STEAM EDUCATION FOR SUSTAINABLE DEVELOPMENT and FUTURES LITERACY

SGD13 Climate Action and Sustainable Development

Programme Phase: Strand 2 People Power and Place

Leaving Certificate Support Lessons

TOPICS: Biodiversity, Environment, Science, Sustainability

SFI Discover
Science Foundation Ireland

An Roinn Oideachais
Department of Education

SDG 13 Strand 2 People Power and Place
Climate Action and Sustainable Development

Climate Action & Sustainable Development

Strand 2

People Power and Place

Module Summary: CASD People Power and Place

This curated set of lessons from Muinín Catalyst programmes is designed to support students and teachers engaging with Strand 2 of the Climate Action and Sustainable Development (CASD) Senior Cycle subject.

Strand 2 invites students to explore the dynamic relationship between people and place, considering how identity, values, and political choices shape both local and global responses to climate change and sustainable development. These lessons provide structured opportunities to reflect on our place in the world, the drivers of climate injustice, and what a just transition might look like in Ireland and beyond.

Grounded in participatory, inquiry-based approaches, the lessons encourage learners to connect their lived experiences of place—whether in school, community, or nation—with global systems of power, production, and change. Students investigate how personal behaviour, collective action, and systemic transformation intersect, while developing futures literacy, resilience, and civic agency.

For teachers, the lessons offer scaffolded resources that align with the NCCA's vision of a values-driven, student-centred Senior Cycle. They support meaningful classroom dialogue around sensitive but vital issues such as eco-anxiety, social equity, and cultural identity, while equipping educators to facilitate student-led inquiry and collaborative problem-solving.

For students, Strand 2 is an invitation to examine how their own identities and communities are connected to broader global challenges and opportunities. These lessons bridge curriculum and action, helping schools to embed Strand 2 in a way that nurtures knowledge, skills, and values, while inspiring young people to see themselves as active citizens capable of shaping just, inclusive, and sustainable transitions.

Week 16: Shares lessons from our Future of the Ocean and Eco-Agency Youth-led Action that can be used to explore Strand 2, People Power and Place 2.4 and personal behaviour and action. See also Applied Learning Tasks Support for lessons to support and develop research skills 4.2.1

S2.4 FoO Lesson 9: Promoting Positive Action
This lesson aims to show learners the direct consequence that a simple negative action can have on the ocean and the life that exists in it, and the positive actions that can be taken to support the health of the ocean.

Resources include: Worksheet: Preparing for action & scenarios, Supporting Resource: Scenario

S2.4 EEA Lesson 8: Exploring What We CAN Do - Action 1: Building Community
A major contributor to anxiety is a feeling of isolation. Identifying concerns, connecting with others and sharing mutual worries helps us develop resilience and coping tools. In this lesson, learners will develop an understanding of what CAN be done to build community, which may lead to positive action.

Resources: Worksheet: Awareness and Connection - Mutual Worries, Worksheet: Awareness and Connection - My Worries, Teachers' Guide: Action 1

EEA Lesson 9: Exploring What We CAN do - Action 2 Connect: The More Than Human World
Part of developing our resilience toolbox is to engage with mindfulness and spending more time in and surrounded by nature and connecting more with the other than human world. In this lesson, learners and educators will explore mindfulness and nature connection through a guided meditation and a nature connection exercise.

Resources: Worksheet: Be Calm, Connected and CreativeTeachers' Guide: Be Calm, Connected and Creative

Week 17: S2.9 Shares lessons from our Eco-Agency: Youth Led Development and Feeding the World Sustainably in the 21st Century co-developed with Killian Stokes, Moyee Coffee Co-Founder and Proudly Made in Africa CEO. These lessons can be used to explore Strand 2, People Power and Place 2.9 Examine what a just transition would look like for agriculture in Ireland.

S2.9 Lesson 5: Eco Agency: Society - Fishing, Tourism and Agriculture
Eco-anxiety affects us all. In industries like, fishing, tourism and agriculture, often in areas most vulnerable to climate change impacts, eco-grief is also being experienced. In this lesson learners will explore the possible effects of eco-anxiety on industry locally and in the broader sense.

Resources: Worksheet: Impact Brainstorming, Impact Goals and Pillars, Teachers' Guide

Lesson 1: 2000 Years of Human Agriculture, Population and Progress
Through this lesson, we'll learn about the growth in global populations through the ages exploring how population rates have rocketed up in the past century, understanding how and why population is expected to plateau at 10-11 billion by the end of 2100, and explore the links between population growth, agriculture, and food.

Resources: Worksheet: Population Curve Exercise, Worksheet: Nitrogen as Fertiliser, Worksheet: World of Data Links and Questions

Lesson 2: The Food We Eat: Where Does Our Food Come From?
In this lesson, we'll dive into our cupboards, larders, shopping trolleys and bellies to learn what we eat and why, where we buy these foods, where and how they're made, and where they come from.

Resources: Worksheet:The Top Foods We Eat, Worksheet:The Food Pyramid, Worksheet 2 Breakfast

Lesson 3: Food, Agriculture and Climate Change
In this lesson, we'll learn about the connection between industrial agriculture, our global food systems and climate change. Learners will explore our food systems to understand the various and complex ways in which agriculture impacts the natural world, including through land and water use and the production of greenhouse gases from farming. In this lesson we'll attempt to explore whether a more sustainable and climate friendly way is possible and see if our food systems can be reinvented!

Resources: The Four Impacts of Agriculture Worksheet, Top Foods and their Environmental Impact Worksheet

Using the Resources:
If you wish to use these resources, we can offer an induction and online support throughout the module to help you plan integration into your projects and timetable. To register for this option, please contact us at e:hello@futurefocus21c.com For more information on the resources please visit www.muinincatalyst.com

Setting up an online learning environment for the lessons on this module:
Our lessons integrate the use of virtual learning environments. To ensure seamless use of our lessons, a module should be setup on your school's virtual learning environment such as Teams, Google Classroom, etc. Learners are encouraged to upload documents to share with their peers. If your virtual learning environment does not support document sharing, we recommend OneDrive or Google Drive. You can also use Google Sites or Microsoft Sway to encourage learners to present their work over the year - this can easily be set up to reflect the aims of TY and provide a showcase for their work as well as an assessment tool.

Setting up a Canva Education account:
As our lessons integrate design, our lessons also refer to Canva. Educators and schools can open a free Canva for Education account by registering here: Canva for Education provides primary and secondary school teachers and students with premium features and templates. You can then also set up lessons and invite your learners to the class.

Expertise
Expertise in developing the resources including design, layout and overarching pedagogical framework have been developed by Future Focus21c. Future Focus21c is Rebecca White and Anita McKeown, and a network of collaborators and content developers, nationally and internationally. Anita and Rebecca, have close to 5 decades of experience between them working across the arts, education, inclusive design place-based regeneration, STEAM education and sustainability, in both formal and informal settings with diverse learners and communities.

- Dr Anita McKeown, FRSA, FIPM, MEI - is an award-winning artist|scholar and STEAM educator, co-designing values-based leadership through education and community processes at the intersection of art, equitable placemaking, Open Source Culture and Technology (ethical and ecological implications). She is also a certified as a Earth Charter Education for Sustainable Development Educator; Inclusive Teaching and Learning Educator, Enterprise and Innovation educator, Trauma-informed practioner and VUCA world design

- Ms. Rebecca White: UCD - is an educator, consultant, trainer and curriculum developer, focusing on STEAM education, project-based, student-led learning and professional development for place-based learning. She is the Senior Learning Advisor for the Ocean Race and an Award-Winning Programme Developer

- External Expertise: We engage with external experts to bring contemporary and real-life knowledge to our resources. By working with these experts, we can ensure that our resources include future-focused learning and innovative ideas to expose learners to world-leading research in a digestible and accessible format. Learners are encouraged to critically think about and engage with knowledge and content in a learner-led and project-based manner.

