

Food and the Environment – Thinking About Food

Think of something you have eaten this week that would not have been available to Scottish people in the past. Why is it available to you now? Changes in technology, trade, and wealth have contributed to changes for Scotland in:

- 1. the range of foods available to us,**
- 2. the way some of our food is produced,**
- 3. the volume of food waste we produce and**
- 4. the values that we attach to food.**

Global consumption of food, water and energy are rising and it is predicted that food production will have to increase by [70% by 2050](#) to feed the world's population. Producing sufficient food is not the whole story though. We need to produce food in a sustainable way that reduces dependence on finite resources and does not degrade the environment or reduce its productive capacity. This includes reducing the [contribution of food production to climate change](#) while already having to adapt production to the effects of climate change here in Scotland and around the world.



Unequal access to food and the means to produce it are also part of the picture. In the world today there are 1 billion people who are [hungry](#) and another 1 billion who are [obese](#). Food production has to make economic sense. Taxation, quotas and Government standards can be useful tools in supporting our food industry to produce safe, nutritious, affordable, sustainable food. As consumers, we can seek to satisfy our values and moral preferences, as well as our favourite tastes, with every purchase. As learners we can re-disc over our own local foods, develop food growing and cooking skills, and investigate the story of the food on our plate.



1. The Range of Foods Available

Although there are 50,000 edible plant species around the world, just 3 crops, (rice, wheat and maize) provide [60% of global food](#). A further 12 crops provide another 30%. How many different foods have you eaten this week? Economic, social and environmental factors will affect what food is available to you wherever you are in the world.

In Scotland, we can choose to eat fresh foods sourced locally or from around the world, or preserved by freezing, canning, or drying. We can eat foods processed into ready meals or entirely new products and packaged in complex materials. Our diets might contain meat, dairy products, seafood, fruits, nuts, seeds, fungi, vegetables and fruits.



Even within a single item there can be a range of choice. Apples can be sold loose, in bags or in trays; grown in New Zealand, the EU, the USA; heritage, organic, cooking, dessert, Braeburn, Cox's or Bramley varieties to name a few. How do you know which apples are more environmentally friendly? In general, local, fresh, seasonal foods with less packaging are lighter on the environment as they should have required less fossil fuel to reach your plate.

Food Miles

Make a quick mental list of your favourite foods and drinks. Are bananas on the list? Chocolate? Tea? Coffee? These crops require climate conditions very different to those found naturally here in Scotland. We import such exotic foods from around the world, but we also import foods that could be easily grown in Scotland.



Globalisation of food networks means that some foods travel many miles, through different countries for processing and packaging before arriving at their country of sale. Longer journeys may require more packaging, preservatives, and refrigeration than shorter food journeys. This would increase the energy inputs and associated CO2 emissions. Over the same distance, the



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ranking of emissions from different modes of transport from highest to lowest will be air freight, rail freight, road freight, and by sea.

Remember that CO₂ emissions from produce grown abroad in natural heat and light may be lower than emissions from the same product grown locally under artificially created conditions for growth. Although the mode of transport may not be stated, food labelling can identify the country of origin of raw foods. Buying direct from grower at a market or farm shop can avoid the extra food miles of supermarket distribution networks. The assurance mark from Quality Meat Scotland allows full traceability of the meat and also certifies standards of animal husbandry. Some food imports serve a demand for out-of-season availability.



Seasonality

Different crops are ready for harvest at different times of the year in Scotland. Some crops have different varieties that can be harvested at different times (e.g. early, and main crop potatoes, and summer and autumn fruiting raspberries). Fish migrations and natural animal life cycles mean that meat and fish are also seasonal foods. Modern technology and abundant, inexpensive fuels allow us to grow crops outside of their natural season and to store them well beyond that season. When would you eat your first fresh strawberry of the year? June? January? Fresh foods consumed within their season of harvest, are likely to be produced with fewer human inputs of heat, light and plastic sheeting etc. (and therefore are less polluting and more sustainable).

Produce bought in season is likely to be at its freshest, and seasonal abundance can



reduce the price, too. Foods available only at particular times of year may be eagerly anticipated and savoured with particular delight. Surveys cited by the Food Ethics Council have, however, shown that young people have little awareness about what foods are in season when, or what foods can be grown in the UK.

Processing

Chilled 'ready meals' and 'fast foods' can be very convenient, but they require a high degree of food processing. Food processing uses energy and creates food wastes and effluents. It may involve washing raw foods, treating them with preservatives, preparing them for cooking, different cooking methods, or transforming raw foods into new products. Have a look in the supermarket at how many food products there are made from potatoes. How many of these are processed, packaged or chilled? While some of these processes are desirable for extending the life of food products e.g. tinned or frozen fish, highly processed foods use fossil fuel for each stage of their production. As you know, fossil fuels are finite and contribute to climate change. Fossil fuels are also used in plastics for food packaging, most of which is not reusable.

2. The Way our Food is Grown and Harvested

The range of foods available to us has changed over the years and there have also been changes to the way that some of our food is produced. Here in Scotland, we still see cows and crops in fields and sheep on the hills, but not all our food is produced in Scotland or in the style depicted in many children's books.

