

Farming and the Environment Assembly

These notes run alongside the PowerPoint presentation. They provide additional information (if required) and suggestions for interaction:

Slide 2: Where does your food come from?

Give the children a minute to discuss the question of where their food comes from. Do they mainly name supermarkets?

How does it get there?

Where does the food that arrives in our shops come from before it reaches the shelves?

Explain that the ingredients that make our food have to be grown or raised (in the case of animals) on farms and plantations.

Slide 3: History - foraging

Before the development of agriculture (farming animals and growing crops to eat), humans mainly obtained their food through hunting, fishing, and gathering. Hunting involved killing and eating animals for their meat, while fishing involved catching and consuming fish and shellfish. Gathering involved collecting plants, berries, nuts, roots and seeds from the environment.

This way of obtaining food is known as a hunter-gatherer lifestyle, and it was the dominant mode of survival for most of human history. Hunter-gatherer societies were typically small and highly mobile groups, as they had to follow the movements of the animals they hunted and the availability of other food sources.

Slide 4: Early settlements and staying in one place

Agriculture, the practice of cultivating crops and raising animals for food, is believed to have developed independently in different parts of the world around 12,000 years ago. Agriculture allowed humans to produce their own food and settle in one place, leading to the development of larger and more complex societies. Today, agriculture is the primary way that humans obtain their food, although hunting and gathering still play a role in some societies.

Farming first developed in the UK between around 5000 and 4500 BC, around a thousand years later than in much of the rest of Europe. This period saw the transition from a hunter-gatherer lifestyle to a more settled way of life, marking the beginning of the Neolithic period in the UK.

During this time, the first farming communities began to grow crops and raise animals, including sheep, goats, pigs, and cattle. They also began to use tools made of bronze and iron, which allowed them to more effectively clear land and cultivate crops.

Slide 5: How much of the UK is now farmland?

Over time, agriculture in the UK became more sophisticated, with the development of new techniques and technologies.

In 2021 there were 216,000 farm holdings in the UK. These cover 17.2 million hectares (172,000 square kilometres) - around 70% of the total land in the UK. This includes land used for growing crops, raising livestock, and other agricultural activities.

The UK is known for its production of cereals, oilseeds, livestock, dairy products, and even flowers. In 2021, agriculture contributed around 0.5% to the UK's economy.

Slide 6: Imports from across the world

The UK imports around 46% of its food from all around the world. Many of the foods we eat each day are grown far away, perhaps in countries with a warmer climate. The weather in the UK is too cold to grow foods such as bananas, coffee beans, or the cacao plant that is used to make chocolate!

Not only does farming itself have a big impact on the environment, moving food and ingredients around the world has a big effect in terms of the carbon emitted by all the vehicles carrying our products to the places we buy them from.

You can find out more about this in our assembly and lesson plans about food miles.

Slide 7: How does farming our food affect the environment?

Ask the children to consider any harm that might come to the environment as a result of farming the food we eat. They might be familiar with some campaigns, such as the recent ones against palm oil.

Slide 8: Farming uses a lot of water

Watering crops is known as 'irrigation'. Farming uses a LOT of water: over two thirds (around 71%) of the world's freshwater usage each year is for agriculture. It's not just watering the plants that uses up water. All the farm animals need to drink. In a hot country, one cow can require about 100 litres of water per day. When you consider that there are over 264 million dairy cows being farmed worldwide, you can work out that's a massive amount of water. Many people around the world don't have access to clean drinking water, so thinking up ways to use water more effectively in farming is very important.

Slide 9: Deforestation and habitat destruction

One of the major environmental impacts of farming is through deforestation and other habitat destruction. The demand for ever more crops for animals and people to eat leads to natural habitats such as forests, grasslands and wetlands being destroyed and turned into farms. In South America, huge swathes of rainforest and dry forest are being cut down to make way for plantations of soybeans and for cattle ranches.

This process, known as habitat conversion, results in a huge loss of biodiversity and the displacement of wildlife.

Deforestation also leads to still more carbon emissions when the destruction of trees results in the release of carbon stored inside them into the atmosphere.

Slide 10: Farming produces a LOT of greenhouse gases

Greenhouse gases, such as carbon dioxide, methane, and nitrous oxide, trap heat in the Earth's atmosphere and contribute to climate change. Agriculture and farming practices can contribute to greenhouse gas emissions in several ways. One way is through the production of methane, during the digestive process of cows and other ruminant animals. These animals produce a lot of methane when they burp and fart! Methane is also

produced when organic matter, such as manure, decomposes in the absence of oxygen, a process known as anaerobic digestion. This process can actually be used to generate power, when waste is used as a biofuel, but if badly managed, the gases just leak into the atmosphere.