For more information or to access online support in integrating the programme into your existing teaching please contact: hello@futurefocus21c.com

References and full programmes can be found here www.muinincatalyst.com/courses

MM1: L9WS PREPARING FOR ACTION & SCENARIOS

Activity 1

Discuss the following prompts:

- Globally, the ocean is important because...
- Our local coastline is vital to the community because...
- In our country, the ocean is important because...
- Local positive action towards the ocean is needed because...

Activity 2

When you have your scenario partner, look at your cards and discuss:

- What is happening in each of your scenarios?
- How can you connect the two scenarios together? Why are they a match?
- How is the match between the scenarios negative?
- Is this something you could see happening locally? Why/why not?
- What are some positive actions that can be taken to prevent what you see in the scenarios?

MM1: L9WS SCENARIOS CARDS

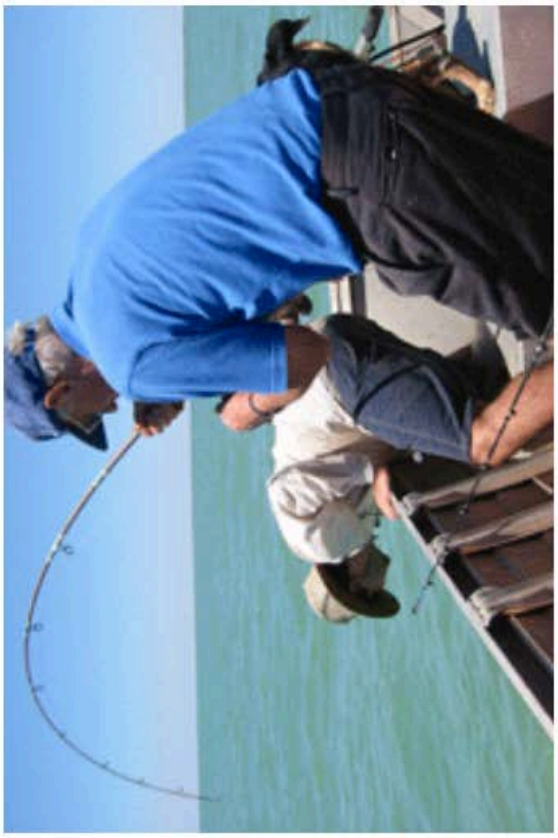
14 LIFE BELOW WATER

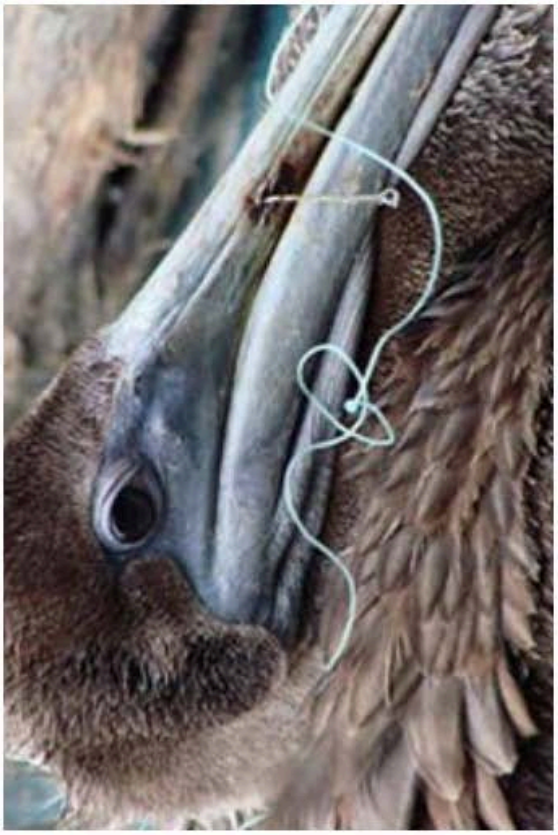
MM1: L9WS SCENARIO CARDS

14 LIFE BELOW WATER

MM1: L9WS SCENARIO CARDS

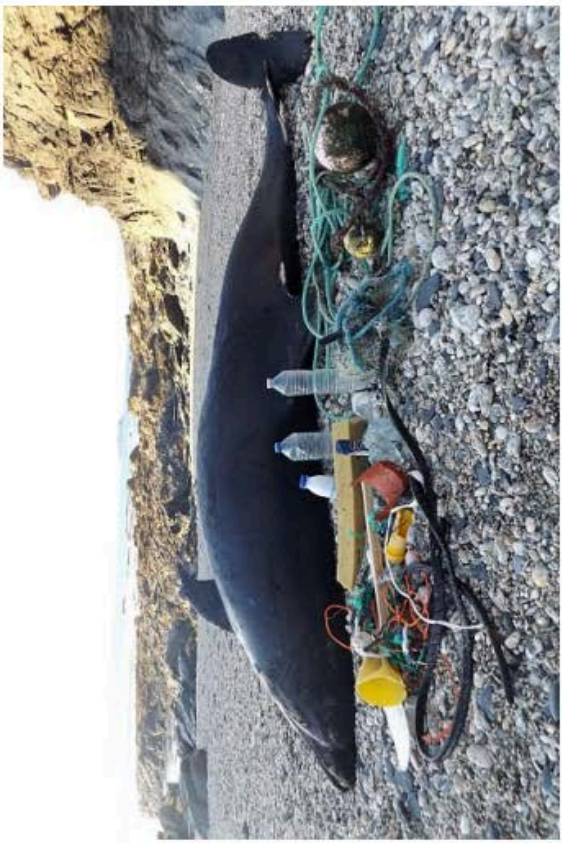
14 LIFE BELOW WATER





MM1: L9WS SCENARIO CARDS

14 LIFE BELOW WATER



MM1: L9WS SCENARIO CARDS

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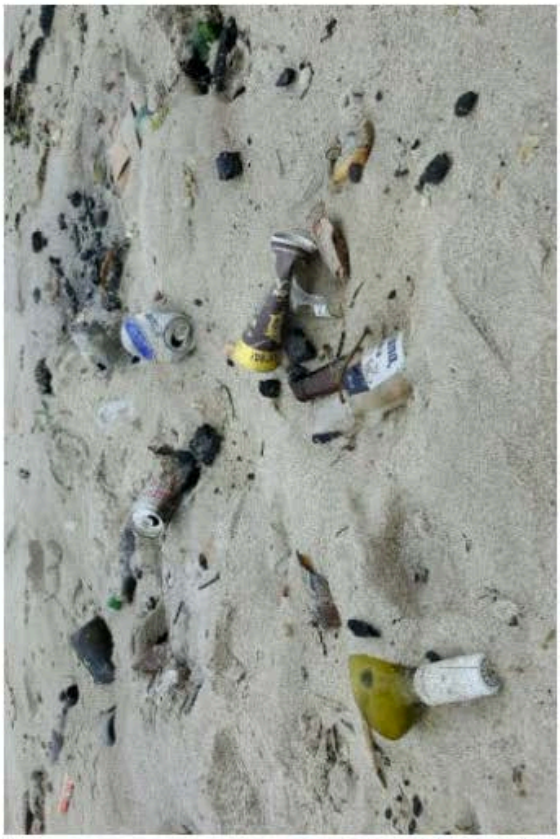

