Sustainability: Food

Curriculum: Sustainability KA2a – Definitions

Key terms

Food miles – The distance food travels from the time of its production until it reaches the consumer

Carbon footprint – The mass of carbon dioxide emitted by any specific activity

Carbon neutral – No net release of carbon dioxide into the atmosphere

Carbon offsetting – Compensating for emissions of carbon dioxide into the atmosphere with an equivalent reduction in carbon dioxide emissions elsewhere.

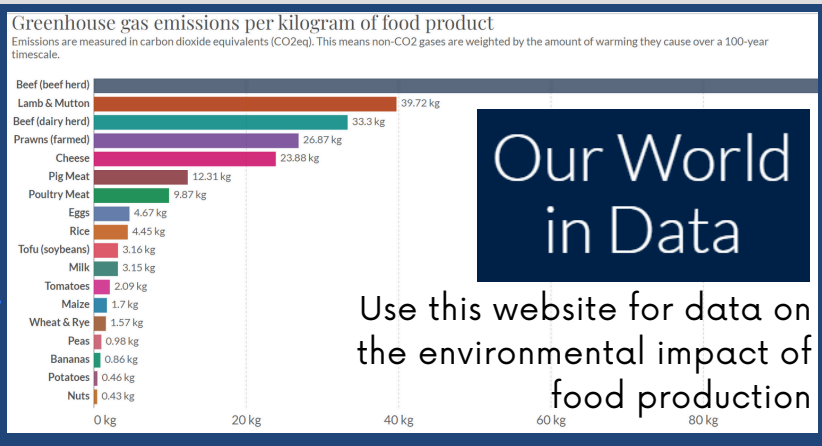
Curriculum: Sustainability KA2b – Impacts (social, economic, environmental) of an increasing global population on food supplies

BBC Bitesize

The global human population is increasing and this will have an impact on food, water and energy supplies. Use this website to get to grips with the impact of population growth on food security. Apply your knowledge of biology to suggest ways to optimise agriculture production.

worldometer

Use this website to check the global human population.



Our World in Data

Use this website for data on the environmental impact of food production

Curriculum: Sustainability KA2c - Strategies in farming for a secure food supply.

Government Office for Science

The Future of Food and Farming:
Challenges and choices for global sustainability

Task: The Future of Food and Farming

This government document outlines the challenges and choices that must be made between now and 2050 to respond to the global human population and its impact on food security. Divide into five groups and summarise Challenges A-E. What can individuals do? What can societies do? The executive summary (pages 9-33) provide sufficient detail for this task.

STEM LEARNING

Task: GM crops as a path to food security

Use this pack of resources to explore the potential role of gene technology in global food security. Work in groups to debate the introduction of GM cotton (fast growing, pest-resistant) for a developing country. In your group, you will represent a specific perspective.

Perspectives include:

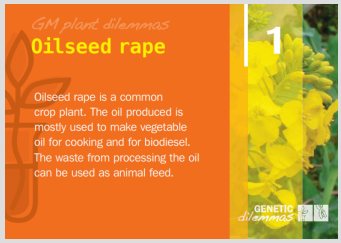
- local farmers
- research scientists
- large agrochemical company
- government and regulators
- environmental campaigners
- cotton merchants

Research their specific concerns and compose a debate response.

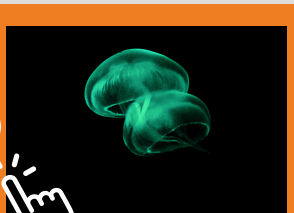
Watch this video about genetic modification.

sserc

SSERC has a discussion pack on the "Genetic modification of plants". To access all the materials for this, click here.



SSERC has developed this experiment to learn about genetic modification - a jellyfish gene encoding green fluorescent protein (GFP) is transferred into a bacterium, resulting in bacterial cells that glow brightly under UV light.



Task: My Food, Our World

SEFARI have launched an interactive tour called "My Food, Our World". Visit the various sites around the map and learn about how scientists in Scottish institutes are using innovative techniques to develop healthier foods.

SEFARI

Following the tour, note down the ways in which researchers are ensuring a safe, healthy and sustainable food supply.

