SDG2 The Future of Food
MM3: Nourishing Connections for a Sustainable Future

Micro-Module 3: Nourishing Connections for a Sustainable Future

Research and Development

Module Overview

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

Micro-module Summary: Nourishing Connections for a Sustainable Future

The micro-module ‘Nourishing Connections for a Sustainable Future’ guides learners through a comprehensive exploration of the intricate connections between society and the food systems that sustain it. Starting with Lesson 1, learners unravel the multifaceted relationships between time, society, and food production. They then deepen their understanding in Lesson 2, grasping the complex web of the food production process and the diverse stakeholders involved beyond mere crop cultivation.

As learners progress through the module, they delve into the role of agriculture in shaping human civilization in Lesson 4. This prepares them for Lesson 5, where the profound influence of agricultural innovations on the course of food history becomes evident. The journey continues with Lesson 6, which unpacks the distinctions between linear and circular food systems, emphasizing material flows across various stages, from production to waste management. The module culminates in Lesson 7, where learners explore the intricate relationships within food chains and webs, gaining a tangible sense of the delicate balance required for ecosystem well-being.

In this module, the learners will:

- identify the Multidimensional Aspects of Food Systems
- consider the Role of Agriculture in Civilization
- evaluate Sustainable Food System Practices
- be more equipped with a holistic perspective on the interplay between society, agriculture, and the broader environment, enabling them to effectively address the complexities of modern food systems.

Materials

- Lesson plans
- Worksheets

Nourishing Connections for a Sustainable Future

Nourishing Connections for a Sustainable Future

Lesson 1: Discovering Links Between Society and Food Systems
In this lesson, learners will discover the connections between time, society and food systems, exploring the complex set of relationships that shape the production of our food. The aim is to provide a deeper understanding of how time, society, the economy, and even culture influence what we eat, and how it is produced. This lesson is designed to encourage critical thinking and discussions about the past and present of food production.

Resources: The Journey of Food: Before and Now Worksheet

Lesson 2: The Play of Food
In this lesson, learners will gain an understanding of the complexity of the food production system and the various actors involved. They will consider the web of the food production system, recognising its multifaceted nature beyond crop cultivation. They discuss each actor's role in ensuring food availability, quality, and safety. This knowledge is the foundation of making informed, impactful decisions as consumers and active contributors to the food production process.

Resources: The Food System Worksheet

Lesson 3: The Play of Food 2 - Roleplay
In this lesson, learners will gain an understanding of the complexity of the food production system and the various actors involved. Learners will take the role of an actor in the food system facing a scenario about the availability, quality, or safety of food. Learners will have the chance to hone these skills through role playing activities.

Resources: Food Roleplay Worksheet

Lesson 4: The Story of Agriculture
In this lesson, learners will gain a broader understanding of how agriculture influences the evolution of human civilization. This lesson will inspire learners to appreciate the significance of agriculture in shaping human societies and foster a deeper understanding of our complex relationship with the natural world and the significance of agriculture in their region, helping develop a sense of pride in their cultural heritage.

Resources: The Agricultural Revolution: Crash Course World History #1 Worksheet, Teacher's Notes

Lesson 5: Exploring Agricultural Innovations and Their Impact
In this lesson, learners will gain a broader understanding of the significant agricultural inventions and practices that have shaped food history. Special emphasis is given to how these inventions

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and practices have impacted their local area. By collating and sharing their findings with their peers, learners will have enhanced their knowledge of agricultural innovations and the role those play in shaping food systems, fostering a critical appreciation for the historical and local significance of these advancements.

Resources: Different Agricultural Practices and Inventions Worksheet

Lesson 6: Linear vs. Circular Food Systems
In this lesson, learners will dive into the different practices within food systems. Understanding material flows and how these encompass various stages, starting from agricultural production, processing, distribution, consumption, and ending with waste management. Circular practices within these flows emphasise reducing the linear "take-make-dispose" model and instead focus on strategies like recycling, reusing, and regenerating resources.

Resources: Linear vs. Circular Food Systems Worksheet

Lesson 7: Food Chains, Food Webs, and Us
In this lesson, learners will gain a hands-on understanding of the interconnectedness of organisms in food webs and the importance of maintaining balance for the well-being of ecosystems. It encourages critical thinking, collaboration, and a deeper appreciation for the delicate ecological relationships in nature.

Resources: Linear vs. Circular Trophic Chains Worksheet, My Food Web Worksheet, Teacher's Notes

Using the Resources:
If you wish to use these resources, we can offer an induction and online support throughout the unit. To register for this option, please contact Rebecca White, e: rebecca.white@ucd.ie

Module development and expertise: Dr. Rodrigo Pérez García, Polyhedra.eu Co-founder and Inova DE GmbH Innovation Officer

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Research and Development

Lesson 1: Discovering Links Between Society and Food Systems

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

Lesson Title and Summary: Discovering Links Between Society and Food Systems

In this lesson, learners will discover the connections between time, society and food systems, exploring the complex set of relationships that shape the production of our food. The aim is to provide a deeper understanding of how time, society, the economy, and even culture influence what we eat, and how it is produced. This lesson is designed to encourage critical thinking and discussions about the past and present of food production.

Vocabulary: Agricultural Production, Calories, Environment, Food Source, Market Forces, Social, Economic, and Cultural Factors

In this lesson, the learner will:

- Get acquainted with the concept of food and time and how these are linked to society
- Analyse the interdependencies between different stakeholders

Materials

- Worksheet: The Journey of Food: Before and Now
- Internet access
- Markers, paper

MM3: Nourishing Connections for a Sustainable Future
L1: Discovering Links Between Society and Food Systems

ACTIVITY INSTRUCTIONS

Activity 1: Favourite Foods (10 mins)

1. Working in groups of 4, ask learners to quickly discuss their favourite meals or food products.

2. Ask someone from each group to write their groups' favourite foods on the board and use this to make a list of the top 5 food/meals of the class.

Activity 2: Past and Present (40 mins)

1. Using activity 1's top 5 foods/meals ask learners to list the main ingredients needed for the learners' favourite foods/meal and where it might come from. Use the questions below to encourage sharing of information:

    - Is the food natural or processed?
    - Is it derived from animals or plants?
    - Is it locally sourced or imported?
    - Do you think your grandparents used to eat the selected 5 foods/meals too?
    - What are the factors that influence food choices?

2. Facilitate a brief class discussion where learners share their thoughts and ideas about the origin of their food.

3. Have learners complete the Worksheet: The Journey of Food: Before and Now.

4. After completing the worksheet, depending on time ask learners' to share answers with the rest of the classroom and write down common points and discuss what may have driven these changes.

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.

MM3: Nourishing Connections for a Sustainable Future
L1: Discovering Links Between Society and Food Systems

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, ask each learner to name 1 favourite meal or food product, and create a class list. Skip steps one and two in activity 2 and have learners only focus on the worksheet.

Extension: For a longer lesson, facilitate a longer class discussion where learners share their thoughts and ideas about the origin of their food and how their recent ancestors were eating. Encourage them to think about the different steps involved in the production process. Ask questions like:

- How does food production affect the environment?
- Was local production and consumption more popular 100 years ago or now?

Option B: Have learners imagine having a conversation with their great-great-grandparents about their food choices and come up with 3 questions they would ask them about the food they ate when they were their age. Have learners share their questions with a group and answer each of their questions. Share as a class.

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

Web article: How Humanity has changed the food it eats
https://www.bbc.com/future/article/20210514-how-humanity-has-changed-the-food-it-eats

Video: Follow the Food Episode 8: Sustainable Food Systems [23:16min]
https://www.bbc.com/future/bespoke/follow-the-food/

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Talk to three different generations (peers, parents and grandparents) and ask about their food choices and access to food when they were 15 years old. This information could be linked with the Media Communications modules 1 - 4 to use their intergenerational discussions as the themes / content of a media output.