MM1: L9WS SCENARIO CARDS

14 LIFE BELOW WATER

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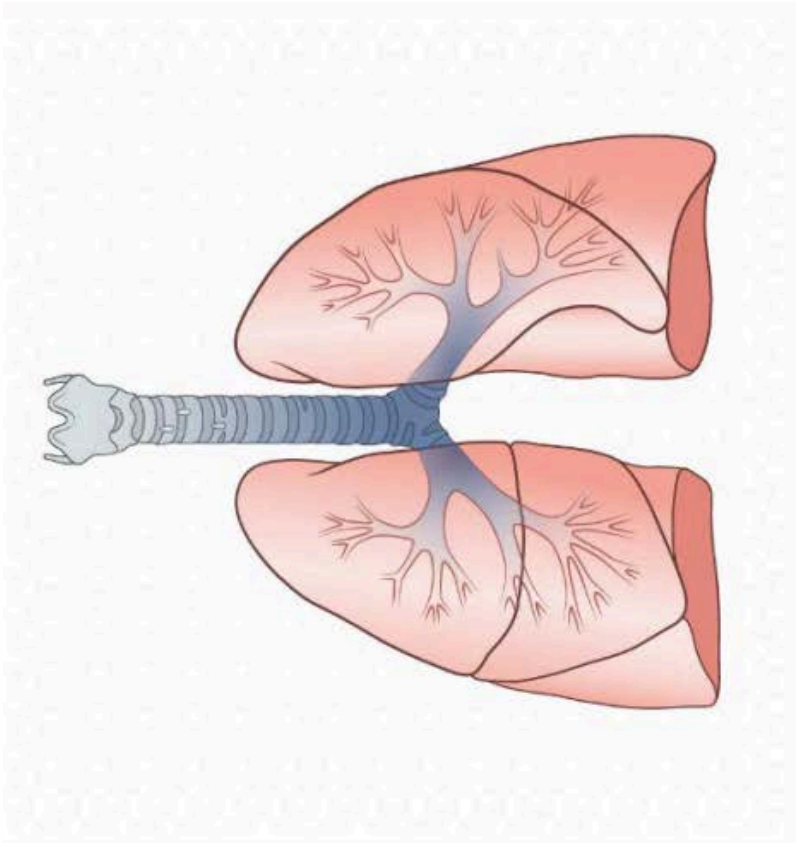


L8WS: Awareness and Connection: Support

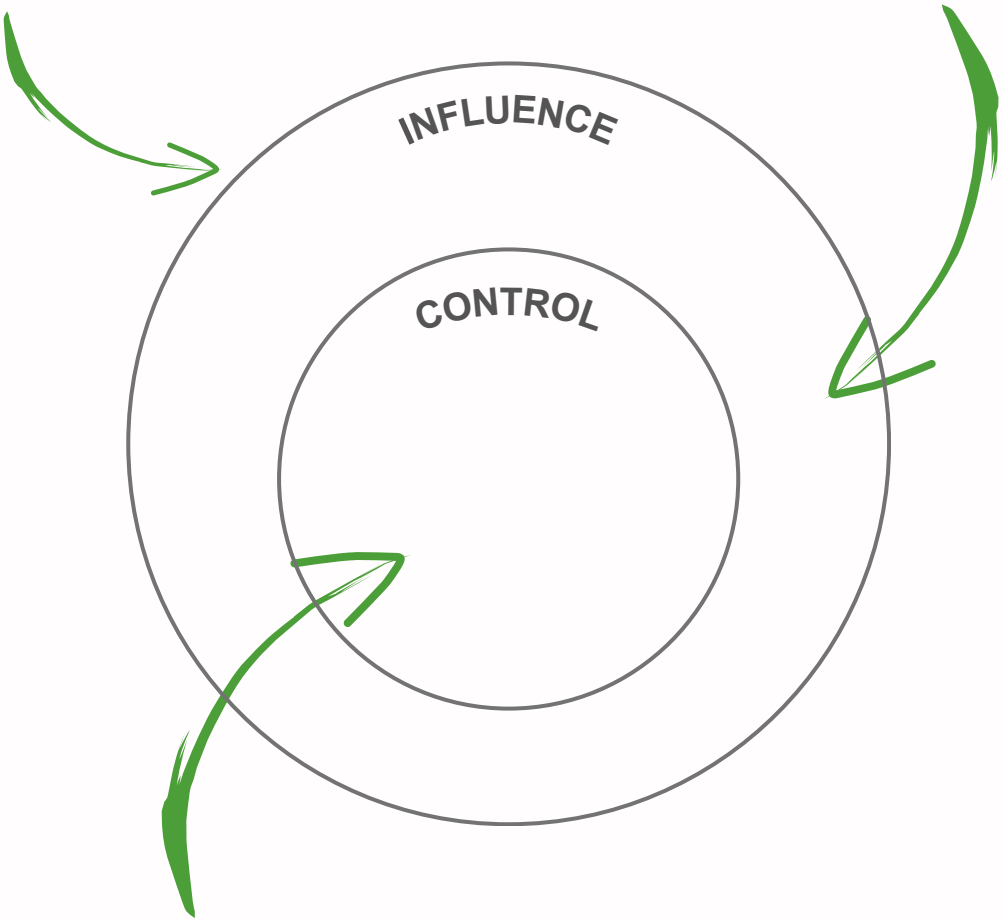
If I cant control or influence, can I learn to ACCEPT it?

- myself
- my family and friends
- my community
- all living things

If I cant control, can I exert INFLUENCE?

- myself
- my family and friends
- my community
- all living things

ACCEPTANCE: NO CONTROL



What is in my CONTROL?

- actions
- behaviours
- decisions
- outlook

L8WS: Awareness and Connection: Support

Awareness and Connection: Action 1

Pillar 1.4
Respect and Care for the Community of Life: Secure Earth's bounty and beauty for present and future generations.

Pillar 2.6
Ecological Integrity: Prevent harm as the best method of environmental protection and, when knowledge is limited, apply a precautionary approach.

Pillar 4.13 Democracy, Non - violence and Peace
Transparency and Participation: Strengthen democratic institutions at all levels, and provide transparency and accountability in governance, inclusive participation in decision making, and access to justice.

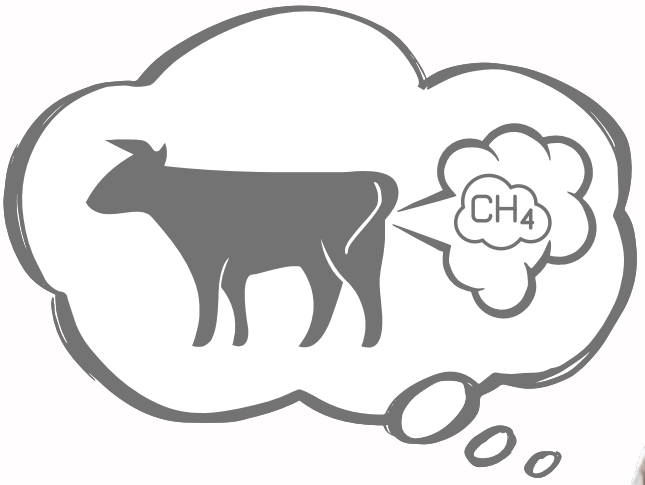
Pillar 4.14 Democracy, Non - violence and Peace
Integrate into formal education and life-long learning the knowledge, values, and skills needed for a sustainable way of life.