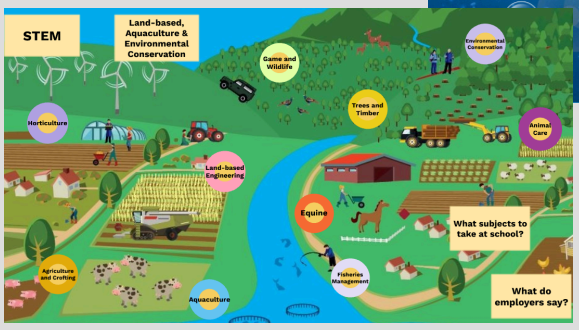
Task: The Future of Farming

Watch this video about the use of technology in farming, now and in the future. Note down the different types of technology mentioned and the roles they will have. Choose your top 5 strategies. Consider the impact some of these technologies will also have on animal health. Discuss the impact of these approaches to the global food supply.

Future farms infographic

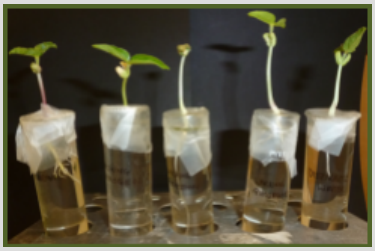
Task: Land-based, aquaculture and environmental STEM futures

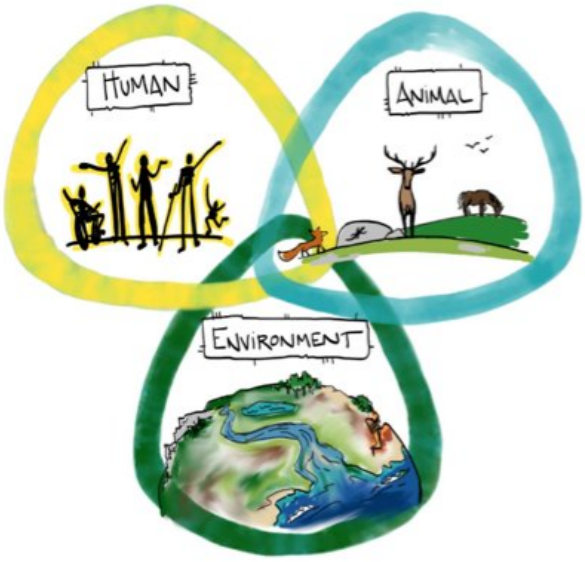
Use these interactive maps to learn about STEM careers in these areas. Video profiles give a great insight into the work done across Scotland to support a productive and healthy food supply.



sserc

SSERC has developed practical activities for fertiliser design and exploring the environmental impact of fertilisers. Click here to access and download these resources.





Task: One Health - a global approach to Food Security

Moredun is a research institute in Edinburgh, recognised across the world for its work into infectious diseases of lifestock. Use the information in the powerpoint to find out what "**One Health**" means. Can you explain how preventing infectious disease in lifestock is linked to global food security?

Task: Seaweed as a natural fertiliser

Fertilisers are used to increase crop yields but can have negative environmental impacts - read about this here. Seaweed is making the headlines in Scotland. Have a read about it here and continue your own research to note down the uses of seaweed and the advantages it presents in contrast to traditional agrochemicals. Could you picture yourself in a Blue Economy career?

SAMS Scottish Association for Marine Science


image: bbc.co.uk

"Sustainable development is the pathway to the future we want for all. It offers a framework to generate economic growth, achieve social justice, exercise environmental stewardship and strengthen governance."

Ban-Ki Moon, Former UN Secretary General, Address to G20 Summit 2013

Task: Red Meat - Sustainability & Environment

Climate change & sustainability are critical issues for Scottish farmers. But red meat production gets a bad press, linked to greenhouse gas production. What are Scottish farms doing to make their work more sustainable? What challenges can you see for farmers? Can you develop a new STEM solution to help farms lower their carbon footprint (task)?
Use these materials to help answer these questions.