The findings from the discussions could also be used to support the development of a driving question to develop a project based on issues emerging from local food trends linked to production, consumption and waste.

LESSON 1 WORKSHEET

THE JOURNEY OF FOOD: BEFORE AND NOW

1. Take a moment to research/ask about the food that your grandparents used to eat when they were your age. Mention three or four examples that are still typical today.

This can be a good reference: How humanity has changed the food it eats - BBC Future: https://www.bbc.com/future/article/20210514-how-humanity-has-changed-the-food-it-eats

Answer:

_____

_____

_____

_____

_____

2. What were some of the everyday foods or ingredients your grandparents might have consumed?

Answer:

_____

_____

_____

3. Now, think about the food that you typically eat today. Name some of the common foods or ingredients in your diet.

Answer:

_____

_____

_____

4. Compare the food choices of your grandparents with your own food choices. Are there any similarities or differences?

Answer:

_____

_____

_____

LESSON 1 WORKSHEET

THE JOURNEY OF FOOD: BEFORE AND NOW

5. For both you and your grandparents, decide if the food choices of either case are more natural or processed?

Answer:

_____

_____

_____

6. For both you and your grandparents, decide if the foods are locally sourced or imported?

Answer:

_____

_____

_____

7. How do you think advancements in technology and transportation have influenced the availability of different types of food?

Answer:

_____

_____

_____

8. How do you think food-production (source) / food-access (availability, quality, calories) impact local communities?

Answer:

_____

_____

_____

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Micro-Module 3: Nourishing Connections for a Sustainable Future

Research and Development

Lesson 2: The Play of Food

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

Lesson Title and Summary: The Play of Food

By the end of this lesson, learners will have a better understanding of the complexity of the food production system and the various actors involved. They will learn that food production goes beyond just growing or harvesting crops, and involves many different steps and players.

Learners discuss the role of each actor in ensuring the availability, quality, and safety of food. They will also gain awareness of the choices they make as consumers and the impact those choices have on the food system to empower them to make informed decisions about their food choices and become more conscious participants in the food production process.

Vocabulary: Society, Food Systems, Agricultural Production, Social, Economic, and Cultural Factors, Market forces, Ethical Behaviour

In this lesson, the learner will:

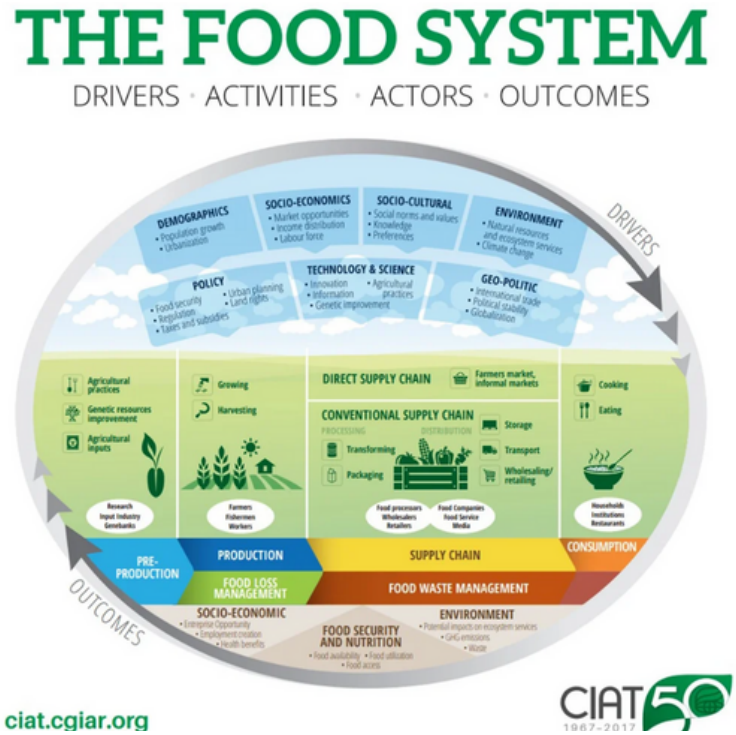
- explore the concept of food systems and their significance in society.
- explore the factors that shape food production.
- get acquainted with different actors in the food system.

Materials

- Worksheet: The Food System
- Internet access
- Markers, paper

MM3: Nourishing Connections for a Sustainable Future
L2: The Play of Food

ACTIVITY INSTRUCTIONS



Activity 1: The Food System Part 1 (25 mins)

1. Project the image so learners can refer to this easily during the class.
2. Give learners the WORKSHEET: The Food System and have learners complete part 1 in groups of 2.
3. Once completed, briefly discuss as a class.

Activity 2: The Food System Part 2 (25 mins)

1. Have learners complete WORKSHEET: The Food System part 2 in groups of 2. These can be the same groups or they can change.
2. Once completed, briefly discuss as a class.
3. Keep these worksheets for the next lesson.
4. Once completed, briefly discuss as a class.

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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L2: The Play of Food

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, skip part 2 of the worksheet.

Extension: For a longer lesson, complete part 3 of the worksheet.

Option B: After part 1 of the worksheet, give learners The Food System graphic from ncat.org (see media box). Have learners answer the following questions:

1. How does this graphic relate to the graphic we just analysed? Are there any similarities or differences? Can you place parts of the new graphic onto the old graphic (e.g. are any parts of the new graphics drivers, outcomes or stages?)?
2. Which part of the new graphic do you think can influence the food system the most?

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

NCAT The Food System Graphic: https://msfoodjustice.ncat.org/wp-content/uploads/2019/09/thefoodsystem.jpg

CIAT Food System Graphic:https://www.iisd.org/sites/default/files/2021-01/ciat-na-food-system-figure.jpg

Eating Our Way to Extinction [1:21:27min]: https://www.youtube.com/watch?v=LaPge01NQTQ&t=1s

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Research and find real-life examples of initiatives or projects in your area that promote collaboration between different actors in the food production system.