Pillar 4.16 Democracy, Non - violence and Peace
Promote a culture of tolerance, nonviolence, and peace

L8WS: Awareness and Connection: Mutual Worries

3 GOOD HEALTH AND WELL-BEING

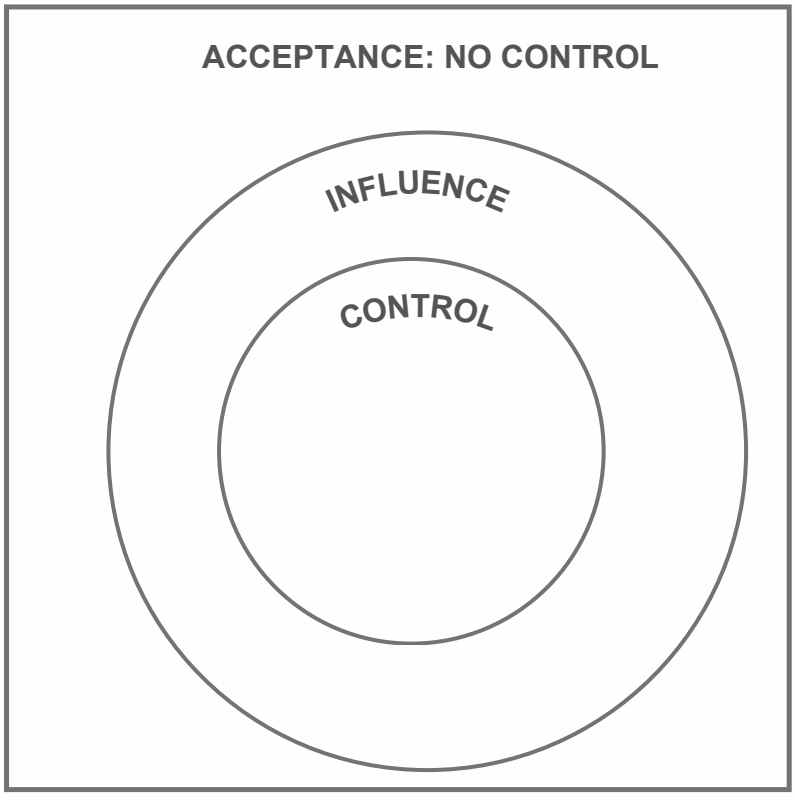
ANNA - 16
OVIEDO
SPAIN



MARY - 17
CO. MEATH
IRELAND

1. What are Anna and Mary worried about?
2. Why might this be an related to eco-anxiety?

- In the square, write what elements are definitely not in their control.
- In the outer circle, write what elements are within their circle of influence: they might be able to influence change but not directly make change happen
- In the inner circle, write what is within their direct circle of control: things they can do directly to affect change



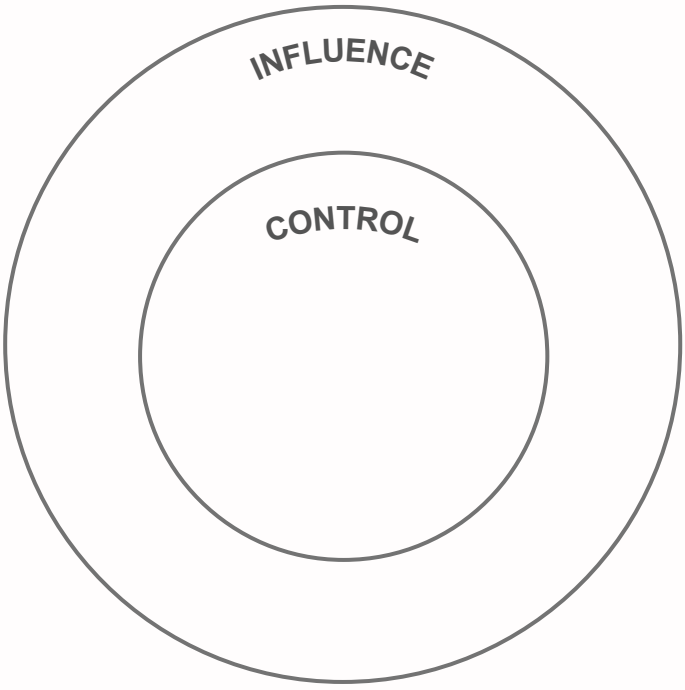
Think: How might these two young people, from different places connect?

L8 Awareness and Connection: Mutual Worries

3 GOOD HEALTH AND WELL-BEING

MY WORRIES AND FRUSTRATIONS

ACCEPTANCE: NO CONTROL



L8 Awareness and Connection: Action

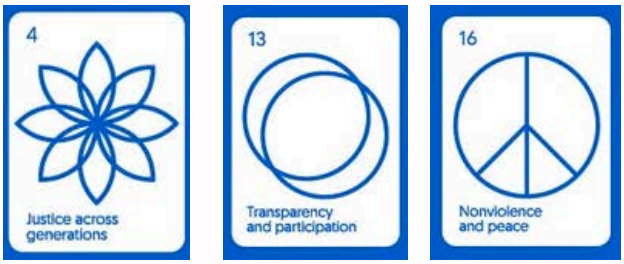
Connecting with others is an important step in finding support and building community which at some point may lead to taking steps towards collective positive action in which yourself and others learn how to cope better with eco-anxiety and empower one another.

1. Work together in pairs and share your worries and concerns and the circles of control and influence you have identified.
2. In your groups, choose one of the worries or concerns from all those you have each shared.
3. Look at the Worksheet: UN Sustainable Development Goals and the Earth Charter Pillar descriptions.
4. Together ideate what is within your control and sphere of influence for taking action and building community through connection with others and link your ideas to one SDG goal and one EC pillar.
5. Identify three actions you will take from your inner circle of control that will make you feel empowered and link your ideas to one SDG goal and one EC pillar. Circle which goal and pillar links to your three actions.

1

2

3



L9WS: Activity 2 Supporting Information: Mindfulness

3 GOOD HEALTH AND WELL-BEING

> **Mindfulness is a type of meditation in which you focus on being intensely aware of what you're sensing and feeling in the moment, without interpretation or judgment. Practicing mindfulness involves breathing methods, guided imagery, and other practices to relax the body and mind and help reduce stress.**
>
> **Mayo Clinic**

TASK: In pairs consider the suggested three ways below

- brainstorm and discuss actions people can take in each way to start building their resilience toolkit
- share your thoughts with their partner on why time in nature can be beneficial to help cope with anxiety and eco anxiety.

ALIGN YOUR ACTIONS WITH YOUR VALUES
identify your values

LEARN HOW TO UNHOOK FROM A "WORRY LOOP"
have a digital detox

NOTICE (AND SHIFT OUT OF) THE URGE TO ISOLATE YOURSELF
call a friend or loved one

L9WS: Action 3 Connect: Nature Mandala

What is a Mandala

A mandala is beautiful design that's just a circle, named by an old language called Sanskrit. Picture in your mind a special sacred symbol that people in many different places and from diverse backgrounds love. It looks like the sun's heat, the moon's light, and the Earth's skin.

In Hinduism and Buddhism, the mandala is seen as a bright and important symbol. It's like a door to the universe and the very core of existence. Its elegant circle shape tells us about how everything is connected in the web of life. It's a gentle reminder that all the parts of life are woven together into a big, beautiful picture.

Tibetan Bhuddist Sand Mandala

The Nature Mandala

Similar to spiritual mandalas, nature mandalas creations reflect the idea of unity, forming a beautiful design that represents oneness. These mandalas are made using materials from nature, like leaves, petals, twigs, and stones, gifts from the Earth. Imagine an object, carefully designed with patterns that have the rhythm of life embedded. They always have a central feature with radiating and concentric circles as core aspects of the design.