Slide 11 Emissions from Fertilisers

In addition to methane, the use of synthetic nitrogen fertilisers in agriculture can also contribute to greenhouse gas emissions. The production of synthetic nitrogen fertilisers requires energy, and the nitrogen itself can be converted into nitrous oxide, another potent greenhouse gas, through a process called nitrification.

Slide 12: Emissions from factories and transport

Processing and packing the food we eat is often done in enormous factories that use a lot of electricity to run all their lights, heating and machinery. This power is often generated by burning fossil fuels that give off carbon dioxide emissions, leading to more global warming. The transportation of agricultural products, such as food and animal feed can also contribute to greenhouse gas emissions through the burning of fossil fuels (petrol or diesel) to power the vehicles.

Slide 13: Soil erosion and health

In order to grow healthy plants, it's important to have healthy topsoil to plant the seeds in. When soil is **eroded**, it means that the topsoil has been worn away, maybe by being washed away by rain, or blown by wind.

Depending on the techniques used, farming can have both positive and negative impacts on soil erosion and degradation. On the one hand, farming can help to prevent soil erosion by keeping the soil covered with crops or vegetation, which helps to protect it from the effects of wind and water. Farming can also help to improve the quality of the soil by adding organic matter, such as compost.

On the other hand, farming can also contribute to soil erosion if the land is not managed properly. Erosion can occur when the soil is not protected from the effects of wind and water, and it can be made worse by factors such as overgrazing and the use of heavy machinery such as ploughs.

Soil degradation, which refers to the decline in soil quality, can also be caused by farming practices. The use of pesticides and fertilisers can lead to the contamination of the soil, while overuse of the land can lead to soil

getting compacted ((squashed down too firmly) which makes it less good for growing crops in and more susceptible to flooding.

Slide 14: Intensive farming: monocultures

Demand for lots of a particular food type (either for humans or animals to eat) can lead to monoculture farming. This is the practice of growing a single crop over a large area, rather than growing a variety of crops. This practice can have several negative impacts on the environment:

- Pest and disease outbreaks - When a single type of crop is grown over a large area, it can be more susceptible to pest and disease outbreaks. This can lead to the need for increased use of pesticides and other chemicals, which can themselves have negative environmental impacts.
- Soil degradation - Monoculture farming can lead to soil degradation due to the repeated planting of the same crop year after year. This can lead to a decline in soil fertility and an increase in soil erosion.
- Biodiversity loss: - Monoculture farming can also lead to a loss of biodiversity (the range of plants and animals that live in a given place), as it typically involves the removal of natural vegetation and the planting of a single type of crop. This can have negative impacts on the ecosystem, as it can reduce the habitat available for wildlife and other species.

Slide 15: Intensive farming: animals

Intensive farming of animals, also known as factory farming, can have a number of negative impacts on the environment as well as on animal welfare.

- Animal waste produced in factory farms can contain high levels of nutrients, such as nitrogen and phosphorus, which can lead to water pollution if not properly managed.
- Factory farms can also contribute to air pollution through the emission of gases such as methane and ammonia from all the animal waste. These emissions can have negative impacts on air quality and human health. Methane is also a potent greenhouse gas which contributes to global warming.
- Animals that are farmed in captivity are also more likely to need antibiotics than animals that live in the wild. This is because animals in captivity may be more susceptible to infections and diseases due to their close proximity to one another and the potential for overcrowding. Overuse of antibiotics is known to lead to antibiotic

resistance, when important medicines stop working and diseases can no longer be treated successfully with them.

Slide 16: Water pollution

Farming also has a significant impact on water pollution. The use of chemicals such as pesticides and herbicides in farming can result in 'runoff' entering nearby water bodies, contaminating them with these toxic substances.

Excess nutrients from fertilisers applied to crops can also wash into nearby water bodies, causing excessive algae growth and leading to oxygen depletion in the water. This can harm aquatic life and lead to the formation of "dead zones" in the water body.

Slide 17: Effects of climate change on crops - drought

The unpredictable and extreme weather events caused by climate change, such as droughts and floods can cause havoc for farmers.

In Australia, a heatwave in 2019 caused some farmers to lose their avocado crops. Avocado trees need a certain amount of water and the heatwave made it hard for the trees to get enough water. As a result, some of the avocado trees dried out and the fruit did not grow properly. This was a big problem for the farmers because avocados are a popular and valuable crop in Australia. The heatwave also affected other crops, such as grapes and almonds, making it difficult for farmers to produce a good harvest.

In Kenya, a long drought in 2017 affected many farmers and their crops. The drought also made it hard for farmers to feed their livestock, which can be a major source of income for many families. This had a serious impact on people's livelihoods.