Since WW2, technical advances in mechanisation, increased chemical inputs and development of plant and animal varieties have increased yields per unit of land for cereal crops in the UK. There are new styles of intensive 'factory farms' that concentrate more animals into production units. Some nations are converting native habitat e.g. forests into land for food production at an unprecedented rate. New technology like GPS and sonar has increased the efficiency of fishing fleets in detecting and catching target species. Alongside the benefits of abundant, affordable food, there are negative impacts on the environment from some of these changes.

Remember that food production happens within different political systems and a global market with powerful multinational companies. Fishermen and farmers may be constrained by finances, and legislation as well as variation in climate and local conditions. What do you know about supermarkets and their relationship to food producers?



Effects on Biodiversity

Conversion of native vegetation into land for crop production is a major cause of habitat loss. Loss of habitat has severe impacts on associated biodiversity. Palm oil plantations are a significant factor in recent dramatic orangutan population decline in Indonesia. Deforestation in the Amazon, driven by global trade in beef and soybeans, has reduced and fragmented the habitat available for rainforest species. Species decline puts further pressure on ecosystems through disruption of the food chain.

Fragmentation of habitat over large areas means that some species lose migration routes, feeding, and breeding patterns. Certification marks such as the Rainforest Alliance help to indicate environmentally sustainable products. (Photo credit Marco Schmidt 2007 Permission cc-by-sa-2.5)



Marine species populations have suffered dramatic declines. In 1992, the cod fishery in Grand Banks, Newfoundland collapsed with huge social cost to the local community and economy. Changes to fisheries management, restrictions such as catch quotas and certification of sustainably sourced fish are part of current efforts to improve fishing practices around the world. International competition for scarce fish stocks remains a threat to fish populations and their ecosystems.

Hedgerow loss in the UK has been linked to farmland bird species declining by over 50% between 1970 and 2006. There is also concern in the UK and around the world about recent severe declines in honeybee populations as we rely on bees to pollinate a third of our crops. Research is underway to investigate links between declining bee populations and exposure to agro-chemicals.

Soil degradation

Most food crops depend on fertile soils for healthy growth. Without healthy soil we would soon be hungry. Loss of soil fertility can be caused by chemical pollution, loss of organic matter and biodiversity, loss of structure and physical erosion. Overgrazing and agricultural mismanagement are named as major causes of soil



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degradation around the world. In Scotland, projected impacts of climate change may accelerate erosion of peat lands. Scottish agricultural soils and biodiversity are offered protection by farmers through a range of agri-environment schemes.

We know the story of the American dustbowl, and that wind and water are the main agents of soil erosion. Current deforestation in tropical regions, where trees are cleared for crop production, e.g. palm oil or soybeans, exposes the soil to erosion. The high soil temperatures there can reduce the ability of soil to absorb water and therefore increases vulnerability to desertification. The loss of soils and their capacity to absorb rainfall can also increase vulnerability to flooding. Where soil is eroded and unproductive, that land is likely to be abandoned and further areas of forest cleared.

Water resources

Access to water for crops is uneven across the world. Some places receive more rain than others and different crops can be grown to suit local conditions. We use water for growing crops, and for cooking raw ingredients. Access to water is sometimes a political or economic issue and disputes over access to water resources have already arisen. Some such disputes can be between local villagers and powerful multinational food companies and have both local and global perspectives.

As water flows over farmland, soil and agro-chemicals can be washed into water courses. Run-off or leaching of pesticides and fertilisers can cause water pollution. Damage to aquatic ecosystems through eutrophication, which reduces available oxygen in the water, can be caused by fertiliser run-off. Severe eutrophication can cause anaerobic 'dead zones', adversely affect the water quality, and render it unfit for consumption. High levels of nitrogen from fertilisers leached into groundwater can also be harmful to human health. SEPA is the regulating body for water quality in Scotland and they monitor pollutant levels in Scottish waters.

Crops may be rainfed, or watered by irrigation. Rainfed crops are dependent on patterns of rainfall, which some Scottish farmers say are changing. Poor irrigation management, or other changes to local water sources, can damage soil fertility. Fields in Egypt beside the River Nile became saline and unproductive after the Aswan Dam was built in 1970.

3. The Volume of Food Waste

Food wastes can include edible and non-edible, avoidable and unavoidable categories. Avoidable waste of edible foods also wastes the associated inputs of packaging and energy needed to grow, process and transport them.

Unavoidable wastes

These include the inedible parts of foods such as bones, eggshells and peelings. Some food packaging waste is unavoidable although we can choose items with less packaging or in packaging that can be recycled or reused.

Avoidable, edible waste

This waste is most usually associated with food bought but not eaten before it goes off. Many people are unclear about the difference in meaning between 'Best Before' and 'Use By' dates. Promotional offers from supermarkets can tempt shoppers into buying more of a product than they will eat before it goes 'off'. In the UK, the content of our rubbish bins has seen a marked change over the past 40 years, with a massive increase in food waste from 19.5% in 1969 to 37% in 2007.