Nature Mandala Examples

L9WS: Action 3 Connect: Making A Nature Mandala

A meaningful activity:
recognizes our connection to the earth and all its living things.

A way to express gratitude:
allows us the space and time to intentionally express gratitude for our earth and all its living things.

A reminder of the connections in life:
reminds us that everything is connected.

A learning opportunity:
learn about the earth and patterns found in nature and explore art, science, religion and life itself.

A time to observe natural patterns:
the chance to observe natural patterns like seasons, moon phases, the tides, and life and death.

A fun and creative activity:
can be done independently or with a larger group.

MATERIALS

- Use organic materials found in nature. Things like twigs, leaves, grasses, flowers, berries, pinecones, and acorns work well.

INSTRUCTIONS

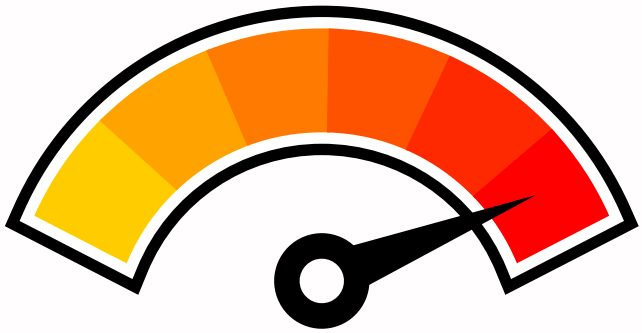
- 1. Pick a peaceful place out in nature to create your nature mandala. Then, you will need to gather some organic materials around you to use. Things like twigs, leaves, grasses, flowers, berries, pinecones, and acorns work really well.
- 2. To create your nature mandala, place a meaningful item in the center. Then start placing other items you gathered near the center first and continue moving outward from the center until you've created a circular design.
- 3. Continue making patterns until your items are used up and your nature mandala looks complete. And remember, you can create it however you like! You could use bright colors or muted earth tones. Make it big or small. Make it as simple or complex as you want.

L5 Worksheet:IMPACT Brainstorming

3 GOOD HEALTH AND WELL-BEING

Consider the consequences of global climate change. For this exercise consider the following threat on your industry: fishing, tourism or agriculture:

EXCESSIVE HEAT



IMPACT

WHAT MIGHT BE SOME OF THE DIRECT AND INDIRECT IMPACTS BE FOR PARTICULAR INDUSTRIES?

DIRECT

heat stress

INDIRECT

threat to health and wellbeing

RISKS?

WHAT RISKS DO THESE IMPACT POSE?

ADAPTIONS?

HOW CAN WORKERS AND COMMUNITIES OF THESE INDUSTRIES MITIGATE AND ADAPT TO CLIMATE CHANGE?

MITIGATION?

WHY AND HOW WOULD THESE IMPACTS AND RISKS AFFECT HEALTH AND WELLBEING?

HOW CAN THEY BECOME MORE RESILIENT AND COPE BETTER WITH ECO-ANXIETY/ECO-GRIEF?

L5 Worksheet:IMPACT Goals and Pillars

Goals and Pillars Overview

- The UN Sustainable Development Goal 10 focuses on reducing inequalities within and between countries.

- The UN Sustainable Development Goal 13 focuses on taking urgent action to combat climate change and its impacts.

- The Earth Charter Pillar 1.4 related to Respect and Care for the Community of Life: Secure Earth's bounty and beauty for present and future generations. and focuses on acknowledging that the actions of each generation must consider the well-being of future generations. Passing down values, traditions, and institutions that promote the sustained prosperity of both human and ecological communities on Earth.

- The Earth Charter Pillar 2.6 relates to Ecological Integrity: Prevent harm as the best method of environmental protection and, when knowledge is limited, apply a precautionary approach and focuses on acting proactively to prevent environmental harm, even when scientific evidence is lacking, requiring those advocating for activities to prove they won't cause significant harm, holding them accountable for any damage, considering the long-term, indirect, global, and cumulative effects of human actions when making decisions and stopping pollution and the accumulation of harmful substances in the environment.

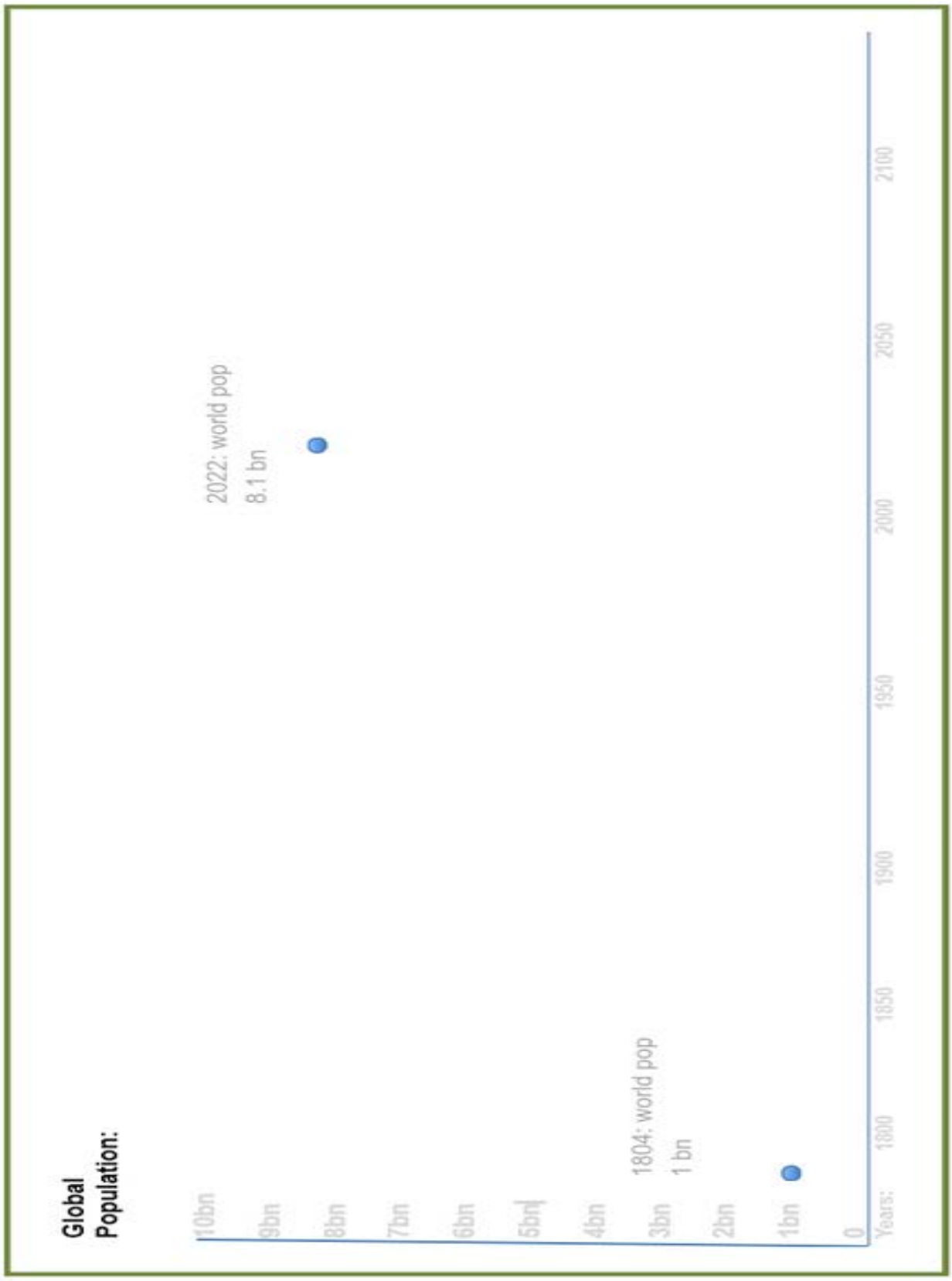
DISCUSS

How might industry alignment to the UN Sustainable Goals and the Earth Charter support workers and communities in these industries experiencing eco-anxiety and eco-grief?