Slide 18: Effects of climate change on crops - flooding

In Bangladesh, heavy monsoon rains in 2019 caused widespread flooding that affected many farmers and their crops. The floods inundated fields of rice, the country's main staple crop, washing away seed beds and causing the plants to drown and rot. The floods also destroyed infrastructure, such as roads and bridges, which made it difficult for farmers to transport their crops to market. In 2022, further flash floods wiped out crops again. 80,000 farmers from the district of Kurigram in North Bangladesh lost their crops when the Brahmaputra River overflowed.

Slide 19: People don't have enough to eat

There are over 8 billion people living on planet Earth at the moment, and by 2050, there will be around another 2 billion more. Some people live well and have access to more food than they can eat, but according to the 2022 edition of *The State of Food Security and Nutrition in the World* report from the United Nations, as many as 828 million people faced hunger in 2021, an increase of 46 million people since the previous year.

As people grow more wealthy, the demand for meat rises - and with it, the pressure on land resources grows. With our current food systems unable to support even the people already in existence, it's clear that the future will need both fairer distribution of resources and ways to feed everyone that don't also have increasingly harmful effects on our already struggling planet.

Slide 20: Future solutions - organic farming

There are a number of potential solutions that could help reduce the environmental impact of farming in the future. For example, organic farming focuses on using natural fertilisers, such as compost, and minimising the use of chemical pesticides and herbicides. This can help reduce the risk of soil pollution from these substances.

Pesticides can be reduced by adding natural predators to the fields that eat pests but not crops, and also by growing a wider range of plants that aren't all likely to be attractive to the same pests. This variety is also better for soil health (and our diet!)

Slide 21: Future solutions - Carbon Farming

Another set of sustainable practices that shows great potential for mitigating and even helping to reverse the effects of climate change is known as 'carbon farming'. Through photosynthesis, plants act as carbon sinks - drawing carbon dioxide (CO₂) out of the atmosphere and locking about 40% of that carbon away in the soil. There, it feeds tiny microorganisms like bacteria, fungi, and nematode worms. Those creatures, in return, give nutrients to the plants, providing a natural fertiliser.

Farms can help this process of carbon sequestration by increasing plant matter in the soil using compost and by planting cover crops (plants that

keep a layer of growth on fields in between the normal crop growing season, such as clover or other wild flowers)

They can also avoid damaging the soil by using reduced or no-till cultivation that avoids the deep ploughing that can damage the topsoil.

Slide 22: Future solutions - Hydroponic techniques

Hydroponics is a method of growing plants using nutrient-rich water rather than soil. Plants grown in hydroponic systems can be carefully controlled and supplied with optimal nutrients and growing conditions, so they may be able to produce higher yields compared to traditional soil-based farming. The controlled environment can also make plants less vulnerable to pests, requiring less use of pesticides.

Hydroponics systems can also be designed to be more water efficient than traditional agriculture, as the water used in the system can be recycled and reused. This can be especially useful in areas with water shortages or where irrigation (watering the fields) is a significant source of water pollution.

The systems can be set up in a variety of locations, including urban areas, which could make it easier to grow food in cities and reduce the need for transportation of produce.

This method can be especially useful if combined with the use of solar power for energy production, so some hydroponic farms are being developed in desert locations where it is sunny and there isn't access to water for watering the fields.

Slide 23: Think about what you eat and where it comes from

By choosing to purchase products from farmers who use sustainable practices, such as organic farming, people can support a wider adoption of these practices and help reduce the environmental impact of farming. It is also a great idea to try to buy food that has been grown locally, to reduce the number of miles that it has to travel to reach your plate (remember the emissions from all those vehicles that move the food around!)

It can be expensive to make these sorts of shopping choices though, and that isn't easy for everyone.

Slide 24: Minimise food waste

One of the most helpful things you can do on a daily basis to reduce some of the harms caused by farming is to reduce the amount of food you buy and just throw away. Food waste is a significant contributor to environmental problems such as greenhouse gas emissions, water pollution, and habitat destruction. All the food you waste still has to be grown, watered and transported. By buying too much and not eating it all, this energy use counts for nothing. Rotting food in landfill sites also creates more greenhouse gas emissions. If you do need to get rid of uneaten food and scraps, the best thing you can do is to compost them or use a food waste caddy.

Slide 25: Pause for thought

Invite the children to think about the impact that farming has on their lives and also on the environment.

"My grandfather used to say that once in your life you need a doctor, a lawyer, a policeman, and a preacher. But every day, three times a day, you need a farmer."

Brenda Schoepp

"A sustainable agriculture is one which depletes neither the people, nor the land"

Wendell Berry