaves. The soil will be darker if there is more organic matter inside.

L2: SOIL ORGANISM SAFARI



Look at the following picture and answer the questions below:

HEALTHY SOIL

SOIL IS ALIVE!
Each shovel of soil holds more living things than all the human beings ever born.

WHAT IS SOIL?
Soil consists of air, water, minerals, & organic material.

Mineral Particles	Humus
Water	Roots
Air	Organisms

45%
25%
25%
1%
1%
3%

Organisms in Soil: Macroinvertebrates, Insects, Fungi, Plant Roots, Burrowing Animals, Microbes.

Logos: Captain Planet Foundation, QR code.

From captainplanetfoundation.org

How does your soil sample compare with the photo? Do you see some of the same organisms in your soil as in the photo? If so, name them.

Did your initial guess of what you expected to see in your soil and the final analysis differ a lot? Why or why not?



Answer sheet for Activity 1:

1. True
2. True
3. True
4. False
5. True
6. False
7. False
8. True
9. True
10. True

Activity 2:

Before class preparation:

Distribute the necessary materials for each group (magnifying glass, tweezers, jar, shovel). If you are going to use the microscope, make sure the microscopes are in the classroom and ready to use. Have microscope slides on hand. You will need to explain how to use each tool safely and effectively.

Collecting soil samples:

Have learners collect soil samples, or in the case of weather conditions or time, have enough soil samples already collected for each group to observe and use two soil samples. If you collect the soil samples they are using, you will need to give them the location you collected them from.

Give learners boundaries for collecting their samples (e.g. they cannot leave school grounds, certain areas are off-limits - e.g. flower beds around the school, they can go to the beach or park nearby if within walking distance).

NOTE: Be sure to seek approval to collect soil samples from any location you send the learners to before the lessons so learners know exactly where it is OK and not OK to take soil samples from. Set a time limit for them to collect samples.

During analysis:

You may consider preparing your own samples so you can project images to guide them in identifying the different organisms present.

L2: TEACHERS' GUIDE

15 LIFE ON LAND



Monitor the analysis as learners may need help spreading their sample or looking for organisms.

If you are going to use microscopes, you will need to make wet mount microscope slides. For this you will need:

Slides
Coverslips
Toothpicks
Water
Scissors
Forceps (optional)
Razor Blade
Microscope

1. Place a small drop of water on a clean slide.
2. Use a toothpick or forceps to gather the soil.
3. Transfer the soil to the water by touching the toothpick or forceps to the water. If necessary, gently move the toothpick or forceps to dislodge materials.
4. Carefully lower a coverslip onto the slide.
5. Examine the slide under low and high power of the microscope.

This section of the Teacher's Notes is to help support you with Activity 2 by giving background information on what can be found.

1. Bacteria:

- Characteristics: Bacteria are tiny single-celled microorganisms that are abundant in soil. They come in various shapes, including spheres, rods, and spirals.
- Role: Bacteria are key decomposers in the soil ecosystem. They break down complex organic matter into simpler compounds, releasing essential nutrients like nitrogen, phosphorus, and carbon. These nutrients become available for plants to absorb and use for growth.

2. Fungi:

- Characteristics: Fungi are diverse and range from microscopic to larger visible structures like mushrooms. They have thread-like structures called hyphae and can form intricate networks known as mycelium.
- Role: Fungi play a critical role in breaking down tougher organic materials, such as cellulose and lignin. They form symbiotic relationships with plants, known as mycorrhiza, where they help plants absorb water and nutrients, and in turn, receive carbohydrates from the plants. Fungi also aid in soil improvement.



3. Earthworms:

- Characteristics: Earthworms are larger, visible organisms with segmented bodies. They have a distinct role in soil health.
- Role: Earthworms are excellent soil mixers. As they burrow through the soil, they create channels that allow water, air, and plant roots to move freely. Their burrows also facilitate the decomposition process by providing pathways for microorganisms to access organic matter. Earthworm castings are nutrient-rich and contribute to soil fertility.

4. Arthropods:

- Characteristics: Arthropods include insects, spiders, mites, and ants. They have exoskeletons and jointed legs.
- Role: Arthropods contribute to soil aeration and nutrient cycling. Some arthropods, like beetles and ants, aid in organic matter breakdown and help distribute nutrients. Predatory arthropods keep pest populations in check, promoting a balanced ecosystem. Mites and springtails assist in decomposition by feeding on microorganisms and dead organic matter.