Link your ideas to SDG 13 and 10, Earth Charter pillars 1.4 and 2.6

MM4: L1 WS POPULATION CURVE EXERCISE

Working in pairs, and using the internet to search if required, plot out the timeline for when global population reached 2, 3, 4, 5, 6 and 7 billion and when it is expected to reach 9 and 10 billion.



MM4: L1 WS NITROGEN AS A FERTILIZER

Part 1

The Haber Process is (circle one):

a. Turning air into fertiliser
b. Turning water into fertiliser
c. Turning fertiliser into air
d. Turning water into air

True or False: A nitrogen gas molecule plus three hydrogen gas molecules gets you two ammonia gas molecules t_____ / f____

Without the faber process how many people could farmers feed? _____

Where do plants normally get their nitrogen? _____

What percentage of the air is nitrogen? _____

In what year did Fritz Harber make his discovery?

_____

Part 2

How much ammonia is produced in the world each year? _____

How many elephants would it take to match the weight of that ammonia _____

What % of the ammonia produced is used for fertiliser in agriculture _____

What percentage of fertiliser is not absorbed by these plants _____

Where does this nitrogen go and what does it lead to?

_____

_____

MM4: L1 WS ANALYSIS OF GROWTH OF CROP

Working in pairs, visit the two world of data websites, explore the data and answer the questions below:

First Website: https://ourworldindata.org/fertilizers

Question 1: Looking at fertilizer use and using the map view, try to capture the names of the countries that have applied less than 12.5 kg of nitrogen fertiliser per hectare:

_____

_____

_____

Question 2: What do you notice about these countries?

_____

_____

_____

Second Website: https://ourworldindata.org/crop-yields

Question 3: Looking at four key crops: corn (maize), rice, cereal & wheat, what are the two smallest yield segments per hectare per crop?

Wheat: _____ & _____
Corn (Maize): _____ & _____
Rice: _____ & _____
Cereal: _____ & _____

Question 4: Name 5 countries from these two lowest performing segments for each of the four crops:

_____

_____

_____

MM4: L2 WS THE TOP FOODS WE EAT

75% of our calories come from just 12 crops and 5 animals.
Can you name them?

You have five minutes to fill in the blanks.

Crop 1: _____

Crop 2: _____

Crop 3: _____

Crop 4: _____

Crop 5: _____

Crop 6: _____

Crop 7: _____

Crop 8: _____

Crop 9: _____

Crop 10: _____

Crop 11: _____

Crop 12: _____

Animal 1: _____

Animal 2: _____

Animal 3: _____

Animal 4: _____

Animal 5: _____

MM4: L2 WS THE TOP FOODS WE EAT

THE TOP FOODS WE EAT

Answers:

Crops:

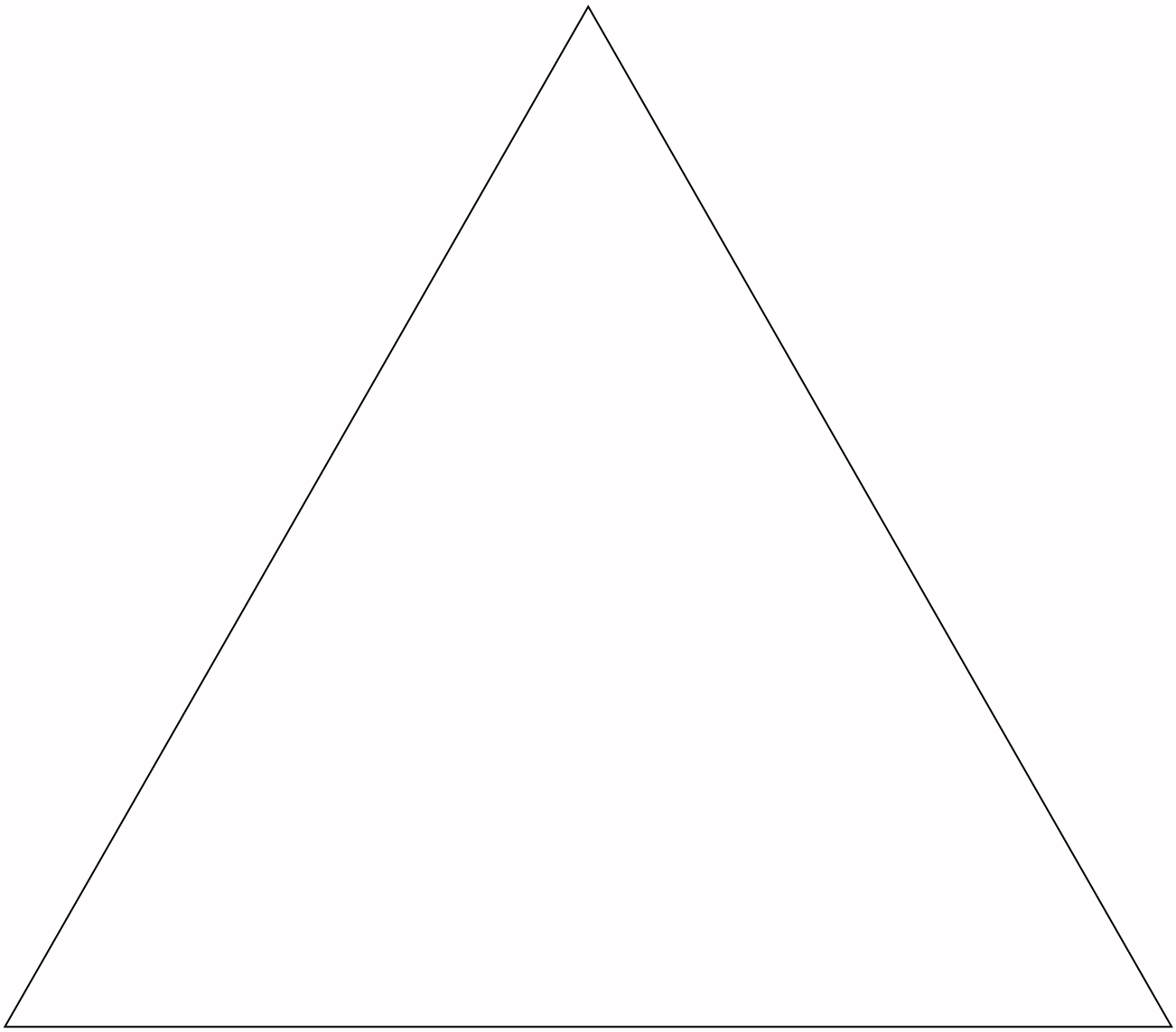
Wheat, Sugar, Rice, Corn/Maize, Soy, Potatoes, Palm Oil, Cassava, Sorghum, Millet, Groundnut, Sweet Potatoe

Animals:

Cows, Buffalo, Chickens, Pigs, Goats

MM4: L2 WS Food Pyramid

Nutritionists typically say there are six different food groups.
Can you name each food group and place them in the food pyramid below?