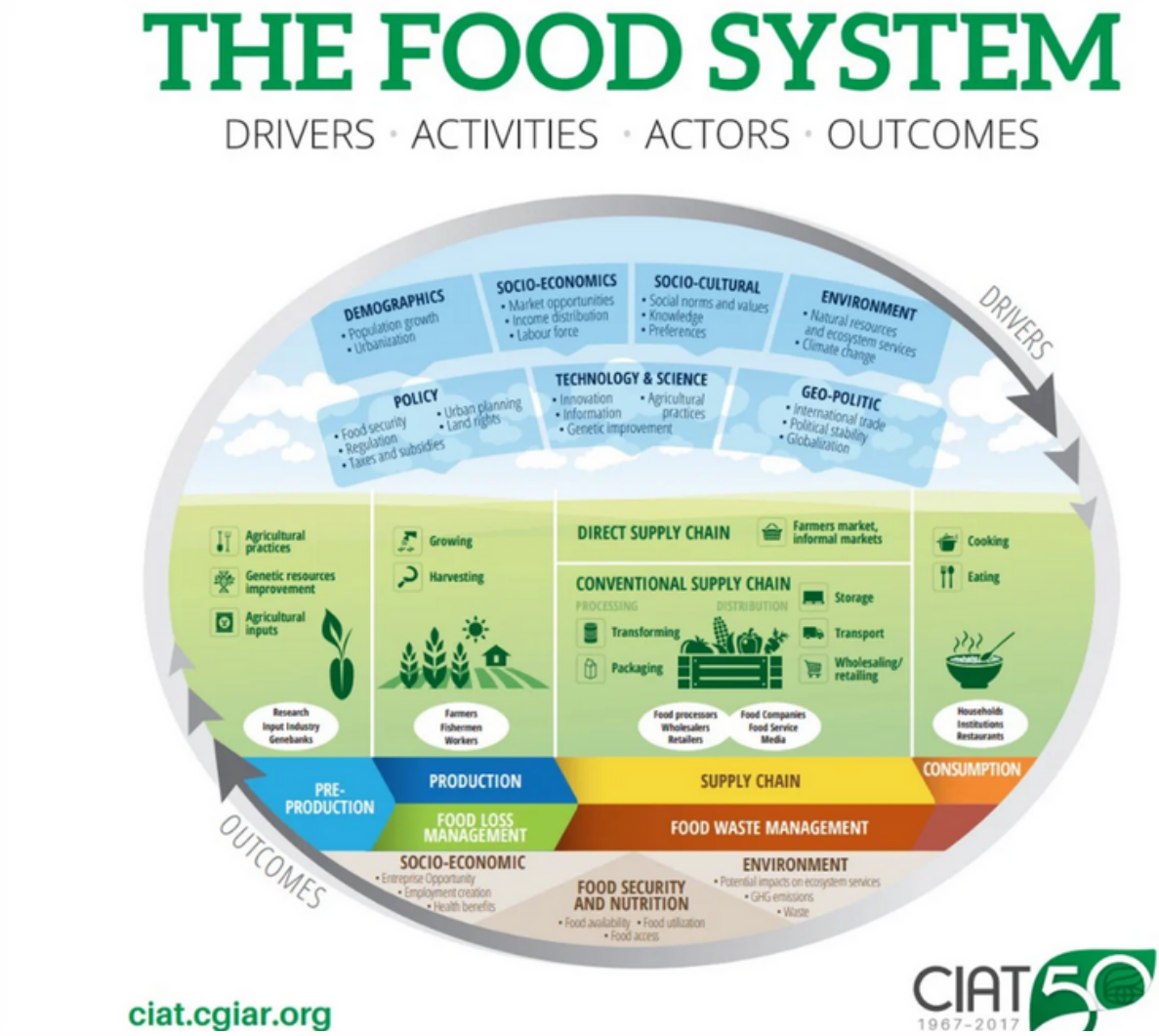
Briefly describe each example and present two arguments on how it DOES / DOES NOT contribute to a more sustainable and inclusive food system.

LESSON 2 WORKSHEET THE FOOD SYSTEM

2 ZERO HUNGER

Part 1

Look at the below graphic about food systems and their drivers, activities, actors and outcomes. Answer the questions in groups of two.



1. Name the 7 drivers of the food system:
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____
   g. _____

2. Which drivers do you think are most important? Why?

_____

_____

_____

LESSON 2 WORKSHEET THE FOOD SYSTEM

3. Are there any drivers that you as an individual can influence? If so, which ones? Why?

_____

_____

_____

_____

4. Name the 3 outcomes of the food system:
   a. _____
   b. _____
   c. _____

5. Which outcomes do you think are most important? Why?

_____

_____

_____

6. Are there any outcomes that you as an individual can influence? If so, which ones? Why?

_____

_____

_____

_____

7. Name the six stages of the food system; the first one has been done for you:
   a. Pre-production
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____

8. Which stages overlap? Why do you think they overlap?

_____

_____

_____

9. Which stages do you think that you as an individual can influence? Why?

_____

_____

_____

LESSON 2 WORKSHEET THE FOOD SYSTEM

10. How do you think that the drivers, outcomes and stages influence one another?

_____

_____

_____

_____

11. Try to name three actors (or people) who influence the food system, not including individual citizens like yourself.

a. _____

b. _____

c. _____

Part 2

What role do you think each of these actors play in the food system? Which part(s) of the food system do they influence?

Fishermen:

_____

_____

_____

Regulatory authorities:

_____

_____

_____

Farmer's markets:

_____

_____

_____

Transport and Storage Firms:

_____

_____

_____

Food Processing Companies:

_____

_____

_____

LESSON 2 WORKSHEET THE FOOD SYSTEM

THE FOOD SYSTEM

NGOs:

_____

_____

_____

Consumers:

_____

_____

_____

Packaging Industry:

_____

_____

_____

Researchers and Scientists:

_____

_____

_____

Part 3

1. Why is it important to understand that food production involves multiple actors?

_____

_____

2. Give two examples of how consumers' choices can impact the way food is produced and the environmental effect this has.

_____

_____

_____

LESSON 2 WORKSHEET THE FOOD SYSTEM

THE FOOD SYSTEM

3. Propose three ways you could influence the food system as a consumer, to ensure a sustainable and more ethical food system.

_____
_____
_____
_____

4. Choose two drivers and for each driver answer:
   a. How does the driver influence the outcomes of the food system?

      _____
      _____
      _____

   b. Which stage of the food system does the driver affect?

      _____
      _____
      _____

   c. Do you think that this driver is being used in Ireland to build a more sustainable food system? Why or why not?

      _____
      _____
      _____

   d. Give three suggestions you would give Ireland to improve this driver to make the food system more environmentally friendly:

      _____
      _____
      _____

5. Choose two actors and for each actor answer:
   a. Do you think that this actor in Ireland is building a more sustainable food system? Why or why not?

      _____
      _____
      _____

   b. Give three suggestions to this actor in Ireland to make the food system more environmentally friendly:

      _____
      _____
      _____

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Micro-Module 3: Nourishing Connections for a Sustainable Future

Research and Development

Lesson 3: The Play of Food 2 - Roleplay

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

Lesson Title and Summary: The Play of Food 2 - Roleplay

By the end of this lesson, learners will have a better understanding of the complexity of the food production system and the various actors involved.

Learners will take the role of an actor in the food system facing a scenario about the availability, quality, or safety of food. Learners will have the chance to hone these skills through role playing activities.

Vocabulary: Society, Food Systems, Agricultural Production, Social, Economic, and Cultural Factors, Market forces, Ethical Behaviour

In this lesson, the learner will:

- understand the role of different actors in the food system
- use role playing as a method of communication
- practice rapid ideation
- develop negotiation skills
- gain confidence in exploring ideas

Materials

- Worksheet: Food Roleplay
- Internet access
- Markers, paper

MM3: Nourishing Connections for a Sustainable Future

L3: The Play of Food 2 - Roleplay

ACTIVITY INSTRUCTIONS

Activity 1: Review (5min)

1. Divide learners into groups of 4.
2. Have learners review their worksheet: The Food System part 2 from the previous lesson.

- What players / actors did they identify?
- What role do they play in the food system?
- What issues might each player / actor consider important (e.g., price of food, quality of food, health and safety, etc.)?

Activity 2: Roleplay (45min)

1. Assign each group of four a player / actor: farmer, consumer, retailer, or government representative (planning, health and safety)

2. In their groups, learners will discuss their player / actor's role and opinions on two of the situations using the worksheet: Food Roleplay. The situations will need to be decided as a class, and can be voted on as to which situations are used. Each individual learner should take notes on what their group discusses and decides as they will need these notes to complete the roleplay in step 3 below. Encourage internet research on the issues and situations, and limit this discussion to 10-15 minutes.

3. Re-divide the learners into groups ensuring that each group has one of the players / actors (farmer, consumer, retailer and government representative). Using their notes from their previous group, learners should take the role of their player / actor to reach a decision on the chosen situation(s). Limit this discussion to 10 minutes per situation.

4. Share as a class the final decisions of each group for the situation(s).

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.

MM3: Nourishing Connections for a Sustainable Future

L3: The Play of Food 2 - Roleplay

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, choose only one situation and reduce the discussion times.