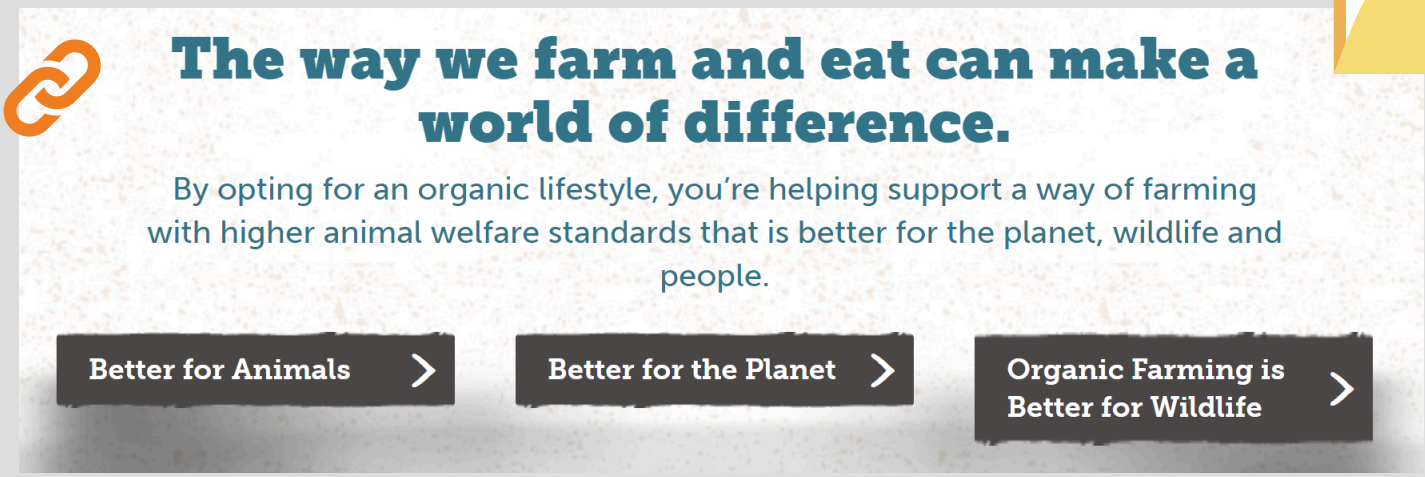
QUIZ! PLAY

Curriculum: Sustainability KA2d – Organic farming, including advantages and disadvantages.

Task: Organic Farming

As the general public respond to concerns around climate change and loss of biodiversity, there is growing interest in ethical and sustainable food production that minimises food miles and carbon footprint. The organic farming market is growing, serving a key role in sustainable food production, legally defined and quality assured.

It is claimed that organic farming is "better for animals", "better for the planet" and "better for wildlife". What is the evidence of this? What are the challenges of converting to organic farming?



Curriculum: KA2ef – Strategies in marine systems for a secure food supply; fish conservation approaches

Task: Managing fishing practices

Fish are important economically and culturally across the world. But, crucially, are vital for the overall health of marine ecosystems. Unsustainable fishing practices have depleted approximately 90% of large predatory fish, including tuna. While intensive fishing practices (trawling and dredging) ensure a good supply of food, it has been at enormous environmental cost and is unsustainable.

Explore the ecosystem impacts of unsustainable fishing using this resource from the Marine Conservation Society. **Identify** steps that can be taken to manage fishing practices to reduce these negative impacts and **explain** what makes seafood sustainable.

The PPT and Lesson Plan will look at aquaculture and you should explore the ecosystem impacts of this.

PPT

Lesson

Task: Exploring STEM careers

Aquaculture describes the farming of freshwater and marine plants and animals, including salmon, sea bass, oysters and seaweed. This is a growing STEM industry in Scotland; according to Lantra, "the industry is currently worth more than £620 million to the UK's GDP". Find out more from the Lantra website.

Working outdoors

developing new skills

innovative

keeping up with the latest science and technology

fast-paced

STEM AMBASSADOR HUB

STEM AMBASSADORS IN SCOTLAND

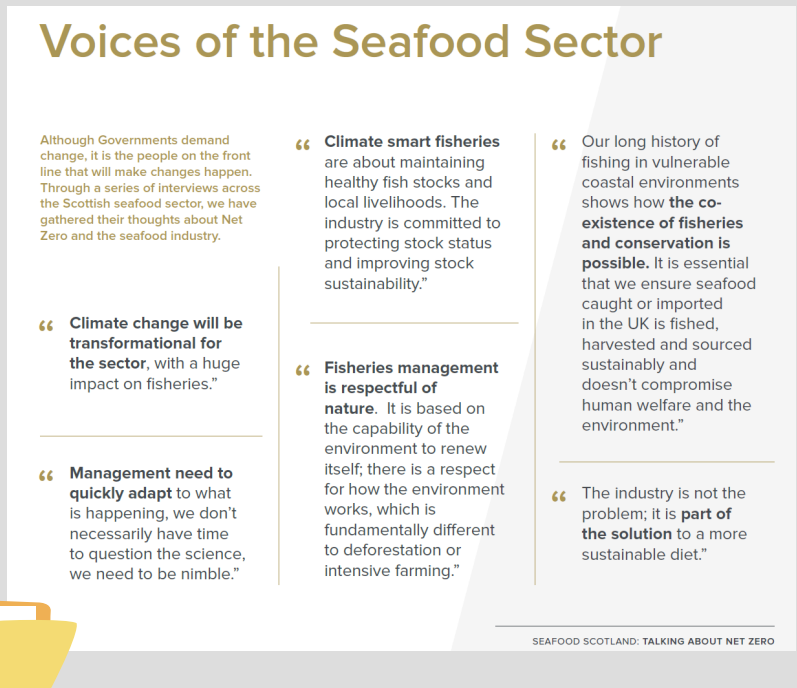
Task: Exploring STEM careers

Check out the STEM Ambassadors in Scotland Hub for the latest Spotlights on Aquaculture careers. Check here to explore.