As a group, can you think of five different food items for each food group?

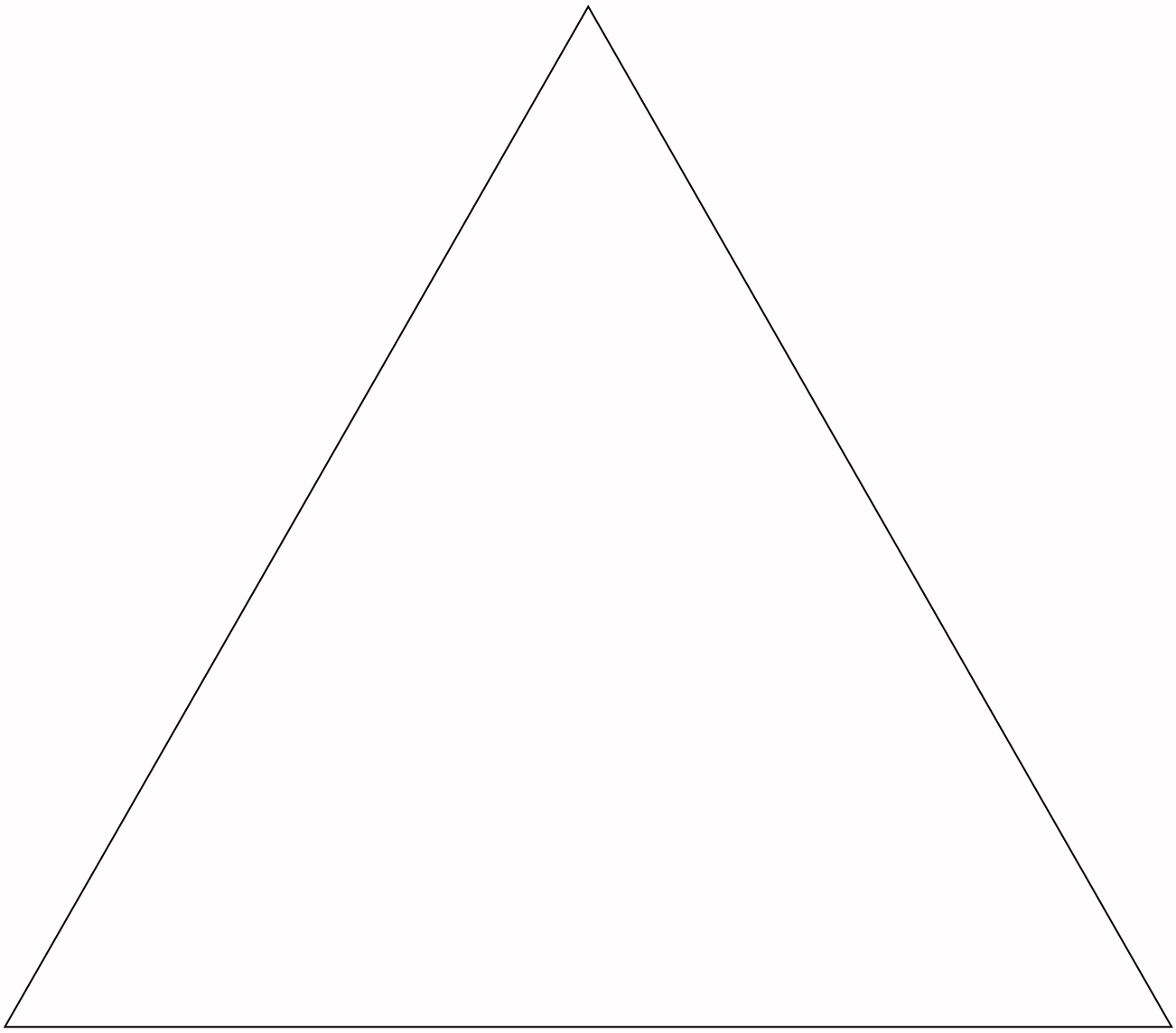
Draw or write them in the food pyramid above.

MM4: L2 WS FOOD PYRAMID BREAKFAST

BREAKFAST

Part 1

Using the food pyramid below, brainstorm a typical breakfast in your assigned country and sort each item into an appropriate food group.



MM4: L2 WS FOOD PYRAMID BREAKFAST

BREAKFAST

Part 2

Why do you think the breakfast foods in part 1 are so popular in your assigned country?

Where do you think the breakfast foods in part 1 are made / produced?

How do you think these foods are made / produced?

Do you think we could grow or produce the breakfast foods in part 1 at your home in your assigned country?

MM4: L2 WS FOOD PYRAMID BREAKFAST

BREAKFAST

What is food-miles? Write a definition with your group.

What do you think the relationship between food miles and our carbon footprint is?

What stages of travel and transportation do you think food goes through to reach Ireland?

Do you think your breakfast in part 1 has to travel far to reach your plate? If so, how far?

Where would you buy the breakfast foods in part 1? Are there any alternative places where you could buy these foods?

MM4: L2 WS FOOD PYRAMID BREAKFAST

BREAKFAST

How sustainable do you think your breakfast in part 1 is?

_____

_____

_____

Part 3

We are going to calculate the food miles of our breakfasts from part 1!

First, identify the country of origin of each breakfast food item from part 1:

Now, use www.foodmiles.com & https://www.distancesfrom.com/ to look up the food miles of each item.

_____

_____

_____

Then, add all of the food miles together.

_____

Does your breakfast have a high amount of food miles or a low amount of food miles?

_____

_____

_____

MM4: L2 WS FOOD PYRAMID BREAKFAST

BREAKFAST

Which of the food items had the highest and lowest food miles? Why do you think this is the case?

Did any of the food items' food miles surprise you? If so, which ones and why?

How could we make our breakfast from part 1 more sustainable? Is there any item that has a high amount of food miles we can do without or replace? If so, what and what could we replace it with?

MM4: L3 WS THE 4 IMPACTS OF AGRICULTURE

As a group, write your own definition for each of the following words:

Land Use:

Water Use:

Carbon Footprint:

Eutrophication:

MM4: L3 WS TOP FOODS ENVIRONMENTAL IMPACT

You will be assigned 1-2 foods from the list below, and a worksheet for each food.

Visit the website:https://ourworldindata.org/environmental-impacts-of-food

and interact with the data explorer diagram ensuring your allocated food is showing.

Foods:

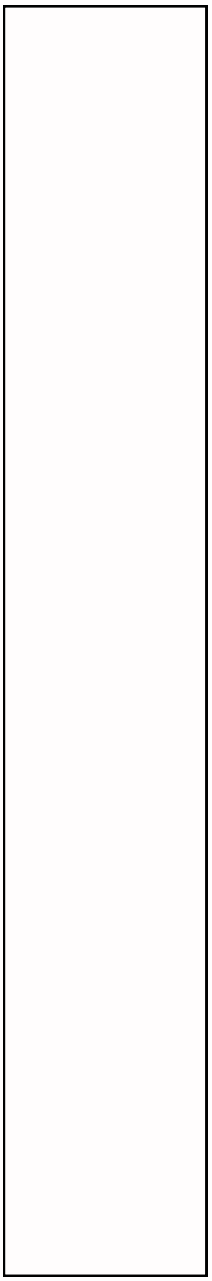
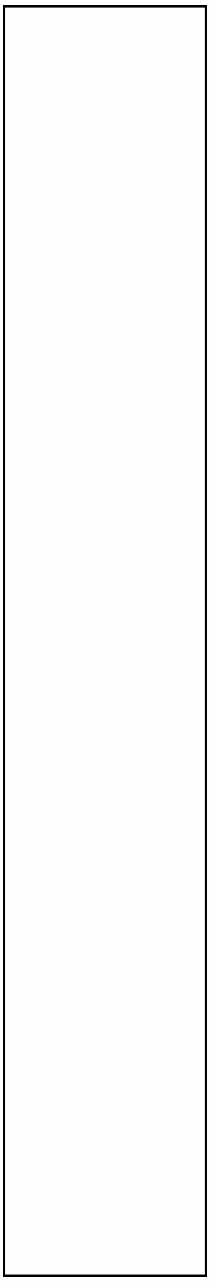
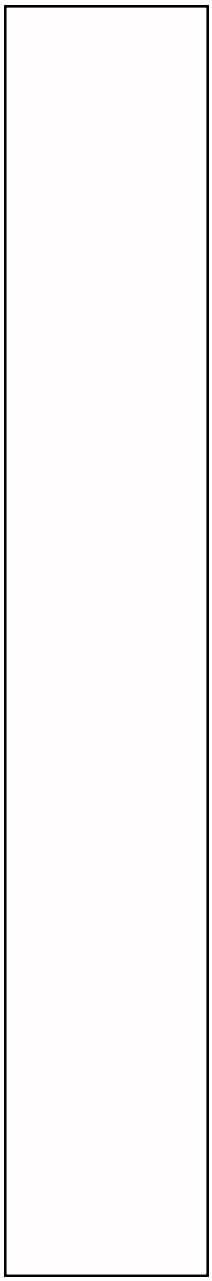
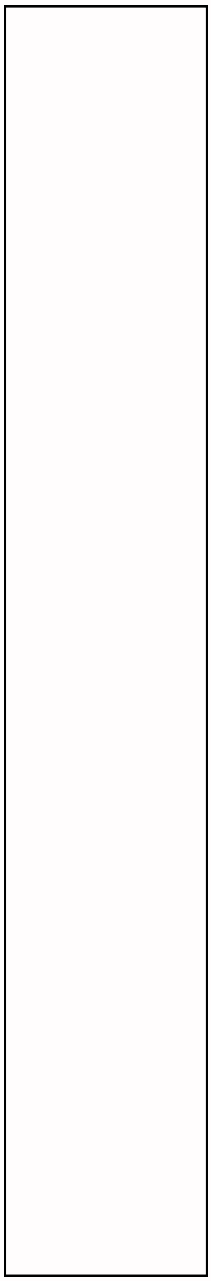
1. Beef (Herd)
2. Lamb
3. Pigs
4. Chickens & Poultry
5. Eggs
6. Rice
7. Wheat
8. Sugar Cane
9. Potatoes
10. Maize / Corn
11. Cassava
12. Soy / Soy Milk
13. Bananas
14. Coffee
15. Tomatoes
16. Prawns
17. Nuts
18. Groundnuts
19. Milk
20. Dark Chocolate

MM4: L3 WS TOP FOODS ENVIRONMENTAL IMPACT

Food (write in the name of the food you are researching):

_____

Color in the columns below to the right level of each impact for your food.

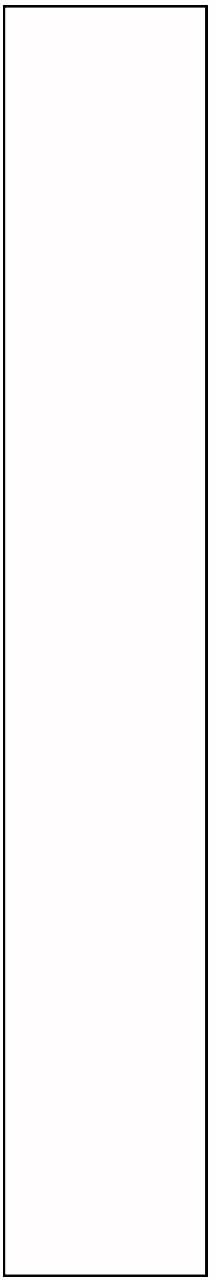
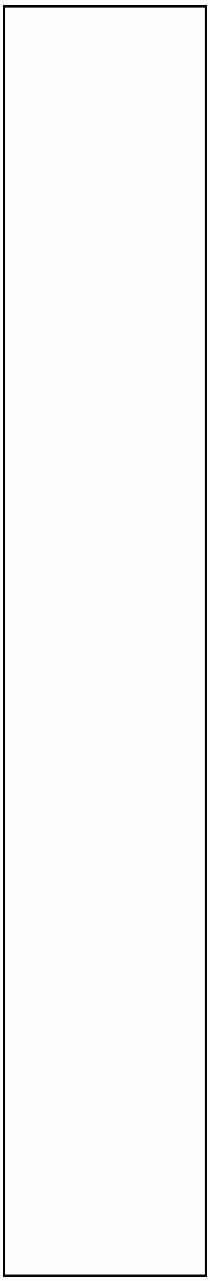
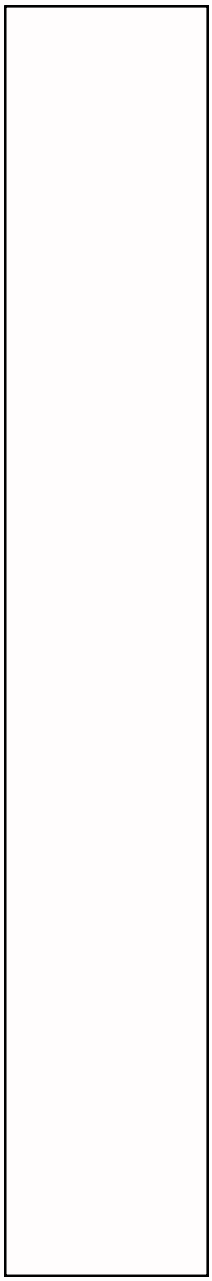
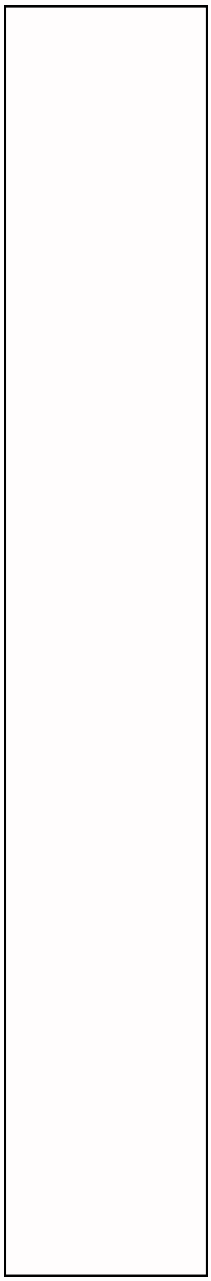
Carbon Footprint p/kg:	Water Use p/kg:	Land Use p/kg:	Eutrophy p/kg:
100 Kgs CO2	6,000 Litres	400 sq metres	400 grams
			
0 Kgs CO2	0 Litres	0 Sq Metres	0 Grams

MM4: L3 WS TOP FOODS ENVIRONMENTAL IMPACT

Food (write in the name of the food you are researching):

_____

Color in the columns below to the right level of each impact for your food.

Carbon Footprint p/kg:	Water Use p/kg:	Land Use p/kg:	Eutrophy p/kg:
100 Kgs CO2	6,000 Litres	400 sq metres	400 grams
			
0 Kgs CO2	0 Litres	0 Sq Metres	0 Grams