Extension: For a longer lesson, encourage learners to come up with their own situation after discussing two of the given situations.

Have learners write their scenario, actors / players, and guiding questions. Switch with another group and have learners roleplay another groups' scenario.

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

Department of Agriculture: https://www.gov.ie/en/organisation/department-of-agriculture-food-and-the-marine/

Food Safety Authority: https://www.fsai.ie/home

Irish Farmers Association: https://www.ifa.ie/

Guide to Food Markets in Ireland: https://www.bordbia.ie/globalassets/bordbia.ie/lifestyle/information/farmer-markets/guide-to-food-markets-in-ireland.pdf

Agriculture and Food Development Authority: https://www.teagasc.ie/

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Contact the actors / players from the situations in your local community. Ask what concerns and questions they must consider when addressing the sample scenarios. For example, contact the organiser of the local farmers' market; what do they need to consider when organising and running the farmers' market?

LESSON 3 WORKSHEET FOOD ROLEPLAY

Scenario 1: Circular Economy in the Restaurant Business

Your town in Ireland is hosting a meeting about the circular economy in the town's agricultural sector. You will need to decide how local farmers and restaurants can move from a linear to circular system.

Actors / Players:

Farmer - Lily: An organic farmer who raises both cattle and grows produce. You might consider:

1. What can you provide to the restaurants?
2. How could you use the restaurants' waste on your farm?
3. How much are you willing to pay for the restaurants' waste? How much are you selling your produce for?
4. How will moving from a linear system to a circular system impact your farm? Will you need more staff, new ways of transportation, etc.?
5. What government regulations will you need to follow if you take food waste from the restaurants?

Consumer - Alex: A food enthusiast and parent who is interested in sustainable eating. You might consider:

1. How can you support a move to a circular economy in your town?
2. Will prices go up if restaurants use local produce and proteins? How much are you willing to pay for local ingredients?
3. How can you reduce food waste when you go out to eat?
4. Are you more likely to eat at a restaurant if they source their ingredients locally and are low or no-waste?

Retailer - Sarah: Owner of a popular local restaurant, which wants to switch to a more sustainable system.

1. How could your restaurant reduce food waste?
2. How much are you willing to pay for local ingredients?
3. How can you advertise and encourage customers to visit a low or no-waste restaurant which uses local ingredients?
4. How much will you charge customers for their meals? Is this impacted by where you source your ingredients?

LESSON 3 WORKSHEET FOOD ROLEPLAY

Government Representative - Colm: A liaison from the Department of Agriculture, responsible for regulations and health and safety.

1. What are the labelling requirements for local produce to be sold in the shop?
2. What standards do the local ingredients need to be held to?
3. What health and safety concerns do you have?
4. What issues of transparency and traceability do you have?
5. What are the regulations on disposing food waste?
6. Are there any government initiatives supporting restaurants and farmers in their switch from a linear to circular economy?

Scenario 2: Selling local products in grocery stores

Your town in Ireland is interested in collaboratively addressing the food supply chain. The following actors are engaged in a discussion about ensuring a smooth and sustainable flow of food from farm to table. The local shop is interested in selling local farmers' produce to the public. Come to an agreement about the terms and conditions of the deal, while considering customers' needs, farmers' needs, shop's needs, and government regulations.

Actors / players:

Farmer - Liam: A dedicated organic farmer known for his commitment to sustainable practices.

1. What type of produce would you sell to the shop?
2. What are the seasons of the types of produce you grow?
3. How much would the shop need to pay you for this to be profitable? Think about the cost of planting, growing, harvesting and transporting the produce to the shop.
4. Is it more profitable to sell your produce in the shop, from a farmers market, or directly from your farm?
5. How will the shop guarantee they promote and boost sales?
6. How will you manage food waste from your farm if the shop rejects 'ugly' produce?

LESSON 3 WORKSHEET FOOD ROLEPLAY

Consumer - Alex: A health-conscious individual who values locally sourced and fresh produce.

1. What type of produce would you like to purchase from the shop?
2. What is the price you are willing to pay for local products in the shop? How expensive is too expensive?
3. How can the shop encourage you to buy locally produced products vs. other products which may be cheaper but have travelled further to get to the shop?
4. Are you willing to have a reduced variety of produce in exchange for organic and local products?
5. What are the main nutritional concerns of your family?

Retailer - Emily: Owner of a local grocery shop which is interested in community-focused products.

1. What type of produce does your shop need?
2. How much are you willing to pay the farmer for their produce?
3. How much will you sell the produce for to the customer? Think about the difference between local vs. non-local produce, organic vs. non-organic produce. How will you ensure customers choose the local organic produce to increase profits?
4. What labelling and traceability requirements will you need to consider?
5. What standards will you hold the local produce to? Will you reject 'ugly' produce?
6. How will you advertise the local produce?
7. How can you streamline logistics and communication with local farmers to sell their produce?

Government Representative - Lucy: A liaison from the Department of Agriculture, responsible for regulations and health and safety.

1. What are the labelling requirements for local produce to be sold in the shop?
2. What standards does the produce need to be held to?
3. What health and safety concerns do you have?
4. What issues of transparency and traceability do you have?
5. Are there any government initiatives supporting local farmers and shops to sell local produce?

LESSON 3 WORKSHEET FOOD ROLEPLAY

Scenario 3: Farmers' Market Expansion

Your local area would like to expand their very small farmers' market. Currently, the market is only on a Saturday from 9am-1pm and contains 4 stands outside of the community centre. The local farmers association has held a meeting with different stakeholders to see if they can coordinate the expansion of the market. Consider crop diversity, market logistics (e.g. time, location, size, types of stands, etc.), and economic benefits of the local market.

Players / actors:

Farmer - Oisín: A diverse crop farmer who supports local biodiversity.

1. What type of produce would you sell at the farmers market?
2. What are the seasons of the types of produce you grow?
3. How much would you need to charge for your produce for this to be profitable? Think about the cost of planting, growing, harvesting, transporting the produce to the market and staffing the market.
4. Is it more profitable to sell your produce in the shop, from a farmers market, or directly from your farm?
5. How will you manage food waste from the farmers market? Will you sell 'ugly' produce?

Consumer - Ava: A foodie passionate about unique, locally grown ingredients.

1. What types of products would you like to purchase from the market?
2. What is the price you are willing to pay for local products? How expensive is too expensive?
3. What other types of activities and stands would you like to see at the farmers market?
4. Are you willing to have a reduced variety of produce in exchange for organic and local products?
5. What are the main nutritional concerns of your family?

LESSON 3 WORKSHEET FOOD ROLEPLAY

Retailer - Owen: Manager of the farmers' market looking to expand its offerings.

1. How will you reach new customers?
2. How will you reach new farmers and other local artisans?
3. How will you ensure crop and product diversity?
4. Where would be a good location for the expanded farmers' market?
5. What insurance considerations would you need to negotiate?
6. How will you profit from the farmers' market (e.g. charge a fee for the stands; if you do, how much would you charge?)?
7. How will the farmers' market be organised?
8. Will you expand the days and times the market is open?
9. How will you ensure government regulations and health and safety are followed?
10. How will you reduce food waste in the farmers' market?

Government Representative - Maya: Economic development representative focusing on community growth.

1. What are the labelling requirements for local produce to be sold in the farmers' market?
2. What standards does the produce need to be held to?
3. What health and safety concerns do you have?
4. What issues of transparency and traceability do you have?
5. Are there any government initiatives supporting farmers' markets?

LESSON 4 WORKSHEET

THE AGRICULTURAL REVOLUTION: CRASH COURSE WORLD HISTORY #1

Read each statement below and determine whether it is true or false. Circle the correct answer.