There are sources of food wastes from production, manufacturing, distribution and retail sectors, as well as from canteens and kitchens. Supermarket 'out-grades' are products that fail to meet required criteria of size and appearance. When biodegradable materials such as food waste are sent to landfill they decompose under a large pile of rubbish 'anaerobically', (without oxygen). This type of rotting releases methane instead of CO₂. Methane is 25 times more powerful than CO₂ as a greenhouse gas. If food waste were a country, it would be the [third largest](#) greenhouse gas emitting country in the world.

Some uncooked vegetable and fruit wastes can be used as ingredients to make your own compost. On a larger scale different composting systems can be used to produce compost from the whole range of biodegradable food waste, creating a valuable resource and avoiding methane emissions. The Scottish Parliament passed waste regulations in May 2012 that include a ban on biodegradable municipal waste (including food waste) going to landfill from January 2021.

Packaging

There are benefits to packaging. It can help to prolong the shelf-life of foods, protect the contents from contamination and provide useful information about the food. The energy used in the production of packaging materials has a carbon cost, and some packaging materials are not yet recyclable. New, compostable packaging materials have been developed that replace plastic wrappers. They are often printed with an explanatory logo on the material. Food packaging allows us great freedom to eat wherever and whenever we choose but packaging waste is now found almost everywhere, even in the middle of the Atlantic Ocean.

4. Food Culture and Values

When we speak about value and food, it may mean financial cost or affordability. It can also represent values that relate to ethics, religious practices, or to our daily lives and the informal food cultures we create. The impacts of our food on the natural environment mean that our food choices could also reflect values that we attach to the wider world.

Ethical foods

Global access to affordable food is very uneven. UK households in the lowest 20% income bracket typically spend 15 - 16% of household income on food and non-alcoholic drink. This percentage rises to 60% or more of household income in food-insecure developing nations. Ethical trading organisations, such as Fair Trade have arisen to address global trade inequalities and to secure better trade conditions for producers in developing countries. Alleviating poverty is often correlated with reducing local environmental damage.

Ethical decisions on diet can be related to environmental issues. Some vegetarians and vegans choose to omit meat and dairy products from their diet on the basis of the associated high inputs of energy and high outputs of greenhouse gases. Ruminant animals (sheep and cows) produce methane. However, some land in Scotland, inappropriate for arable crops, can be used to raise livestock. The method of meat production can have a bearing on its environmental costs. Extensive organic farming systems rely on livestock for a natural source of fertiliser and organic matter to replenish soil fertility. This avoidance of artificial fertiliser and stimulation of natural soil processes can avoid greenhouse gas emissions and can help to absorb carbon into the soil.



Biotechnology, including traditional crop or breeding programmes, is used in food production to modify products for particular tolerances e.g. drought or saline conditions or to increase yields. However, genetically modified organisms (GMOs) are the focus of intense debate and controversy as, among other issues, they combine genes isolated from very different species (e.g. fish and tomato) that could not naturally interbreed. The Food and Agriculture Organisation is working to unravel the issues surrounding GMOs from an ethical perspective. This includes issues of 'ownership' and control of seed varieties, food safety, environmental impact, transparency, and potential risks and benefits.

Informal food culture

What is your favourite brand of pizza? What makes it your favourite? Is it just the taste? What else could be involved? Some people have clear preferences for their burger or pizza of choice. What informs those choices may be more to do with convenience, peer pressure, or marketing than issues of price, taste or environmental sustainability. Food is certainly eaten to fuel activity, but it can also provide a central role in group cohesion.

The presence of a full range of produce all year in the supermarkets means that people can grow up without being aware of the links between place and food or seasons and food. The presence of fast foods, ready meals and processed foods means that a person can survive without knowing how to grow and cook food. The erosion of such skills and knowledge disconnects us from the natural processes that sustain us, and perpetuates a reliance on those foods with negative impacts on individual and planetary health.

Different nations have different traditional foods and eating etiquette. In some countries food is served 'buffet' style rather than on individual plates, and there are conventions that convey meaning. In Thailand, for example, finishing your food means that you are still hungry, although it is considered wasteful to leave rice on your plate. What other eating customs might be helpful at a buffet style meal? Table manners might seem old fashioned when, today, in Scotland, many meals are eaten in front of the television, and may not involve a plate or cutlery. Investment in establishing an eating etiquette could help to inspire an attitude of 'value' attached to food, and the time and energy taken to provide it.



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Think of a recent get together with friends or family celebration. Was food or drink involved? Food often forms part of our social lives, and provides a time when we speak to each other, and establish, build or maintain our relationships. Food is often a part of particular celebration days, e.g. the Christmas dinner, Easter eggs, Birthday cakes and it may form part of religious observance, sometimes via fasting or abstinence. We are becoming aware of the environmental impacts of our current food culture both locally and globally. As consumers, we can exercise the power of our purchasing decisions. As learners, we can investigate the story of the food on our plates, and begin to create a sustainable future for food and the environment.

