

MM4: Feeding the World Sustainably and Responsibly



Micro-Module 4: Feeding the World Sustainably and Responsibly

Experimentation and Exploration

Lesson 3: Food, Agriculture and Climate Change

Subjects: Agricultural Science, CPSE, Geography, Home Economics, SPHE

Lesson Title and Summary: Food, Agriculture and Climate Change

In this lesson, we'll learn about the connection between industrial agriculture, our global food systems and climate change. Over half of land on our planet is devoted to raising livestock, crops, and food. This is responsible for quarter of all man made greenhouse gas emissions. We 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!

Vocabulary: Land Use, Water Use, Eutrophication, Greenhouse Gas Emissions, Crops, Livestock

In this lesson, the learner will:

- Identify information and vocabulary related to food, agriculture & climate change
- Explore the link between agriculture and climate change
- Examine how food systems and farming can become more sustainable
- Carry out online research
- Engage in pair and group work

Materials

- Worksheet 1: The Four Impacts of Agriculture
- Worksheet 2: Top Foods and their Environmental Impact
- Pens, paper and blue tack
- Online resources (computer / iPhone; website links)
- Blackboard/Whiteboard and chalk/white board markers



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ACTIVITY INSTRUCTIONS

Activity 1: The Negative Impact of Nitrogen Fertiliser (15 mins)

1. Divide the class up into small groups of 2-5 students
2. Encourage teams to find 3 photos online showing the negative impacts of the use of nitrogen fertiliser / nitrogen runoff in agriculture. (Note: useful search terms include nitrogen runoff, nitrogen and algae bloom, nitrogen pollution).
3. Briefly discuss as a class what teams are finding.

Activity 2: Environmental Impacts of Agriculture (15 mins)

1. Keep the class in the small groups of 2-5 students
2. Distribute Worksheet: The Four Impacts of Agriculture. Ask the class to split the topics amongst themselves and research what each topic means and write up a quick definition for each in their own words.

Activity 3: Food and its Impact on the Environment (20 mins)

1. Keep the class divided up into the same small groups of 2-5 students.
2. Assign each group with a food from the Worksheet: Top Foods and their Environmental Impact and ask them to complete the worksheets using the world in data environmental impacts page (<https://ourworldindata.org/environmental-impacts-of-food>). Ensure their allocated food is showing and that they know how to toggle through carbon footprint, water use, and land use. Encourage the learners to fill in the diagrams and hang them on the wall.
3. Once all teams are done, direct the learners to sequence the diagrams according to carbon footprint and, if time is permitting, to re-sequence them according to land use, and finally water use.
4. Discuss as a class what foods we should eat more or less of? Direct the class to divide the foods on the wall into these two groups.

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.

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EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, remove Activity 1

Extension: For a longer lesson, as a class watch the UN EP video Why Do We Need To Change Our Food Systems. While watching the video ask the learners to take notes about what they are hearing and seeing. Here are some prompts to guide them:

- Take note of how many people on the planet suffer from malnutrition?
- How does the lack of diversity of food and the quality of food impact our health and the planet?
- in what different ways are our natural resources under pressure?
- How is food waste connected to climate change?
- What are the 4 key stages of the food system?
- What are the two main goals we need to achieve?
- Who are the different stakeholders in our food systems?

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

- The 12 crops and 5 animals that feed us <https://np.thepondfoundation.org/the-12-crops-and-5-animals-that-feed-us/>
- What the world eats: <https://www.nationalgeographic.com/what-the-world-eats/>
- 25 Most produced foods: <https://beef2live.com/story-top-25-produced-foods-world-124-107239>
- Biggest producing countries of key foods: <https://ourworldindata.org/grapher/maize-production?tab=map>
- Food Spending Around the World: <https://www.vox.com/2014/7/6/5874499/map-heres-how-much-every-country-spends-on-food>
- Photos of plates of food based on income & poverty levels: <https://www.gapminder.org/dollar-street?topic=plates-of-food&media=all>
- Yields and Habitat Loss <https://ourworldindata.org/yields-habitat-loss>
- UN EP Video (3:46mins): <https://www.youtube.com/watch?v=VcL3BQeteCc>
- “Why beef is the worst food for the climate” (4:37mins) <https://www.youtube.com/watch?v=3lrJYTsKdUM&t=114s>

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Media Communications 2: Research Poster Working in pairs, learners are each given one country and asked to prepare a poster on how food and agriculture has affected the environment, wild habitats, water systems and biodiversity of that country over time.

MM4: L3 WS THE 4 IMPACTS OF AGRICULTURE

2 ZERO HUNGER



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

2 ZERO HUNGER



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:

100 Kgs CO₂

0 Kgs CO₂

Water
Use p/kg:

6,000 Litres

0 Litres

Land
Use p/kg:

400 sq metres

0 Sq Metres

Eutrophy
p/kg:

400 grams

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