1. Agriculture originated in multiple regions around the world at slightly different times. (True/False)
2. The Agricultural Revolution marked the transition from a nomadic lifestyle to settled communities. (True/False)
3. Agriculture provided more reliable access to food compared to hunting and gathering. (True/False)
4. The transition to agriculture did not lead to changes in human diet, health, and population. (True/False)
5. Agriculture has had both positive and negative effects on biodiversity and climate. (True/False)
6. Cultivation of crops and domestication of animals had taken place for less than 15000 years. (True/False)
7. The development of agriculture led to an increase in population density. (True/False)
8. The Palaeolithic Period is associated with the emergence of agriculture and the transition from hunting and gathering. (True/False)
9. Herders contributed to the rise of complex civilizations and the development of urban centres. (True/False)
10. The development of agriculture contributed to the emergence of writing, religion, and law. (True/False)

Discussion Questions:

1. What were the key factors that led to the Agricultural Revolution?

   _____

   _____

   _____

2. How did the transition from hunting and gathering to agriculture change the way humans lived?

   _____

   _____

   _____

LESSON 4 WORKSHEET

THE AGRICULTURAL REVOLUTION: CRASH COURSE WORLD HISTORY #1

3. What were some of the advantages and disadvantages of early agricultural societies?

4. How did the development of agriculture impact the growth of civilizations and the establishment of permanent settlements?

5. In what ways did the Agricultural Revolution shape the future of human society, including advancements in technology, trade, and social organisation in your region?

Extra Questions:

1. Did agriculture make humans happier? Why or why not?

2. Did agriculture make humans more diverse? Why or why not?

3. Did agriculture make humans more powerful? Why or why not?

4. Did agriculture start at the same time and place around the world? Where and when did agriculture start?

5. Did agriculture start with cereal grains? If so, what were the first cereal grains?

LESSON 4 WORKSHEET

THE AGRICULTURAL REVOLUTION: CRASH COURSE WORLD HISTORY #1

6. Did agriculture lead to the specialisation of labour? Why or why not?

_____

_____

_____

7. Did agriculture lead to social inequality? Why or why not?

_____

_____

_____

8. Did agriculture lead to civilization? Why or why not?

_____

_____

_____

LESSON 4 TEACHER'S NOTES

TEACHER'S NOTES

True / False Answers:

- Agriculture originated in multiple regions around the world at slightly different times. (True)
- The Agricultural Revolution marked the transition from a nomadic lifestyle to settled communities. (True)
- Agriculture provided more reliable access to food compared to hunting and gathering. (True)
- The transition to agriculture did not lead to changes in human diet, health, and population. (False)
- Agriculture has had both positive and negative effects on biodiversity and climate. (True)
- Cultivation of crops and domestication of animals had taken place for less than 15000 years. (True)
- The development of agriculture led to an increase in population density. (True)
- The Palaeolithic Period is associated with the emergence of agriculture and the transition from hunting and gathering. (False)
- Herders contributed to the rise of complex civilizations and the development of urban centres. (False)
- The development of agriculture contributed to the emergence of writing, religion, and law. (True)

Extra Questions Answers:

- Did agriculture make humans happier? Maybe. Agriculture made humans happier, as they could access food more regularly, but they needed to work harder and had more conflicts.
- Did agriculture make humans more diverse? Yes. Agriculture made humans more diverse, as they developed different languages, cultures, and religions
- Did agriculture make humans more powerful? Yes. Agriculture allowed humans to increase their population, wealth, and technology
- Did agriculture start at the same time and place around the world? No. It started at different times and places around the world independently
- Did agriculture start with cereal grains? Yes, it did. Wheat, barley, rice, and maize were among the first cultivated goods
- Did agriculture lead to the specialisation of labour? Yes. Agriculture led to the specialisation of labour, as some people became farmers, artisans, merchants, priests, or rulers
- Did agriculture lead to social inequality? Yes, it enabled some people to become richer, more powerful, or more privileged than others
- Did agriculture lead to civilization? Yes, it did. Agriculture led to civilization, as people formed complex societies with cities, states, laws, and writing

SDG2 Future of Food

Nourishing Connections for a Sustainable Future

Micro-Module 3: Nourishing Connections for a Sustainable Future

Research and Development

Lesson 5: Exploring Agricultural Innovations and Their Impact

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

Lesson Title and Summary: Exploring Agricultural Innovations and Their Impact

In this lesson, learners will get a deeper understanding of the significant agricultural inventions and practices that have shaped food history. Special emphasis is given to how these inventions and practices have impacted their local area.

By collating and sharing their findings with their peers, learners will have enhanced their knowledge of agricultural innovations and the role those play in shaping food systems, fostering a critical appreciation for the historical and local significance of these advancements.

Vocabulary: Innovation, Food Systems, Technological Evolution

In this lesson, the learner will:

- Get acquainted with the concept of food systems evolution
- Explore the local changes in food production critically
- Analyse the interdependencies between different stakeholders in the food system

Materials

- Flipped classroom: Different Agricultural Practices and Inventions
- Internet access
- Access to images for the timeline
- Markers, paper

MM3: Nourishing Connections for a Sustainable Future
L5: Exploring Agricultural Innovations and Their Impact

ACTIVITY INSTRUCTIONS

Activity 1: Flipped classroom playback (25 min)

This activity requires learners to investigate different agricultural inventions in history and how they have shaped food history. Begin with the FLIPPED CLASSROOM: 'Different Agricultural Practices and Inventions', from the last class / session.

1. Divide the class into groups of 2. Discuss the findings from the flipped classroom exercise.
2. As a group, discuss the following questions:

    a. Identify the time period considered by each of you
    b. What was being done until then
    c. How did your invention or practice change the way people farmed?
    d. How did your invention or practice impact the environment?
    e. How did your invention or practice change the way people lived in that time (e.g. did it give them more free time, help transportation of food, etc.)?

Activity 2: Create a timeline of agricultural innovations (35 min)

1. As a class, create a physical timeline in your classroom by joining posterboard together or create a digital timeline by using an online timeline tool (see media box links). Have learners populate the timeline with their inventions/practices they found in the flipped classroom.
2. Have learners share their contributions to the timeline touching on the following questions:

    a. What is your invention and when was it made?
    b. What impact did your invention have on agriculture?
    c. What impact did your invention have on the environment?
    d. What impact did your invention have on society / how people lived?

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.

MM3: Nourishing Connections for a Sustainable Future
L5: Exploring Agricultural Innovations and Their Impact

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, undertake the flipped classroom activity in class in preparation for a second class to create the timeline.

Extension: For a longer lesson, have each group create a 3 slide presentation (their invention, when and how their selected invention and practices have impacted their local area, such as through trade, migration, cuisine, or environmental changes.

These can then be collated as a class and organised sequentially to create a timeline to share with other learners e.g. younger learners history class or submit to the local library's archive.

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

The Development of Agriculture: https://education.nationalgeographic.org/resource/development-agriculture/

History of Agriculture: https://foodsystemprimer.org/production/history-of-agriculture

Digital Timeline Tools:

- Timetoast: https://www.timetoast.com/
- Tik-Toki: https://www.tiki-toki.com/
- Timeline JS: https://timeline.knightlab.com/#fileformat
- Vennage: https://venngage.com/features/timeline-infographics

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Fish or Farmers Market Field Trip: The aim is to provide learners with firsthand knowledge of local fish or farmers markets and the opportunity to interact with farmers, fishmongers, or professionals there.

Before the trip, learners can prepare a list of questions about the different species, fishing / farming methods, sustainability, and the local fishing / farming industry. During the visit, they can engage in conversations with the fishmongers / farmers who can share their insights.