Task: Seafood Scotland - Talking about Net Zero

Net zero targets set by Government reflects climate change and the need to adopt sustainable working practices. But this presents environmental, social and economic challenges for industries. This resource, from Seafood Scotland, presents sustainability strategies that bridge the key areas of Unit 3.

1. Choose one **case study** (from page 5-11) and report the strategies they have adopted to meet Net Zero targets.
2. How can the seafood industry **reduce carbon emissions**? (see page 12).
3. Use the information on page 13 to highlight the challenges facing the industry regarding "**food miles**" and potential solutions to minimise their impact on climate change.



Voices of the Seafood Sector

Although Governments demand change, it is the people on the front line that will make changes happen. Through a series of interviews across the Scottish seafood sector, we have gathered their thoughts about Net Zero and the seafood industry.

"**Climate change will be transformational for the sector**, with a huge impact on fisheries."

"**Management need to quickly adapt** to what is happening, we don't necessarily have time to question the science, we need to be nimble."

"**Climate smart fisheries** are about maintaining healthy fish stocks and local livelihoods. The industry is committed to protecting stock status and improving stock sustainability."

"**Fisheries management is respectful of nature**. It is based on the capability of the environment to renew itself; there is a respect for how the environment works, which is fundamentally different to deforestation or intensive farming."

"Our long history of fishing in vulnerable coastal environments shows how **the co-existence of fisheries and conservation is possible.** It is essential that we ensure seafood caught or imported in the UK is fished, harvested and sourced sustainably and doesn't compromise human welfare and the environment."

"The industry is not the problem; it is **part of the solution** to a more sustainable diet."

SEAFOOD SCOTLAND: TALKING ABOUT NET ZERO

GREENPEACE

Task: What's on your plate?

"Tuna" covers a family of species, including the five detailed in this article. The article explains a number of different fishing methods and the impacts these can have on fish and other organisms (including birds, reptiles and amphibians).

TOP TIP choose pole & line or 'trolled' albacore, from the Pacific.

Critically endangered bluefin tuna is seen being traded on the dock at the port of Kesen-numa City, Miyagi Prefecture, North East Japan.

Use the information in this article to:

1. List the 5 tuna species mentioned, providing details on their relative population sizes. This may require further research.
2. Outline the fishing methods that have negative impacts on marine ecosystems.
3. Identify the sustainable fishing methods suggested in the article.

Curriculum: Sustainability KA2g - Environmental impact of food distribution: food miles, carbon footprint, carbon neutral, carbon offsetting.

UNIVERSITY OF ABERDEEN
The Rowett Institute

Task: Hemp for the future

Plants provide humans with many useful products but, in doing so, can have wider environmental and economic impacts.

Hemp is resistant to climate fluctuations and is described as a "carbon neutral, zero-waste crop". Use this resource to discover the main uses of hemp: energy, materials and healthy food.

Can you explore any further uses of this crop, e.g. in the development personal care products?

The plant world has even revolutionised the world of Formula 1 motor racing. Listen to this podcast and learn more. Could you suggest a use for hemp in this setting?

Task: Number Muncher Diets

Use this mathematical method to create a "weekly shopping list" based on nutritional guidelines, costs, environmental impact and personal food preferences. Find out the greenhouse gas cost of your meals. Explore the resource to identify small changes you could make to your diet to improve its nutritional balance while decreasing its environmental impact.

Task: Food distribution has an environmental impact. Food miles explores how far your food has travelled to get to your plate. It can be used to estimate the pollution it has caused. Look at your food packaging to determine where your food item was produced and then use this **food miles** calculator to calculate the food miles associated with it.

In the "**Egg Miles**" tab, add the unique code printed on your eggs to determine where they came from.

For more info, check out ETA Food Miles.

Curriculum: Sustainability KA2 - General resources .

- FDF Scotland have a Wakelet of suitable resources relevant to food and sustainability education.
- FDF Scotland have a series of webinars relating to environmental sustainability and food waste.
- FDF Scotland have published podcasts and documents, and run a series of online training events - accessible here.