The trip activity will have two main activities:

- Observation and Documentation: Encourage learners to observe the market environment, paying attention to the variety of species, their appearance, and how they are displayed. They can take photos or make sketches to document their findings.
- Conversations with Fishmongers / Farmers: learners should ask questions about the different species, their characteristics, the fishing / farming methods employed currently, etc.

LESSON 5 FLIPPED CLASSROOM

DIFFERENT AGRICULTURAL PRACTICES AND INVENTIONS

At home, you are going to research an agricultural invention or practice that has shaped food history and how this has affected your local area.

You should choose an agricultural invention, farming innovation or fishing practice that has had a significant impact on food throughout history. If you cannot think of any straight away, please use the following pages:

- National Geographic: https://education.nationalgeographic.org/resource/development-agriculture/
- Khan Academy https://www.khanacademy.org/humanities/world-history/world-history-beginnings/birth-agriculture-neolithic-revolution/v/how-did-agriculture-grow
- Timeline of agriculture and food technology - Wikipedia https://croplife.org/news/feeding-the-world-a-timeline-of-agricultural-innovations/

NB: Wikipedia is not a reliable source as it can be edited by anyone, anytime. If you are going to use Wikipedia as your source you must also provide another source to verify the wiki source.

Once you have decided on a practice or invention, answer the following questions to bring to class.

1. What is the agricultural invention or practice you chose? Also, provide name and the source where this information was found:eg. company website, report, news article

_____

2. When did your invention or practice come into practice / was invented? Also, provide the source where this information was found:eg. company website, report, news article

_____

3. Where did your invention / practice originate from? Also, provide the source where this information was found:eg. company website, report, news article

_____

LESSON 5 FLIPPED CLASSROOM

DIFFERENT AGRICULTURAL PRACTICES AND INVENTIONS

4. How does this invention or practice contribute to the way food is understood? Provide the source where this information was found:eg. company website, report, news article

_____

5. What are the main benefits or advantages of this invention or practice? Also, provide the source where this information was found:eg. company website, report, news article

_____

_____

6. . What are the main disadvantages of this invention or practice? Also, provide the source where this information was found: eg. company website, report, news article

_____

7. How has this invention or practice impacted your local area specifically? Also, provide the source where this information was found: eg. company website, report, news article

_____

8. Based on your research , what is your overall assessment of the impact of the chosen agricultural invention or practice on food history and your local area?Also, provide the source where this information was found: eg. company website, report, news article

_____

SDG2 Future of Food
Nourishing Connections for a Sustainable Future

Micro-Module 3: Nourishing Connections for a Sustainable Future

Research and Development

Lesson 6: Linear vs. Circular Food Systems

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

Lesson Title and Summary: Linear vs. Circular Food Systems

In this lesson, learners will dive into the different practices within food systems. Understanding material flows and how these encompass various stages, starting from agricultural production, processing, distribution, consumption, and ending with waste management. Circular practices within these flows emphasise reducing the linear "take-make-dispose" model and instead focus on strategies like recycling, reusing, and regenerating resources.

Vocabulary: Circular economy, Food Systems, Co-Dependence, Resource Efficiency, Nutrient Cycling, Material Flows

In this lesson, the learner will:

- Begin to recognize the difference between linear and circular systems
- Recognize some of the impacts of Linear Food Systems
- Begin to think critically about the ecosystem interactions

Materials

- Worksheet: Linear vs. Circular Food Systems
- Internet access
- Markers, paper

MM3: Nourishing Connections for a Sustainable Future
L6: Linear vs. Circular Food Systems

ACTIVITY INSTRUCTIONS

Activity 1 AgroFood and Circular Economy (15 min)

1. Watch and discuss the video AgroFood and Circular Economy [5:43min] https://www.youtube.com/watch?v=CzR_ArBQXi0&ab_channel=WorlDynamics

2. Encourage learners to take notes and ask the following questions to the class to encourage discussion:

- What are the main characteristics of a linear food system?
- What is a circular food system?
- What are 2 of the main benefits of a circular food system for the environment, society, and economy?
- Name 1 challenge or barrier to achieving a circular food system.

Activity 2 Linear vs. Circular Food Systems (35 min):

1. Ask learners to carefully look at the picture in the worksheet: Linear vs. Circular Food Systems.
2. Have learners work in small groups to answer the questions from the worksheet: linear vs. circular food systems based on their personal experience.
3. As a class, collate the answers and discuss the image using the previous answers to encourage conversation.
   a. Think about the amounts of food wasted/lost at farms and at the consumer level.
   b. Does the Circular Economy produce waste?
   c. Is it easy or even allowed to donate expired food?

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.

MM3: Nourishing Connections for a Sustainable Future
L6: Linear vs. Circular Food Systems

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, skip activity 1 and just do activity 2.

Extension: For a longer lesson, watch the additional videos in the multimedia box. Ask learners to reflect on their own food choices and behaviours in relation to linear and circular food systems. Prompt them to think about how they source, prepare, consume, and dispose of their food. For each question (source, prepare, consume, and dispose), they have to write down what they do in a linear approach and what they will do if they would like to do it in a circular manner. To conclude, ask them to share their answers with a partner or a small group and compare their responses.

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

AgroFood and Circular Economy [5:43min]
https://www.youtube.com/watch?v=CzR_ArBQXi0&ab_channel=WorlDynamics

Explaining the circular economy: Rethink progress [3:49min]
https://ellenmacarthurfoundation.org/videos/explaining-the-circular-economy-rethink-progress

Producing 70% more food with a circular AgroFood System [1:27min]
https://www.youtube.com/watch?v=TfC3UtbfHLE&ab_channel=WageningenUniversity%26Research

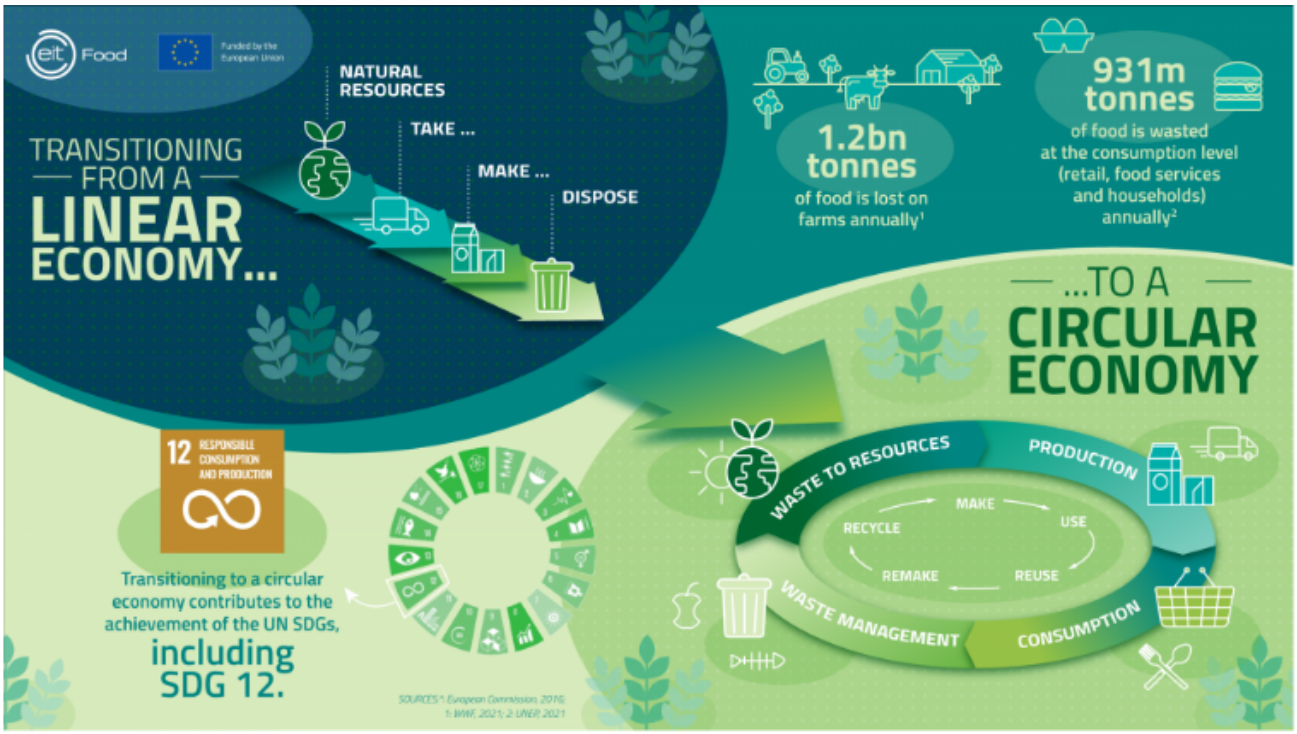
Transitioning to a circular food economy: the solution for food waste and food loss?
https://www.eitfood.eu/blog/transitioning-to-a-circular-food-economy-the-solution-for-food-waste-and-food-loss

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Community Garden Visit: Arrange a visit to a local community garden where learners can work alongside older volunteers who have been involved in gardening for years. Engage in gardening activities together, such as planting, weeding, or harvesting, while initiating conversations about sustainable gardening practices, composting and the importance of pollinators.

LESSON 6 WORKSHEET LINEAR VS CIRCULAR FOOD SYSTEMS

Look at the image below and answer the questions based on your knowledge of a linear vs. circular economy and your personal experience.



https://www.eitfood.eu/blog/transitioning-to-a-circular-food-economy-the-solution-for-food-waste-and-food-loss

1. What happens to the leftover food scraps after a meal at home? Are they thrown away or used for something else?

_____

_____

_____

2. How do farmers handle food waste and 'ugly' produce?

_____

_____

_____

3. What are two ways a farmer can support a circular economy?

_____

_____

_____

LESSON 6 WORKSHEET LINEAR VS CIRCULAR FOOD SYSTEMS

4. How do supermarkets handle unsold or expired food items? Do they donate them or throw them away?

5. What are two ways supermarkets can support a circular economy?

6. How do local restaurants handle food waste, unsold food or expired food items? Do they donate them, give scraps for animal consumption, compost or throw them away?

7. What are two ways restaurants can support a circular economy?

8. What happens to food packaging after it is used? Is it recycled or thrown away?

9. How does buying locally sourced food support the circular economy? What are the benefits for farmers and the environment?

10. Can you think of 1 way to reduce the use of single-use plastics in the food system?

LESSON 6 WORKSHEET LINEAR VS CIRCULAR FOOD SYSTEMS

11. How can we reduce food waste at home? Can you think of 2 creative ways to use leftover ingredients or repurpose food?

_____

_____

_____

12. Mention 3 alternative energy sources that can be used in food production and distribution that will make it more sustainable.

_____

_____

_____

SDG2 Future of Food
Nourishing Connections for a Sustainable Future

Micro-Module 3: Nourishing Connections for a Sustainable Future

Research and Development

Lesson 7: Food Chains, Food Webs, and Us

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

Lesson Title and Summary: Food Chains, Food Webs and Us

In this lesson, learners will gain a hands-on understanding of the interconnectedness of organisms in food webs and the importance of maintaining balance for the well-being of ecosystems. It encourages critical thinking, collaboration, and a deeper appreciation for the delicate ecological relationships in nature.

Vocabulary: Circular economy, Food Systems, Co-Dependence, Food Chain, Food Web, Trophic Level, Energy Flow, Nutrition

In this lesson, the learner will:

- Begin to recognize the difference between linear and circular systems
- Begin to think critically about the ecosystem interactions

Materials

- Worksheet: Linear vs. Circular Trophic Chains
- Worksheet: My Food Web
- Teacher's Notes: Linear vs. Circular Trophic Chains
- Post-its or small pieces of paper
- Markers or pencils
- Poster board or blackboard
- Tape

MM3: Nourishing Connections for a Sustainable Future

L7: Food Chains, Food Webs, and Us

ACTIVITY INSTRUCTIONS

In these exercises learners should work as a team and divide up the questions on each worksheet between them and use the time at the end to discuss their collective findings.

Activity 1 Linear vs. Circular Trophic Chains (25 min)

1. Provide learners with the WORKSHEET: Linear vs. Circular Trophic Chains and ask them to answer the questions provided in the worksheet. See Teacher's Notes.
2. Discuss as a class.

Activity 2: Build a Food Web Puzzle (25 min)

1. Divide learners into small groups of a maximum of 4 and provide each group with post-its or small pieces of paper.
2. Instruct each group to choose an ecosystem, such as a forest, ocean, or grassland, and identify at least 8 organisms that are part of that ecosystem. Each organism should be written on a separate piece of paper.
3. Once the groups have identified their organisms, have them arrange the cards or papers on a poster board or large paper to create a food web. They should use arrows to show the flow of energy from one organism to another.
4. Have learners complete the worksheet: My Food Web. Discuss as a class.

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.

MM3: Nourishing Connections for a Sustainable Future
L7: Food Chains, Food Webs, and Us

EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, in activity 1, limit discussion time. Ask the learner to identify only 4 organisms in activity 2.

Extension: For a longer lesson, in activity 2, add small pieces of paper to represent external factors that can impact the food web, such as pollution, habitat loss, or climate change.

They can then place these factors in the appropriate locations on the poster board to show their effects on the ecosystem.

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

Food Chains & Food Webs [2:54 mins] https://www.youtube.com/watch?v=2lqhJNgn_Wg

Food Chains Compilation [15:56 mins] https://www.youtube.com/watch?v=CZhE2p46vJk

Ecological Pyramids [3:41 mins] https://www.youtube.com/watch?v=wGfOoRrICto

Article: Food Chains and Food Webs

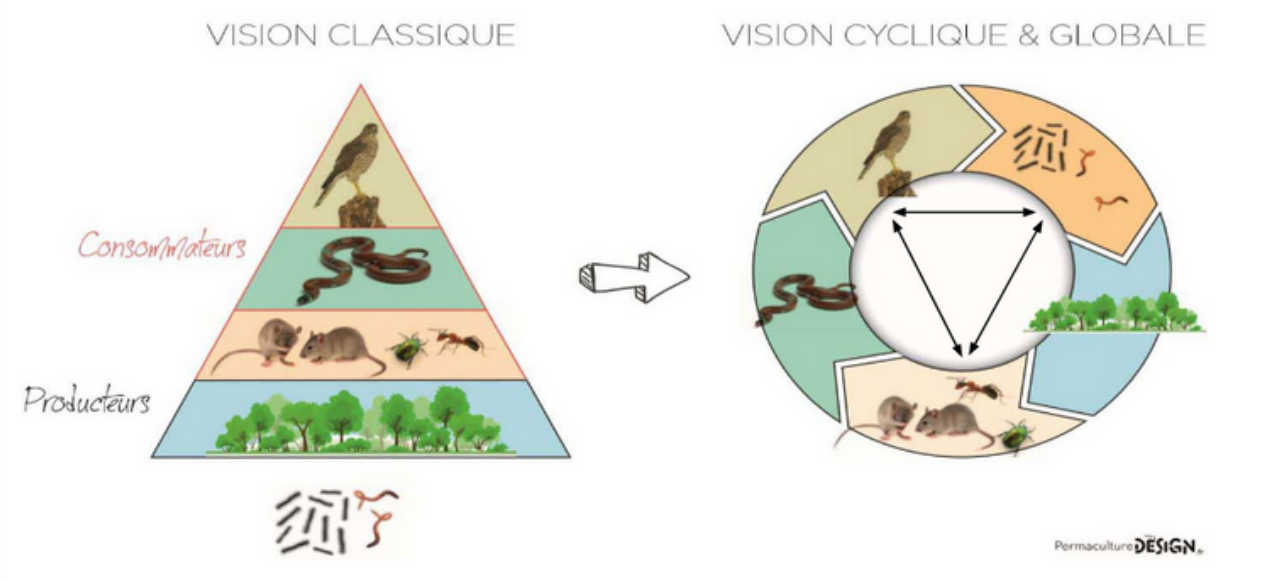
https://bio.libretexts.org/Bookshelves/Ecology/Environmental_Science_%28Ha_and_Schleiger%29/02%3A_Ecology/2.03%3A_Communities/2.3.01%3A_Biotic_Interactions/2.3.1.01%3A_Trophic_Interactions/2.3.1.1.04%3A_Food_Chains_and_Food_Webs

LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Talk to a local fisherman or farmer about what organisms they find now or do not see vs. 10 years ago. Ask them what impact this has had on their fishing / farming.

LESSON 7 WORKSHEET LINEAR VS. CIRCULAR FOOD SYSTEMS

Look at the image below and answer the questions. You may need to use the internet to help.



1. What does trophic mean? Write a definition with your group.

_____

_____

_____

2. What is a food chain / web? Write a definition with your group.

_____

_____

_____

3. What differences do you notice between the two graphics?

_____

_____

_____

4. Why do you think one is a circle and the other is a triangle?

_____

_____

_____

LESSON 7 WORKSHEET LINEAR VS. CIRCULAR FOOD SYSTEMS

5. Which graphic represents a linear food web?

6. Which graphic represents a circular food web?

8. What are producers, consumers, and apex predators? Write a definition with your group for each of these words. What role do each of these play in a food web?

9. Do you think a linear or circular food web best represents reality? Why?

10. What challenges could you face when trying to accurately represent the interactions between organisms in a linear food chain?

11. How does a circular food web better capture the complexity of interactions in an ecosystem compared to a linear food chain?

12. Why do you think it's important to understand these interactions and relationships in ecosystems, especially when it comes to conservation and environmental management?

LESSON 7 WORKSHEET LINEAR VS. CIRCULAR FOOD SYSTEMS

13. How can the concept of a circular food web help us make more informed decisions about issues like biodiversity, habitat protection, and food production?

_____

_____

_____

14. How can human behaviour impact the ecosystem and its food webs?

_____

_____

_____

15. What happens to a food chain or food web when humans overfish or overhunt certain species?

_____

_____

_____

16. How does the use of pesticides or fertilisers in agriculture affect the relationships between organisms in a food chain?

_____

_____

_____

LESSON 7 WORKSHEET MY FOOD WEB

As a group, pick eight organisms from a certain ecosystem (e.g. the ocean, the rainforest, grasslands, lakes, forest, bog, etc.). You should have at least one producer, one consumer, and one apex predator.

Draw pictures of these organisms on separate pieces of paper and arrange your organisms into a food web on your posterboard or table.

Draw arrows between the organisms to represent the flow of energy. This means drawing an arrow from one organism to another to represent consumption. Note you may have more than one arrow going to or from a single organism.

Think about the natural flow of energy in the food web and answer the following questions - use your drawings and arrows to play with the flow of energy between each organism for each question:

What happens if one organisms' population suddenly reduces?

_____

_____

_____

What happens if one organisms' population suddenly increases?

_____

_____

_____

What happens if the apex predators disappear?

_____

_____

_____

What happens if the producers disappear?

_____

_____

_____

What happens if the consumers disappear?

_____

_____

_____

LESSON 7 WORKSHEET MY FOOD WEB

Do you think population size in a food web fluctuates naturally (e.g. do you think organisms' populations reduce and increase due to other factors besides human intervention?)? If so, name three reasons an organism's population may reduce / increase naturally:

Now, create a new drawing for humans. Where do they fit in your food web?

Imagine that humans have over-consumed one organism in your food web. For example, if you chose an ocean as your ecosystem, you could imagine that humans have overfished cod. This means that your cod population would be reduced or completely disappear. Take away your arrows from this organism. If you have time, try this with a number of organisms that are in different categories (e.g. apex predator, consumer, producer).

Answer the following questions as a group, using your drawings and arrows to play with the flow of energy between each organism for each question:

What does the reduction or disappearance of this organism do to the rest of the food web?

What other organisms might disappear as a result of humans over-consuming your one organism?

What impact would this have on humans?

What impact would this have on the ecosystem?

LESSON 7 WORKSHEET

MY FOOD WEB

Do you think overconsumption is the only impact humans have on the food web? If no, name three other ways humans might affect the food web.

_____

_____

_____

Name three ways you think we could limit or manage our impact on the food web:

_____

_____

_____

LESSON 7 TEACHER'S NOTES

TEACHER'S NOTES: LINEAR VS. CIRCULAR FOOD SYSTEMS

Let’s analyse this picture. It describes how energy flows through different organisms in a usual “forest/wild” ecosystem, producers (plants) who convert sunlight into food through photosynthesis. It then moves on to consumers, which can be divided into primary consumers (herbivores) that eat plants, secondary consumers (carnivores) that eat herbivores, and tertiary consumers (top predators) that eat other carnivores. At the very bottom, you have decomposers, such as fungi and bacteria, which break down dead organisms and return nutrients to the soil and play a very important role in the trophic chain.

The left image, however, promotes a misconception regarding the interconnectedness of organisms in a food chain, emphasising that each organism relies on another for energy. It visually suggests that the transfer of energy (nutrition) from one level to another is linear.

The image on the right presents a circular approximation and invites us to think about how multiple food chains can overlap and form complex relationships among organisms. Ecosystems are more complex than just one line. That's where food webs come in. Food webs are like a big tangle of food chains. They show how different plants and animals are connected because sometimes one animal can eat more than one thing, and some animals can be eaten by many others. It's like a big puzzle of who eats who and who depends on who. It's a bit like a big team where everyone has a role to play. Just like a team needs all its players, an ecosystem needs all its plants and animals to stay healthy and work together

If we focus on the food chains when people are involved, both as consumers and as participants in the production and distribution of food, we must add the impact of human activities, such as habitat destruction and pollution, and think about how those can disrupt these ecological relationships and have far-reaching consequences on food chains and webs. For instance: What happens to a food chain or food web when humans overfish or overhunt certain species? How does the use of pesticides or fertilisers in agriculture affect the relationships between organisms in a food chain?

LESSON 7 TEACHER'S NOTES

TEACHER'S NOTES: LINEAR VS. CIRCULAR FOOD SYSTEMS

Let’s analyse this picture. It describes how energy flows through different organisms in a usual “forest/wild” ecosystem, producers (plants) who convert sunlight into food through photosynthesis. It then moves on to consumers, which can be divided into primary consumers (herbivores) that eat plants, secondary consumers (carnivores) that eat herbivores, and tertiary consumers (top predators) that eat other carnivores. At the very bottom, you have decomposers, such as fungi and bacteria, which break down dead organisms and return nutrients to the soil and play a very important role in the trophic chain.

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If we focus on the food chains when people are involved, both as consumers and as participants in the production and distribution of food, we must add the impact of human activities, such as habitat destruction and pollution, and think about how those can disrupt these ecological relationships and have far-reaching consequences on food chains and webs. For instance: What happens to a food chain or food web when humans overfish or overhunt certain species? How does the use of pesticides or fertilisers in agriculture affect the relationships between organisms in a food chain?